Record of the Year

2010-2011

An account of activities and accomplishments of the staff of The Connecticut Agricultural Experiment Station during the year, for the use and advantage of the citizens of Connecticut.

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION

Record of the Year

2010-2011

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 (on Sheldon Road). Station research is conducted by members of the following departments: Analytical Chemistry, Biochemistry and Genetics, Entomology, Forestry and Horticulture, Environmental Sciences, and Plant Pathology and Ecology. 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

A wide range of field and laboratory studies were conducted on agricultural, public health, and environmental problems. Two exotic insect pests, the brown marmorated stink bug and spotted-wing *Drosophila*, have been detected in the state. Of Asian origin, these pests threaten a wide range of fruits and vegetables. More than 326,000 mosquitoes were collected and tested for encephalitis viruses. The West Nile virus re-emerged in at least 30 towns and cities and caused illnesses in 9 persons. A fungus is being investigated as a possible control for ticks that transmit the Lyme disease agent and other pathogens. There is additional evidence that barberry growths enhance tick populations in or near forests and that there are higher numbers of ticks infected with the Lyme disease bacterium in these settings. Our crop research is making good progress. A patent application has been submitted for a new strawberry cultivar called Rubicon. Pest resistant lines of tobacco have been developed. Moreover, improvements have been made in growing grapes and vegetables. Diagnostic laboratories in the Departments of Entomology and Plant Pathology and Ecology have been busy answering public inquiries. Bed bug infestations and fungal infections of plants continue to be topics of great interest to homeowners and growers, respectively. Analytical chemists documented the presence of urea formaldehyde in building insulation material.

Improvements are being made or planned for our buildings. The Jenkins-Waggoner Laboratory is in the design phase with Flad Architects of Stamford, CT. The Bond Commission allocated $500,000 to build a field laboratory in Griswold, CT. This facility will serve growers and other state residents in eastern Connecticut. Other funds were received to correct water problems in the boiler room.

The Experiment Station's outreach programs reach millions of citizens. During this reporting period, there were 2,686,464 page views on our website. Staff members gave 1,266 talks and interviews. In addition, a 30-second video was produced to help describe the Station's research being conducted in different core areas.

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, 2011 were:

Governor Dannel P. Malloy, President
Mr. Terry Jones, Vice President
Mr. Paul Larson, Secretary
Dr. Louis A. Magnarelli, Director
Commissioner Steven K. Reviczky
Dr. Stephen L. Dellaporta
Ms. Norma O'Leary
Dr. Johan C. Varekamp

The Board of Control met on August 4, 2010, October 13, 2010, January 20, 2011, and April 20, 2011.

STATION STAFF

The Experiment Station exists to advance scientific knowledge. Those advances depend completely upon the quality and dedication of its staff. The following was the staff of The Connecticut Agricultural Experiment Station as of June 30, 2011.

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. Jason C. White, Department Head
Terri Arsenault
William A. Berger
Dr. Brian D. Eitzer
Dr. Lester Hankin, Emeritus
Dr. Walter J. Krol
Dr. MaryJane Incorvia Mattina, Emeritus
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
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
Bonnie L. Hamid
Rose Hiskes
Ira J. Kettle
Morgan F. Lowry
Dr. Chris T. Maier
Michael J. Misencik
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

ENVIRONMENTAL SCIENCES
Dr. Theodore G. Andreadis, Department Head
Dr. Phillip M. Armstrong
Angela B. Bransfield
Gregory J. Bugbee
Dr. Chia-Ying Chen
Shannon L. Finan
Dr. Melissa C. Hardstone
Dr. Mark R. June-Wells
Dr. Charisma V. Lattao
Dr. Goudarz Molaei
Kittipath Prapayotin-Riveros
Dr. Joseph J. Pignatello
John J. Shepard
Michael C. Thomas
Dr. Charles R. Vossbrinck

FORESTRY & HORTICULTURE
Dr. Jeffrey S. Ward, Department Head
Joseph P. Barsky
Joan Bravo
Dr. Martin P. N. Gent - Emeritus
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
Sandra E. Carney
Dr. Wade H. Elmer
Dr. Francis J. Ferrandino
Mary K. Inman
Dr. Yonghao Li
Dr. Robert E. Marra
Pamela Sletten
Peter W. Thiel

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, Emeritus
Diane Riddle
Dr. Hugh Smith
Michelle Salvas

PLANT SCIENCE DAY 2010

A beautiful, warm, sunny day greeted close to 1,000 visitors as they came to help the Station celebrate the 100th anniversary of Plant Science Day at Lockwood Farm.

There was very good attendance at the following **Short Talks and Demonstrations**.

Gregory J. Bugbee	Identification of Invasive Aquatic Plants
Dr. Kirby C. Stafford, III	Be Our Guest – the History of Plant Science Day
Dr. Sandra L. Anagnostakis	Chestnut Blight: A Trip Through Time
Dr. Carole A. Cheah and Dr. Todd L. Mervosh	Control Options for Invasive Plants
Dr. Jeffrey S. Ward	Our Dynamic Connecticut Forest: 80 Years of Observation

Pesticide Credits were available for interested participants. Dr. Robert Marra led a 1-hour guided tour of selected field plots. Participants were able to discuss experiments and topics with scientists at each station on the tour. Stops on the pesticide credit tour included:

Dr. Francis J. Ferrandino	Powdery Mildew on Chardonnay Winegrapes
Dr. Anuja Bharadwaj	Natural Products for the Control of the Tick (*Ixodes scapularis*)
Dr. Richard Cowles	A systemic Insecticide for Integrated Management of Armored Scales in Christmas Trees
Joseph P. Barsky	Demonstration of Japanese Barberry Control Methods

Dr. Robert E. Marra conducted a 1-hour **Guided Walking Tour**. Participants were able to discuss the experiments at the plots with the scientists conducting them. Stops on the walking tour included:

Dr. Sandra Anagnostakis	Chestnut Species and Hybrids
Dr. Abigail A. Maynard	Beach Plum, Paw-Paw, and Japanese Plum Variety Trials
Dr. William Nail	Hybrid and Vinifera Winegrape Cultivar Trials
Dr. Robert Marra	Biological Control for Bacteria Spot of Peaches
Dr. Kimberly Stoner and Dr. Brian D. Eitzer	Measuring Pesticides in Squash Pollen and Nectar

Dr. Jeffrey S. Ward conducted a guided **tour of our native shrub plantings**. Participants learned about using native shrubs for naturalistic landscapes without the use of pesticides and fertilizers.

Tours through the **Bird and Butterfly Garden** were available for visitors. Jane Canepa-Morrison demonstrated "Deadheading perennials: The Why, When, and Where". Jeffrey Fengler led a Butterfly Identification Walk through the garden.

The following **Barn Exhibits** were very popular and well attended:

100 Years of Advancement in Measurement Science Applied to Food and Environmental Safety:
Investigators: Dr. Brian D. Eitzer, Dr. Walter J. Krol, Dr. Christina S. Robb, and Dr. Jason White
Assisted by: Terri Arsenault, William A. Berger, Craig L. Musante, and John F. Ranciato

From Hybrid Corn to Sequenced Genomes: 100 Years of Plant Genetics
Investigators: Dr. Neil A. McHale, Dr. Richard B. Peterson, Dr. Neil P. Schultes, Dr. Douglas W. Dingman
Assisted by: Carol R. Clark and Regan B. Huntley

Entomology – Then and Now
Investigators: Dr. Kirby C. Stafford, III, Dr. Anuja Bharadwaj, Dr. Carole A. Cheah, Dr. Richard S. Cowles, Bonnie L. Hamid, Dr. Louis A. Magnarelli, Dr. Chris T. Maier, Dr. Gale E. Ridge, Dr. Claire E. Rutledge, Dr. Victoria L. Smith, and Dr. Kimberly A. Stoner
Assisted by: Elizabeth E. Alves, Tia M. Blevins, Jeffrey M. Fengler, Rose T. Hiskes, Ira J. Kettle, Morgan F. Lowry, Stephen J. Sandrey, Heidi R. Stuber, Peter W. Trenchard, and Tracy Zarrillo

Department of Environmental Sciences: 100 Years of Research and Service
Investigators: Dr. Theodore G. Andreadis, Dr. Philip M. Armstrong, Gregory J. Bugbee, Dr. Goudarz Molaei, Dr. Joseph J. Pignatello, and Dr. Charles R. Vossbrinck
Assisted by: Shannon L. Finan, Bonnie L. Hamid, Michael J. Misencik, Angela B. Penna, John J. Shepard, Michael C. Thomas, and Michael P. Vasil

Vegetable Research – Then and Now
Investigators: Dr. Abigail A. Maynard and Dr. David E. Hill
Assisted by: Holly Neckerman

Plant Pathology and Ecology: 100 Years of Contributions to Plant Health in Connecticut
Investigators: Dr. Sharon M. Douglas, Dr. Sandra L. Anagnostakis, Dr. Wade H. Elmer, Dr. Francis J. Ferrandino, Dr. Yonghao Li, and Dr. Robert E. Marra
Assisted by: Mary K. Inman, Pamela Sletten, and Peter W. Thiel

Children's Activities have grown into a large part of Plant Science Day. More than 350 children visited the Kids' Korner and Girl Scouts of Connecticut booths. Many participated in the "Passport for Kids" activity. Getting children interested in science and their natural surroundings is the focus of the Passport Activity.

There were **90 field plots** for visitors to go to. The plots are planted and maintained by Station scientists with the help from Farm Manager Richard Cecarelli and his staff, Rollin Hannan and Michael McHill. Together with summer helpers they prepared the farm for the hundreds of visitors to Plant Science Day at Lockwood Farm.

The Farm Crew was assisted by Maintenance staff Ron LeFrazier, Miguel Roman, Michael Scott, and Nicole Wachter, under the supervision of Bancroft Nicholson, Head of Maintenance, to put up tents, do repairs and clean the farm buildings to make Lockwood Farm beautiful for the 100th anniversary of Plant Science Day.

Under the big tent, at 11:20AM, Dr. Louis A. Magnarelli, Director, welcomed visitors to Plant Science Day 2010.

The Century Farm Award was presented to the Brown Family Farm, located in Windsor Connecticut. The presenter was Dr. John F. Anderson. The Brown family was given a citation signed by Governor M. Jodi Rell, and a bronze plaque naming the Brown Family Farm as the recipient of the 2010 Century Farm Award.

The Brown Family Farm, located in the Poquonock section of Windsor, was started in 1874 by James M. Brown. He grew Broadleaf tobacco and Havana seed and made his own cigars. In 1938, Hubbell Brown began growing Shade tobacco. The Brown family added other crops over the years including potatoes, asparagus, raspberries, and pick-your-own strawberries and peas. During the early 1960's, scenes from the movie "Parrish" were filmed on the property. Today, pumpkins are grown along with tobacco.

The Brown Family Farm is now in its fifth generation. Day-to-day operations for more than 500 acres of farmland are conducted by Stanton and Jane Brown, daughters Kathi Martin and Susan Connor, and son Kevin Brown. Numerous family members and employees over the years have contributed to the success of the business.

The Brown family is dedicated to the agricultural industry and community interests. The Browns have been members of the Connecticut Farm Bureau and served on the Farm Bureau's National Labor Board. They contribute time to the Windsor Historical Society, Connecticut Tobacco Museum, and are involved in the National Council of Agricultural Employers. Mrs. Brown was Chairperson of the local Farm Credit Association and a member of the National Co-Bank Board. The Browns also open their farm to community groups and are active in public education on agriculture.

After the Century Farm Award was presented, Dr. Magnarelli introduced Dr. Dana Royer, Assistant Scientist, Department of Earth & Environmental Sciences, Wesleyan University, who gave the Samuel W. Johnson Lecture "What Fossil Plants Can Tell Us About Climate Change". After his talk, Dr. Magnarelli presented Dr. Royer with a certificate signed by Governor M. Jodi Rell, President of the Board of Control, Paul C. Larson, Secretary of the Board of Control, and himself as the Director of the Station.

Following the Samuel W. Johnson Lecture, Dr. Magnarelli introduced Pamela Weil, President of the Experiment Station Associates, who spoke on the activities of the Associates. She invited visitors to join the Association.

The combined efforts of the entire staff – professional, technical, clerical, administrative, maintenance and farm crew - all made Plant Science Day 2010 the big success that it was.

EVENTS HELD AT THE STATION

Northeast Plant Diagnostic Network Annual Meeting

The Experiment Station hosted the 2nd Annual Meeting of the Northeast Plant Diagnostic Network (NEPDN), 23-25 February 2011, in Jones Auditorium. Dr. Sharon M. Douglas organized and hosted the event, with assistance from Mary Inman and Dr. Yonghao Li. Twenty-six plant disease diagnosticians from West Virginia to Maine were greeted by Dr. Louis A. Magnarelli, Director. Pamela Sletten, Dr. Yonghao Li, Dr. Francis Ferrandino, Dr. Wade Elmer, Dr. Victoria Smith, Dr. Neil Schultes, Dr. Douglas Dingman, Dr. Jason White, and Dr. Philip Armstrong all talked on the research programs going on in their departments at the Station. The group also visited the USDA Forest Service Quarantine Facility in Ansonia and Geremia Greenhouses in Wallingford.

On March 11, 2011, Dr. Wade H. Elmer organized a special Lunch Club Seminar about "Salt marsh change and biotic responses". Dr.Roman Zajac from The University of New Haven was the featured speaker.

EVENTS HELD AT THE VALLEY LABORATORY

Nursery and Landscape Research Tour

On September 22, 2010, 20 nursery and landscape professionals attended the Valley Laboratory's annual Nursery and Landscape Research Tour. Attendees were welcomed by Dr. James LaMondia and then toured the farm and heard presentations from staff members. Dr. James LaMondia spoke on "Foliar nematodes on ornamentals"; Thomas Rathier gave a presentation on "Container media: Water issues"; Dr. Richard Cowles spoke on "Hemlocks: Control of adelgids and scale insects"; Dr. John Ahrens gave the talk "New herbicides for field-grown conifers"; and Dr. Todd Mervosh spoke on "Mile-a-minute weed: Management option". Presentations given indoors were "CAES arthropod database online" by Dr. Hugh Smith; "Common cultural and disease problems of plants in 2009-2010" by Dr. Sharon Douglas; "*Phytophthora ramorum* and chrysanthemum white rust" by Dr. Victoria Smith, "Common arthropod problems 2009-10" and "Asian longhorned beetle update" by Rose Hiskes, and "Emerald ash borer update" by Dr. Claire Rutledge. Thomas Rathier, James Preste, and Vickie Christian helped with preparations for the meeting.

Christmas Tree Twilight Meeting 2010

The Valley Laboratory hosted the Connecticut Christmas Tree Growers Association for the annual Christmas Tree Twilight Meeting on July 20, 2010. About 60 growers attended the meeting, which was organized by Dr. Todd Mervosh. The farm tour stopped at Christmas tree experiments being conducted at the Valley Lab, as CAES scientists talked about their research and/or the latest issues regarding Christmas tree production. Presentations were the following:

"Disease management in Christmas trees" by Dr. Sharon Douglas, "Weather and cultural factors" by Thomas Rathier, "Evaluation of exotic fir species" by Dr. John Ahrens, "Management of scale insects" by Dr. Richard Cowles, and "Herbicide evaluations" by Dr. Todd Mervosh. Jim Preste and Zach Conais helped with preparations for the meeting.

EVENTS HELD AT THE GRISWOLD RESEARCH CENTER

Growing of Direct Descendants of the Original Charter Oak

2010 marked Connecticut's 350th anniversary. To mark the occasion, people from several state agencies contacted Robert Durgy at the Griswold Research Center to inquire about Charter Oaks that might still be growing at the Griswold Center. Other species previously planted were there, but there were no Charter Oaks. To meet requests for the trees, several scientists decided to grow some from acorns that came from direct descendants of the original Charter Oak. Acorns were gathered from several different trees that were first generation descendants and were planted at the Griswold Research Center on October 4th. The plants are well on their way. There are 50 trees in the ground that should be ready for transplanting in the spring of 2011. The Station, through this project, is continuing the tradition of cultivating the historic Charter Oak.

STATION PARTICIPATION IN THE COMMUNITY AND AROUND THE STATE

Tobacco Research Meeting in Suffield

The Connecticut Agricultural Experiment Station's annual Tobacco Research Meeting was held at the Suffield High School Auditorium on February 23, 2011 and drew over 135 participants. Director Louis A. Magnarelli and Dr. James LaMondia welcomed growers to the meeting. Dr. Magnarelli spoke about recent developments at the Station. The meeting addressed a wide variety of issues of concern to growers. Dr. LaMondia spoke about research on management of tobacco pathogens including poty viruses, target spot and progress of the breeding program for multiple pathogen resistance. Dr. Todd Mervosh spoke about herbicides, weed control and cover crop issues. Dr. Sandra Anagnostakis explained the history and current status of her Chestnut breeding program. Thomas Rathier spoke about the effect of degree days and weather on shade and broadleaf tobacco and tobacco cultural considerations. Tess Foley updated growers about the purpose and achievements of the Connecticut Agricultural Experiment Station Research Foundation. Michelle Salvas, Jane Canepa-Morrison, James Preste and Diane Riddle 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 70 persons received credit. Representatives from other agencies and organizations also participated.

Connecticut Conference on Natural Resources

Dr. Robert E. Marra served on a Steering Committee for the Connecticut Conference on Natural Resources from 2005 – present. On March 7, 2011, the Conference was held at the University of Connecticut, Storrs. The Conference was attended by 243 people, including seven scientists from CAES, who presented seven talks and one poster.

Incident Command System Exercise

On March 9 and 10, 2011, approximately 60 personnel from the Station and the Connecticut Department of Environmental Protection, USDA-Forest Service, and USDA-APHIS Plant Protection and Quarantine, participated in an Incident Command System Exercise concerning a simulated detection of Emerald Ash Borer. The purpose of the exercise was to demonstrate and practice the ability of state and federal agencies to cooperate to address the detection of a potentially devastating, federally regulated insect pest. The exercise was held at Ft. Trumbull in New London, with simulated finds of EAB at locations in the surrounding area. Station personnel participating in the exercise were: Jeffrey Fengler and Stephen Sandrey (Survey Team Leaders), Peter Trenchard (Regulatory Group Leader), Joseph P. Barsky (Safety Officer), Tia Blevins (Ground Support Unit Leader), Dr. Carole Cheah, Diane Riddle, and Dr. Richard Cowles (Survey Team members), Dr. Claire Rutledge (Scientific Support), Rose Hiskes (Assistant Information Officer), and Dr. Victoria Smith (Agency Administrator). The exercise received coverage in print in the New London Day and on television (Channel WFSB).

Aerial Survey Aviation Safety and Management 2011

On March 29-31, 2011, the USDA Forest Service/Forest Health Protection sponsored Aerial Survey Aviation Safety and Management 2011. The 37 participants included Station personnel Tia Blevins, Dr. Victoria Smith, and Peter Trenchard. It was held in Harrisburg, PA.

The Connecticut Agricultural Experiment Station Award Presented At The New Haven Public Schools Science Fair 2011

From May 10-12, 2011, at the Yale University Commons, Dr. Claire Rutledge, Dr. Richard Peterson, and Dr. Robert Marra served as special awards judges for the New Haven Public Schools Science Fair, choosing on behalf of CAES the "Best Project Related to Food, Plants, Insects, or the Environment". They unanimously chose Ms. Waltrina Kirkland-Mullins' 3rd Grade Class from the Davis Street Arts and Academics Magnet School for their project titled "Which Way is Up? – A Fascinating Look at Corn Plants". Dr. Marra presented the award and a $100 check to three students representing their class at the Awards Ceremony, which was held at Sheffield-Sterling Strathcona Hall on the Yale Campus.

Station Participated in the Fifth Annual Norwalk-Wilton Tree Festival

On May 21, 2011, staff from the Experiment Station participated in the Fifth Annual Norwalk-Wilton Tree Festival at Cranbury Park in Norwalk. Staff members were there to teach children and their parents about trees, tree diseases, exotic insects, and bees. Dr. Sharon M. Douglas organized and coordinated the Station's participation, which included two booths – one for bees and trees (diseases) and one for two exotic invasive insects at our state borders, Asian Longhorned Beetle and Emerald Ash Borer. This was the fourth year the Station has participated in this "by invitation only" event, a reflection of the organizers' recognition of the importance of the Station's contributions to the health of urban trees in Connecticut. Dr. Douglas Dingman, Dr. Sharon Douglas, Dr. Robert Marra, and Dr. Claire Rutledge, along with Katherine Dugas, Ira Kettle, and Diane Riddle, answered questions, distributed Station fact sheets, coloring books, and

other literature to attendees. Specimens of the Asian Longhorned beetle, the Emerald Ash Borer, and honey bees, were available for examination by attendees, and they were able to ask questions about tree diseases. More than 1,300 attendees, including 800 youths, participated in the event.

Experiment Station Helps With Invasion of the Bloodsuckers Exhibit at Yale Peabody Museum

Dr. Gale Ridge made major contributions to the new exhibit "Invasion of the Bloodsuckers: Bed Bugs and Beyond" at the Yale Peabody Museum of Natural History. Accompanied by Dr. Kirby Stafford, Dr. Anuja Bharadwaj and Katherine Dugas, Dr. Ridge attended an opening reception for the exhibit. Detailed models of a bed bug, flea, mosquito, tick, head louse, and crab louse created, by the Peabody's resident artist Michael Anderson, are part of the display. Dr. Ridge worked closely with Dr. Leonard E. Munsterman at Yale University, who acknowledged the valuable contributions that the Experiment Station has made for this and other exhibits. Dr. Ridge is featured in the introductory video to the exhibit and she provided the live bed bugs that are on display. The event took place on May 28, 2011.

PRODUCE DONATIONS

Donations from Lockwood Farm

A total of 24,211 pounds of spinach, radishes, pak choi, summer squash, assorted squash, eggplants, peppers, tomatoes, cucumbers and other assorted vegetables grown at Lockwood Farm were donated to the Connecticut Foodbank – East Haven. The produce came from plots grown by Drs. Martin P. N. Gent, Frank Ferrandino, Abigail Maynard, Kim Stoner and the Lockwood Farm staff.

Donations from Valley Laboratory

A total of 10,493 pounds of tomatoes, plums, cabbage, corn, squash and watermelon grown at the Valley Laboratory were donated to Foodshare of Hartford. An additional 1,750 pounds 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, 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.

LOCKWOOD LECTURES

On October 25, 2010, Dr. Francis J. Ferrandino invited Dr. Odile Carisse, Plant Pathologist, Agriculture and Agri-Food Canada, Horticulture Research and Development Centre, Quebec, Canada to give a Lockwood Lecture. The title of the lecture was "Molecular tracking of airborne inoculum: impact on grape disease management."

On May 6, at the invitation of Dr. Sandra Anagnostakis, Dr. Jeanne Romero-Severson, Quantitative and Population Geneticist, Forest Conservation and Tree Genetics Program of the

Department of Biological Sciences at the University of Notre Dame, Indiana, delivered the Lockwood Lecture entitled "Seeing the Forest and the Trees" in Jones Auditorium. Dr. Romero Severson works on the molecular genetics of plants and insects.

AWARDS AND RECOGNITION RECEIVED BY STATION STAFF

August 5-7, 2010, Dr. John F. Ahrens received a commendation from the Connecticut Christmas Tree Growers' Association, signed by Governor M. Jodi Rell and presented to him by Dr. Louis A. Magnarelli, for his longtime service to the Christmas tree industry.

August 9-13, 2010, Dr. Wade H. Elmer was presented with three awards: Honorary Co-Chair, Guest Delegate, and Invited Speaker at the International Conference on Plant Nutrition held in Hyderabad, India.

On November 6, 2010, Dr. Kimberly Stoner was honored by CT NOFA for her 20 years as a member of the Board of Directors. She was given a lifetime membership in CT NOFA, and five hives of honey bees were donated to Heifer International in her honor.

On November 10, 2010, Dr. Scott Williams fulfilled the requirements and was deemed a "Certified Wildlife Biologist" by the Wildlife Society.

In January, 2011, Dr. John Ahrens received the SOAR Award from IR-4 for his ongoing work helping to get herbicides registered for ornamental crops.

In April, 2011, Peter Trenchard was nominated for the Carl E. Carlson Distinguished Achievement Award in Regulatory Plant Protection which is awarded by the National Plant Board.

On June 1, 2011, Dr. Scott Williams received a Certificate of Appreciation from Future Farmers of America at their awards ceremony held at Lyman Memorial for giving talks to students.

On June 1, 2011, Joseph P. Barsky received a Certificate of Appreciation from Future Farmers of America at their awards ceremony held at Lyman Memorial for giving talks to students.

On June 21, 2011, Dr. Jason White was awarded one of three inaugural "Super reviewer Awards" by Professor Jerald Schnoor, Editor-In-Chief of *Environmental Science and Technology.*

On June 24, 2011, Dr. Wade H. Elmer received a Best Seller Status award by APS Press for 2008m, 2009, and 2010 for his book *Mineral Nutrition and Plant Disease.*

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

DEPARTMENT OF ANALYTICAL CHEMISTRY

JASON C. WHITE

- Vice President of the International Phytotechnology Society and also serves as Managing Editor for the *International Journal of Phytoremediation*
- Editorial Board of *Environmental Pollution*
- Member, the Science Advisory Board (SAB) for the Annual International Conference on Soils, Sediments, Water, and Energy held in October of each year at the University of Massachusetts Amherst

BRIAN D. EITZER

- Serves on the Conservation Commission for the Town of Bethany
- Served as a judge at the Connecticut Science Fair held at Quinnipiac University this past year
- Member of the Board of Directors of AAPA – American Association of Professional Apiculturists

WALTER J. KROL

- Served as Secretary of the New Haven Section of the American Chemical Society (elected for 2 year term)
- Served as a special judge on behalf of the New Haven Section of the American Chemical Society at the New Haven Public Schools Science Fair May 10, 2011
- Served as Chairman of the New Haven Section ACS National Chemistry Week Program and introduced an Earth Day Poster program. In that capacity, he organized the Sections' Annual Poster Contest (including judging), and also presented awards to 10 students and their teachers at a banquet in the Jones Auditorium at the CAES on May 24th, 2011

CHRISTINA S. ROBB

- Chairs the "Food Analysis" session at Eastern Analytical Symposium in November of each year
- Serving on the Association of Public Health Laboratories (APHL) Working Group on ELISA Based Methods for the USDA FSIS FERN network

DEPARTMENT OF BIOCHEMISTRY AND GENETICS

NEIL A. MCHALE

- Chairman, Institutional Biosafety Committee

RICHARD B. PETERSON
- Vice President and voting delegate, Quinnipiac Chapter Sigma Xi
- Radiation Safety Officer

NEIL P. 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 Programs Committee

DOUGLAS W. DINGMAN
- Sigma Xi programs committee (Quinnipiac Chapter)
- CAES Institutional Biosafety Committee
- CAES Plant Science Day committee
- 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

KIRBY C. STAFFORD III
- Member, Multi-State Activities Committee, Northeastern Region Association of Experiment Station Directors

- Administrative Advisor, Multistate Research Project NE-1931 on potato breeding
- Administrative Advisor, Multistate Research Project NE-1043 on biology disease vectors
- Member, Connecticut Coalition Against Bed Bugs
- Member, U.S. EPA Network for Lyme Disease Prevention

TIA M. BLEVINS
- Treasurer, Horticultural Inspection Society, Eastern Chapter

CHRIS T. 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

GALE E. RIDGE
- Chair, Connecticut Coalition Against Bed Bugs
- Member, Rapid Response Research Activity Working Group for Bed Bugs (Series 500)

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 Board of Directors; member
- National Plant Board National Meeting Agenda Committee; member
- New Pest Advisory Group, Eastern Plant Board Liaison
- Eastern Plant Board; Member and President
- USDA-APHIS-PPQ Early Detection-Rapid Response Committee; member
- New England Wildflower Society, Connecticut Task Force; member
- Authorized Certifying Official; certificate number 20080160

KIMBERLY STONER
- Member, Multi-State Research Project NC1173 – Sustainable Solutions to Problems Affecting Bee Health
- Board Member, Association of Professional Apiculturalists

DEPARTMENT OF ENVIRONMENTAL SCIENCES

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-1043: Biology, Ecology & Management of Emerging Disease Vectors
- 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*
- Associate Editor, *Journal of Environmental Quality*
- Secretary,W-2082 Multi-State Research Project: Evaluating the Physical and Biological Availability of Pesticides and Contaminants in Agricultural Ecosystems
- Past Chair, Division S-11 (Soils and Environmental Quality) Soil Science Society of America
- Member of the Biochar Standardization Workgroup, International Biochar Initiative

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 Energy and 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

DEPARTMENT OF FORESTRY AND HORTICULTURE

JEFFREY S. WARD
- Secretary, Connecticut Tree Protection Examination Board
- Executive Board Member, Connecticut Urban Forest Council
- Audubon Connecticut Science Committee
- New England Society of American Foresters, 2012 Program Chair
- Advisor, Fairfield County Municipal Deer Management Alliance
- Ex-Officio Member, Goodwin Scholarship Committee
- Reviewer: USDA Forest Service-Northern Research Station, Northern Journal of Applied Forestry, Forest Ecology and Management

MARTIN P. N. GENT
- Official representative, NE1035 Regional Research Committee.
- Associate editor, *Journal of Plant Nutrition*.
- Reviewer for 4 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*

WILLIAM R. NAIL
- Steering Committee, New England Vegetable and Fruit Conference
- Secretary, American Society of Enology and Viticulture- Eastern Section
- Chair-Elect, NE-1020: Multi-state evaluation of winegrape cultivars and clones

SCOTT C. WILLIAMS
- Executive Board Member, Connecticut Urban Forest Council
- Scientific Advisor, Fairfield County Municipal Deer Management Alliance
- Commissioner, Town of Guilford Inland Wetlands Commission
- Commissioner, Town of Guilford Land Acquisition Commission
- Commissioner, Town of Guilford East River Preserve Management Plan Steering Committee

DEPARTMENT OF PLANT PATHOLOGY AND ECOLOGY

SHARON M. DOUGLAS
- Member, APS Foundation Board, American Phytopathological Society
- Member, Local Arrangements Committee (2012), 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
- Chair, Education Committee, Connecticut Tree Protective Association

SANDRA L. ANAGNOSTAKIS
- Park Naturalist and Board Member, Sleeping Giant Park Association
- International Registrar for Cultivars of *Castanea*, International Society for Horticultural Science

WADE H. ELMER

- Divisional Forum Representative for Northeastern Division of American Phytopathological Society (NEDAPS)
- Member, Membership Committee (Ad hoc), American Phytopathological Society
- Chair, Constitution Committee (Ad hoc), Northeastern Division of American Phytopathological Society
- Chair, Site Selection Committee, Northeastern Division of American Phytopathological Society
- Senior Editor *Phytopathology*
- Associate Editor *Crop Protection*
- Coordinator, Widely Prevalent Fungi List Coordinator, New England
- Member, Program Committee, Connecticut Greenhouse Grower's Association
- Member, Northeast Research, Extension and Academic Program Committee
- Member, State Advisory Council for Agriculture Science and Technology

ROBERT E. MARRA

- Chair, Local Arrangements Committee (2012), Northeastern Division of American Phytopathological Society
- Chair, Graduate Student Awards Committee, Northeastern Division of American Phytopathological Society

VALLEY LABORATORY

JAMES A. LAMONDIA

- Member, Northeast Regional Project NE-1040, "Plant-Parasitic Nematode Management as a Component of Sustainable Soil Health Programs in Horticultural and Field Crop Production Systems".
- Past-President, Northeast Division of the American Phytopathological Society
- President-Elect- Society of Nematologists
- Society of Nematologists Extension Committee.
- Connecticut Agricultural Information Council.
- Ex-Officio Member, Connecticut Tree Protection Examining Board.
- North American Blue Mold Forecast Center State Coordinator.
- Worker Protection Standards Trainer for the Valley Laboratory.
- CT Vegetable & Small Fruit Growers' Conference steering committee

JOHN F. AHRENS

- Advisor, Connecticut Christmas Tree Growers Association, Chairman of the Fire Safety and Tree Improvement Committees.
- 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
- Member of International Organization of Biological Control

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

DEWEI LI
- Environmental Microbiology Proficiency Analytical Testing Task Force of American Industry Hygiene Association.

TODD L. MERVOSH
- Connecticut Invasive Plant Working Group – Member of Steering Committee & Symposium Planning Committee, Chair of Stewardship Committee
- Weed Science Society of America – Weed Alert Committee
- Northeastern Weed Science Society – Nominating Committee
- IR-4 Program for Specialty Crops – State Liaison for Connecticut

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.

LECTURES, SEMINARS AND INTERVIEWS

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

AHRENS, JOHN F.

- Served as co-chair of the 50th Anniversary Meeting of the Connecticut Christmas Tree Growers Association at the Jones Family Farm in Shelton and spoke on the walking tours about "Weed suppression on steep hillsides" (150 attendees) *August 5-7, 2010*
- As an official advisor, attended a meeting of the Connecticut Christmas Tree Association Board of Directors *September 8*
- Served as one of three judges of Christmas trees at the Eastern States Exposition in West Springfield, MA *September 16*
- Presented a talk on new herbicides for field-grown conifers at the Nursery and Landscape Research Tour held at the Valley Laboratory (16 attendees) *September 22*
- Gave a paper entitled "Further Experiments with Mesotrione for Postemergence Weed Control in Actively Growing conifers", coauthored by Dr. Todd Mervosh, at the meetings of the Northeastern Weed Science Society in Baltimore, MD *January 3-7, 2011*
- Spoke at the annual meeting of the Connecticut Christmas Tree Growers Association about "Site Selection for Christmas Trees" Middletown, CT (80 attendees) *March 5*
- Spoke on "Weed Basics, Identification and Control" at the Christmas Tree Growers' Pest Management Workshop in Keene, NH (100 attendees) *March 17*
- Spoke about weeds and their control at a twilight meeting of the Connecticut Christmas Tree Growers Association at the Dzen Farm in East Windsor (50 attendees) *June 15*
- Spoke on herbicides for control of specific weeds in Christmas tree plantings at a Saturday meeting of the New Hampshire/Vermont Christmas Tree Growers Association at the Tester Farm in Barton, VT (60 attendees) *June 25*

ANAGNOSTAKIS, SANDRA L.

- Presented a paper on "Breeding Chestnut Trees for Resistance to Asian Chestnut Gall Wasp", presented the Treasurer's Report, and attended the Board meeting at the annual meeting of the Northern Nut Growers Association in Wooster, OH (120 attendees) *July 18-21*, 2010
- Appeared on Garden Talk with Len & Lisa (WTIC-1080) and discussed Plant Science Day and her chestnut research *July 31*
- Was interviewed about chestnuts as a healthy, nutritious food by Alice Marcus Drieg and Carmen Devito on their call-in talk show "We Dig Plants" on heritage radio Network *October 14*
- Spoke about her butternut research to a botany class from Quinnipiac University in Jenkins Conference Room (6 attendees) *November 3*
- Was interviewed about growing nut trees by Barb Feldman for an article in Hobby Farms Magazine *December 1*
- Judged the nut exhibit at the Pennsylvania Farm Show in Harrisburg, PA *January 7, 2011*
- Helped with the planting of 4,370 Connecticut chestnut seeds in a special production system of Scott Schlarbaum of the University of Tennessee at Forrest Keeling Nursery in Elsberry, MO, and delivered 4,370 seeds to be planted in nursery beds at the University of Tennessee in Knoxville, TN *January 11*

- Gave a talk on "Chestnut trees for Connecticut orchards and timber" at the 2011 Annual Meeting of the CT Tree Protective Association held at the Aqua Turf Club in Plantsville, CT (632 adult attendees) *January 20*
- Gave a talk on the Station's chestnut work at the tobacco Growers' Meeting in Suffield (135 attendees) *February 23*
- Gave a talk on chestnuts at Colonial Day at the Fairfield Museum and helped parents and children plant orchard and timber chestnuts (seed) in pots to take home (19 children and 15 adult participants) *February 25*
- Gave the talk "Chinquapins for a change" at the Forest Health Workshop held in Jones Auditorium (45 attendees) *March 3*
- Gave the talk "Growing nuts" at a NOFA meeting held at Manchester Community College in Manchester (52 attendees) *March 5*
- Gave the talk "Chestnuts for food" at Agricultural Day at the State Capitol *March 16*
- Spoke on "Saving the Ozark Chinquapin" at the Ozark Chinquapin Foundation meeting held in Hobbs State Park in Rogers, AR (84 attendees) *March 18*
- Gave the talk "Chestnut trees for orchards and timber" at a meeting of the Maryland Chapter of The American Chestnut Foundation in Gaithersburg, MD (47 attendees) *March 26*
- Gave the talk "Solving the problems of timber and orchard chestnut trees" to a chestnut group in Albany, GA, and examined chestnut trees sent to the area by the USDA in the 1940's and 1950's *May 21*
- With Pamela Sletten, explained their advanced-breeding chestnut plot to visitors at the Griswold Research Center Open House (51 attendees) *June 16*
- Gave the talk "Ozark Chinquapins in the CAES Breeding Program" at the annual meeting of the Chestnut Growers of America held in Louisiana, Missouri, and checked and talked about the 4,000 chestnut seeds planted at the Forrest Keeling Nursery in Elsberry, MO, which are part of a planting experiment with the University of Tennessee *June 24-26*

ANDREADIS, THEODORE G.

- Was interviewed about State and Federal funding for mosquito and arbovirus surveillance by Michael Puffer of the Waterbury Republican American *July 8, 2010*
- Was interviewed about the impact of the record hot temperatures on mosquitoes and West Nile virus activity in the State by Bob Miller of the Danbury News Times *July 20*
- Was interviewed about the impact of the record hot temperatures on mosquitoes and West Nile virus activity in the State by Amanda Pinto of the New Haven Register *July 20*
- Presented an overview of the State Mosquito Trapping and Virus Testing Program to Ray Bendici, Associate Editor, Connecticut Magazine *July 21*
- Was interviewed about the impact of the record hot temperatures on mosquitoes and West Nile virus activity in the State by Amanda Cuda of the Connecticut Post *July 21*
- Was interviewed about the detection of West Nile virus in mosquitoes collected in Bethel, Bridgeport, Meriden, Norwalk, and Orange by Jocelyn Maminta of WTNH-TV8 *August 3*
- Was interviewed about the detection of West Nile virus in mosquitoes collected in Bethel, Bridgeport, Meriden, Norwalk, and Orange by Amanda Cuda of the Connecticut Post *August 3*
- Was interviewed about the detection of West Nile virus in mosquitoes collected in Meriden by David Moran of the Meriden Record Journal *August 5*
- Was interviewed about West Nile virus activity in Connecticut and protection methods by Nancy Schoeffler of the Hartford Courant *August 6*
- Was interviewed about the detection of West Nile virus in mosquitoes collected in Fairfield, Manchester , Milford, Westport, and Wethersfield by Amanda Cuda of the Connecticut Post *August 17*

- Was interviewed about the detection of West Nile virus in mosquitoes collected in Fairfield, Manchester , Milford, Westport, and Wethersfield by Steve Kotchko of CT Public Radio Network *August 17*
- Was interviewed about the human case of West Nile virus in a New Haven resident by Jocelyn Maminta of WTNH TV-8 *August 25*
- Participated in a conference call of the State Mosquito Management Committee with representatives from CT DEP, DPH, and Agriculture to discuss the current status of West Nile virus in Connecticut *August 26*
- Was interviewed about mosquitoes, West Nile virus, Eastern Equine Encephalitis, and the CAES Mosquito and Arbovirus Surveillance Program by Harold Cobin of the Wilton Patch *August 27*
- Was interviewed about the detection of Eastern Equine Encephalitis in mosquitoes collected in North Stonington by Steve Kotchko of the Connecticut Public Radio Network *August 31*
- Was interviewed about the detection of Eastern Equine Encephalitis in mosquitoes collected in North Stonington by Jocelyn Maminta of WTNH TV-8 *August 31*
- Participated in a state-wide conference call with state and local public health officials, on an update for the status of West Nile virus activity in Connecticut *September 1*
- Was interviewed about a human case of West Nile virus infection in residents of Greenwich by Fran Schneido of CBS Radio *September 2*
- Was interviewed about the abundance of human cases of West Nile virus infection in residents of Fairfield County by Amanda Cuda of the CT Post *September 3*
- Was interviewed about human cases of West Nile virus infection in residents of Stamford and Bridgeport by Martin Cassidy of the Stamford Advocate *September 9*
- Was interviewed about the current status of West Nile virus in Connecticut this summer and what people should be doing to protect themselves by Brad Davis of WDRC Radio *September 10*
- Was interviewed about the detection and status of West Nile virus in Meriden and Wallingford by the Meriden Record Journal *September 10*
- Was interviewed about the current status of West Nile virus in Connecticut this summer by Marc Sims of Connecticut Public Radio *September 10*
- Was interviewed about the current status of West Nile virus in Connecticut this summer and what people should be doing to protect themselves by Ray Andrewsen of Quinnipiac College Radio, WQUN AM *September 15*
- Was interviewed about the current status of West Nile virus in Connecticut and what people should be doing to protect themselves by WICC Radio *September 17*
- Presented a lecture in a course on Ecology and Epidemiology of Vector-borne and Zoonotic diseases entitled “West Nile virus: a retrospective look at an emerging mosquito-borne disease in the western hemisphere” to a class of graduate students at Yale University (20 attendees) *October 5*
- Presented a seminar to the Department of Pathobiology and Veterinary Science at the University of Connecticut in Storrs, entitled “West Nile virus: a retrospective look at an emerging mosquito-borne disease in the western hemisphere” (30 attendees) *October 7*
- Was interviewed about the end of the mosquito and arbovirus surveillance program for the 2010 season by Amanda Cuda, of the Connecticut Post *November 9*
- Was interviewed about the end of the mosquito and arbovrus surveillance program for the 2010 season by Marc Sims from Connecticut Public Radio November 9
- Presented an invited seminar “West Nile Virus: A Retrospective Look at an Emerging Mosquito-borne Disease in the Western Hemisphere” to the Department of Biology at the Clark University in Worcester, MA *November 10*
- Spoke with newly elected State legislators in Hartford at an informal luncheon, organized by the Experiment Station Associates, to discuss the Experiment Station’s research and surveillance programs on mosquitoes, Eastern Equine Encephalitis, and West Nile virus *December 1*

- Presented an invited talk entitled "Evaluation of the Role of Mosquito Vectors in Transmission of Eastern Equine Encephalitis virus at the 56th Annual Meeting, Northeastern Mosquito Control Association, held in Hyannis, MA *December 7*
- Reported on the Experiment Station's research and surveillance programs on Prevention and Control of Emerging Mosquito-borne Diseases to the State Appropriations Committee in Hartford as a part of the Results Based Accountability Forum *December 15*
- Hosted the annual Meeting of the Multi-State Research Project NE-1043, "Biology, Ecology & Management of Emerging Disease Vectors" held at CAES and presented an update on research and surveillance activities on arboviruses and mosquitoes *March 1-2*
- Attended the 77th Annual Meeting of the American Mosquito Control Association held in Anaheim, CA and presented an invited symposium talk entitled The contribution of *Culex pipiens* mosquitoes to transmission and persistence of West Nile virus in North America *March 20-24*
- Was interviewed about the mosquito and arbovirus surveillance program for the 2011 season and the impact of budget cuts on the program by Sam Gingerella, WTIC Radio *May 5*
- Was interviewed about the impact of budget cuts on the State mosquito and arbovirus surveillance program for the 2011 season by the Associated Press in Hartford *May 6*
- Was interviewed about the mosquito and arbovirus surveillance program for the 2011 season and the impact of budget cuts on the program by Fran Schneido of WCBS Radio, New York *May 10*
- Was interviewed about Eastern Equine Encephalitis virus in New England by Onica Park of the Standard Times, New Bedford, MA *May 10*
- Presented the invited talk "Epidemiology of Eastern Equine Encephalitis virus in Connecticut with insights on virus overwintering and the role of *Culiseta melanura* and other mosquito vectors at the Northeastern Eastern Equine encephalitis conference sponsored by the Centers for Disease Control and Prevention, held at the New Hampshire Public Health Laboratories, Concord, NH *May 13*
- Was interviewed about mosquito and arbovirus surveillance program for the 2011 season by Jennifer Bernstein of Fox 61 News *May 16*
- Was interviewed about the mosquito and arbovirus surveillance program for the 2011 season and the impact of budget cuts on the program by William Weir of the Hartford Courant *May 19*
- Was interviewed about the mosquito and arbovirus surveillance program for the 2011 season and the impact of budget cuts on the program by Marc Sims of Connecticut Radio Network and WTIC Radio *May 20*
- Was interviewed about the mosquito and arbovirus surveillance program for the 2011 season and the impact of budget cuts on the program by NBC 30 *May 24*
- Was interviewed about the impact of winter snowfall and spring flooding on mosquitoes, West Nile virus and Eastern Equine Encephalitis virus in the northeastern US by ABC Evening News with Dianne Sawyer *May 31*
- Was interviewed about the impact of winter snowfall and spring flooding on mosquitoes, West Nile virus and Eastern Equine Encephalitis virus in Connecticut and the impact of budget cuts on the surveillance program by Karena Garity of Patch.com *May 31*
- Was interviewed about the mosquito and arbovirus surveillance program for the 2011 season and the impact of budget cuts on the program by Christine Woodside of the Groton Patch *June 1*
- Was interviewed about the start of the mosquito trapping and testing program and the abundance of early spring mosquitoes by Judy Benson *June 2*
- Was interviewed about the mosquito and arbovirus surveillance program for the 2011 season, the impact of budget cuts on the program, and the abundance of early spring mosquitoes by Marc Sims, Connecticut Radio Network and WTIC Radio *June 6*
- Was interviewed about the mosquito and arbovirus surveillance program for the 2011 season, the impact of budget cuts on the program, and the abundance of early spring mosquitoes by Amanda Cuda, Connecticut Post *June 7*

- Was interviewed about the mosquito and arbovirus surveillance program for the 2011 season, the abundance of early spring mosquitoes and the forecast for West Nile and Eastern Equine Encephalitis viruses in New England by Jane Allan, ABC News, New York *June 7*
- Was interviewed about the abundance of early spring mosquitoes and its impact on West Nile and Eastern Equine Encephalitis viruses in Connecticut by Diane Orson of WNPR/Connecticut Public Radio *June 8*
- Was interviewed about the abundance of early spring mosquitoes and the isolation of Jamestown Canyon virus from mosquitoes collected in Wilton and Easton by Jeannette Ross, Wilton Bulletin *June 24*
- Was interviewed about abundance of early spring mosquitoes and Jamestown Canyon virus in Connecticut by William Weir of the Hartford Courant *June 29*

ARMSTRONG, PHILIP M.
- Presented a seminar entitled "Emergence of West Nile and Eastern Equine Encephalitis Virus in Connecticut" for the Biology Department at Central Connecticut State University, New Britain, CT *September 27, 2010*
- Gave an oral presentation entitled "Quantification of Eastern Equine Encephalitis Virus in Field-Collected Mosquitoes to Evaluate Their Role as Bridge Vectors at the 59th Annual Meeting of the American Society of Tropical Medicine and Hygiene held in Atlanta *November 3-7*
- Spoke to a group of plant disease diagnosticians from the Northeast Plant Diagnostic Network about the mosquito surveillance and virus testing program at the Station *February 23*
- Attended the Annual Meeting of Multi-State Research Project NE-1043, "Biology, Ecology & Management of Emerging Disease Vectors" held at CAES and presented an update on research activities on arboviruses *March 1-2*
- Served as a judge for the New Haven Public Schools Science Fair *May 10-11*
- Presented the invited lecture "New era, but old problem: Insight into the reemergence of vector-borne viruses" at the Office of Vector Surveillance and Control, NYC Department of Health and Mental Hygiene, New York *May 19*

ARSENAULT, TERRI
- Presented a research update on the activities within the Department of Analytical Chemistry over the last 12 months at the annual FDA Food Emergency Response Network Chemistry Cooperative Agreement Program technical meeting held in Denver, CO *August 16-19, 2010*
- Was selected to become a member of the Course Advisory Group for the US FDA Food Emergency Response Network Training Course for Gas Chromatography – Mass Spectrometry *November 15*
- Was an instructor for a US FDA FERN training course entitled "Drug and Poison Screen Using Acid and Base Extraction with GC/MSD" in Austin, Texas *November 29-December 2*

AYLOR, DONALD E.
- Gave an invited lecture titled "A framework for modeling aerial transport of plant pathogens" in the Department of Plant Pathology, Physiology, and Weed Science at Virginia Polytechnic Institute and State University in Blacksburg, VA (52 attendees) *October 6, 2010*
- Was a judge at the Connecticut Science Fair held at Quinnipiac College (10 youth attendees) *March 17, 2011*
- Spoke about "Aerobiology of corn pollen" to a Springfield College Plant Physiology Class at the Station (14 attendees) *March 28*
- Gave the lecture "Modeling aerial dispersal of plant pathogens" via an Internet webcast to graduate students in the Department of Plant Pathology and in the Engineering Department at Virginia Tech University (10 attendees) *April 14*

- Gave the invited lecture "A biophysical framework for modeling aerial dispersal of plant pathogens" in the Department of Plant Pathology at the University of Nebraska in Lincoln, Nebraska (24 attendees) *April 18*

BARSKY, JOSEPH P.

- Participated in the summer meeting of the Connecticut Chapter of the Society of American Foresters at the Pomfret School, Pomfret *August 20, 2010*
- Participated in the Tour des Farms 25 mile bicycle ride, an event which supports the King's Mark Resource Conservation and Development Program *October 2*
- Gave a presentation titled "Trees, Forests, and You!" to kindergarten students at Bear Path Elementary School, Hamden (72 students, 12 adults) *October 18*
- Taught "Forest Measurements" for Coop High School, New Haven (6 students, 1 teacher) *October 20*
- Gave a presentation titled "Trees, Forests, and You!" to second grade students at Mile Creek Elementary School, Old Lyme (86 students, 7 adults) *October 26*
- Spoke on propane torch safety and operation at a department hosted workshop on Japanese barberry control for members of Joshua's Trust and interested citizens at Preston Sanctuary in Hampton *December 21*
- Participated in the Annual Winter Meeting of the Yankee Division, Society of American Foresters in Haddam *February 25, 2011*
- Participated in the 2011 Emerald Ash Borer Exercise Orientation at the Connecticut Fire Academy, Windsor *March 2*
- Participated in the Annual Forest Health Workshop at CAES, New Haven *March 3*
- Spoke on "Live capture of small rodents" to students studying wildlife research techniques at Lyman Hall High School, Wallingford (6 students, 1 teacher) *March 4*
- Spoke on "Safety YES: safe usage of flame weeding devices" during a USDA-NRCS workshop on invasive species (42 attendees) *March 22*
- Spoke on "Career opportunities in natural resources and environmental science" at the "From Boyz-to-Men: Opportunities for your future" event held at Southern Connecticut State University (25 attendees) *March 25*
- Along with Dr. Walter Krol, presented a display on the Emerald Ash Borer and the Food Emergency Response Network during an Earth Day event at Quinnipiac University (600 attendees) *April 14*
- Presented a display on Agriculture, Natural Resources, and Public Health during an Earth Day event held at the Hamden Middle School (3,000 attendees) *April 30*
- Along with Michael Short, was interviewed about invasive control techniques by James Fisher of The White Memorial Foundation for their newsletter *May 11*
- With Michael Short, presented a CAES Research Display on "Agriculture, Natural Resources, and Public Health" at the Audubon Bent of the River Festival in Southbury (325 attendees) *May 21*
- Presented six talks on "How trees grow" to 4th grade students at the Southington Schools Nature Day (120 students, 20 adults) *June 2*
- Spoke on "Safety: YES" to attendees of an invasive species control workshop held in Lyme (11 attendees) *June 17*
- Staffed a Station exhibit and presented material on Emerald Ash Borer and tree identification skills during the Family Camping Festival/Great American Backyard Campout in West Hartford, CT (500 attendees) *June 25*

BERGER, WILLIAM A.

- Gave a talk entitled "Uptake of organochlorine pesticides by agricultural crops: Mechanistic studies" at the 240th Annual Meeting of the American Chemical Society *August 22-26, 2010*

BHARADWAJ, ANUJA

- With Dr. Kirby Stafford, presented a poster "Field trials of the natural compounds, nootkatone and garlic, for the control of blacklegged tick, *Ixodes scapularis*" at the 58th Annual Meeting of the Entomological Society of America held in San Diego, CA December 12-15 (56 attendees) *December 14*

BLEVINS, TIA

- Participated in an observation of the discovery of Emerald Ash Borer in Saugerties, New York. Techniques for detection and identification of the insect in the field were discussed. Approximately 45 state and federal personnel from New York, Massachusetts, and Connecticut participated *August 10*
- Participated in an emergency preparedness summit for EAB, held at the South Mountain Regional Headquarters of the Massachusetts Department of Camping and Recreation (35 participants) *August 31*
- Participated in an emergency preparedness summit on Emerald ash borer in Jenkins Conference Room (45 participants) *September 14*
- Participated in Aerial survey-Aviation Safety & Management, a course sponsored by the US Forest Service, held at the Rachel Carson Office Building in Harrisburg, PA (37 participants) *March 28-31, 2011*
- Along with Dr. Victoria Smith and Peter Trenchard, participated in Remote/Wilderness First Aid, a course sponsored by the US Forest Service, held at the Rachel Carson Office Building in Harrisburg, PA (16 participants) *April 1*
- Participated in the 37th annual Horticultural Inspection Society, Eastern Chapter's meeting in Worcester, MA. As Treasurer, she presented the financial report to the members *April 11-14*

BUGBEE, GREGORY J.

- Spoke on Update on Controlling Variable Milfoil in Bashan Lake at the annual meeting of the Bashan Lake Association in East Haddam (50 attendees) *July 7, 2010*
- Was interviewed by freelance writer Bob Pollack on Station research on invasive aquatic plants *July 30*
- Gave two demonstration talks on "Identifying Invasive Aquatic Plants" at Plant Science Day at Lockwood Farm in Hamden *August 4*
- Gave the talk "Repairing Lawns from Drought Damage" to the Connecticut Groundskeepers Association in West Hartford, CT (30 attendees) *September 13*
- Spoke on "Soil Testing and Invasive Aquatic Plants to a class visiting the Station from the Hooker School in New Haven (25 students) *September 24*
- Spoke on "Connecticut's Invasive Aquatic Plant Problem – Searching for Solutions" at the Annual Connecticut Invasive Plant Working Group Conference at UCONN (60 attendees) *October 14*
- Gave a seminar on "Using GIS in the Surveillance and Management of Invasive Aquatic Plants as part of the CT DEP wetlands training workshop at Quinebaug Community College in Danielson (40 attendees) *October 30*
- Presented a seminar entitled "Using GIS in the Surveillance and Management of Aquatic Vegetation" at a CT DEP Wetlands Commissioner's workshop held at Housatonic Community College in Bridgeport *November 4*
- Presented two seminars on "Soils" and "Composting" as part of the Federated Garden Club's Garden Study School held in Jones Auditorium *November 8*
- Presented a seminar entitled "Using GIS in the Surveillance and Management of Aquatic Vegetation" at a CT DEP Wetlands Commissioner's workshop at the UCONN campus in Torrington *November 16*
- Spoke on "Using GIS in the Surveillance and Management of Aquatic Vegetation" at GIS Day at Central Connecticut State University *November 17*

- Spoke to a group of students from Post University on "Soil Testing and Invasive Aquatic Plants *November 22*
- Reported on the 2010 invasive aquatic plant survey of Candlewood Lake at a technical committee meeting at the CT DEP in Hartford *December 1*
- Presented a seminar on "Using GIS to control invasive aquatic plants" at a workshop for wetlands commissioners at the UConn Business School in Hartford *December 4*
- With Michael Cavidini taught Basic Soil Science to a science class at the High School in the Community in New Haven *December 10*
- Administered the multistate Aquatic Supervisory License Recertification program at the annual Northeast Aquatic Plant Management Association Conference in New Castle, New Hampshire *January 18-20, 2011*
- Gave a "Soils for Arborists" seminar at the Bartlett Arboretum in Stamford *February 3*
- Along with Jordan Gibbons, gave two Invasive Aquatic Plant Identification seminars at the CT Envirothon at Connecticut College *February 12*
- Gave the talk "Connecticut's Invasive Aquatic Plant Problem" at the CT River Museum in Essex *February 17*
- Spoke on "Soil Testing" and "Invasive Aquatic Plants" to students visiting from Wesleyan University February 22
- Spoke on "Soil Testing" and "Invasive Aquatic Plants" to instructors from Future Farmers of America February 25
- With Jordan Gibbons gave an Aquatic Plant Workshop at Three Rivers Community College in New London *March 10*
- Spoke to a class from Southern Connecticut State University on Soil Testing *March 18*
- With Michael Cavadini, led the Awesome Aquifer event at the 2011 Science Olympiad at Hartford Academy *March 26*
- Along with Jordan Gibbons, participated in the Connecticut Aquatic Nuisance Species Working Group Meeting at Avery Point in Groton *April 7*
- Presented the talk "Improving Soil in the Home Garden" to the Bethel Garden Club *April 8*
- Was interviewed about using wood ash, coffee grounds, etc. as soil amendments by Will Rowlands of Connecticut Gardener Magazine *April 22*
- Along with Jordan Gibbons, presented an invasive aquatic plant workshop to the Middlebury Land Trust *April 26*
- Along with Jordan Gibbons, gave an invasive aquatic plant workshop to high school students participating in Project CLEAR at Western Connecticut University *April 29*
- Updated the Bashan Lake Association on the status of *Cabomba caroliniana* in Bashan Lake *May 7*
- Presented a talk on "Container gardening indoors and out" to the Orange Women's Garden Club held at the Case Memorial Library in Orange *May 10*
- Presented the talk "Composing as part of a garden program" sponsored by the Cragin Memorial Library in Colchester *May 11*
- Spoke on "Using GIS to monitor and manage invasive aquatic plants" at the NEARC Conference in North Hampton, MA *May 17*
- With Michael Cavadini, instructed a high school class at the New Horizons School in New Haven on how to obtain and test soil samples *May 25*
- Spoke to a tour group of tree wardens on Soil Testing and Invasive Aquatic Plants *June 9*
- Spoke to a tour group from Central Connecticut State University on soil testing and invasive aquatic plants *June 15*
- Spoke to a tour group of teachers from Southern Connecticut State University on soil testing and invasive aquatic plants *June 29*

CECARELLI, RICHARD M.

- With Tess Foley held a conference call with the New England Grassroots Environment Fund to discuss potential funding support for upkeep of the Bird & Butterfly Garden at Lockwood Farm *October 18*

CHEAH, CAROLE A.

- With Dr. Todd Mervosh, talked about CT's biocontrol program for mile-a-minute vine to 20 students and DEEP officials from New Britain High School at Quinnipiac River State Park (23 attendees) *July 13, 2010*
- Gave a presentation on invasive species and CT's biological control program for mile-a-minute vine and hemlock woolly adelgid to high school students from the Christadora Ecology Camp at Great Mountain Forest (12 student and 3 adult attendees) *July 19*
- Was interviewed about progress of biological control of mile-a-minute vine in Connecticut by Frank MacEachern of the Greenwich Time *July 23*
- Co-authored a poster on quality control systems in predator rearing programs which was presented at the Southern Forest Insect Work Conference in Wilmington, NC *July 20-23*
- Gave a demonstration on the mile-a-minute biological control program in Connecticut in the morning, as well as the afternoon on Plant Science Day (100 and 30 attendees, respectively) *August 4*
- Co-authored a presentation with Dr. Allen Cohen, on hemlock woolly adelgid predator diets and a poster on process and quality control systems in HWA predator mass rearing at the Fifth HWA Symposium at Asheville, NC *August 17-19*
- Gave a presentation on CT's biological control program for mile-a-minute invasive weed at the CIPWG symposium on "Challenges and Successes: Working Cooperatively to manage Invasive Plants", at the University of Connecticut, Storrs (200 attendees) *October 14*
- Gave an update on CT's biological control program for mile-a-minute invasive weed for 2010 at the CAPS meeting at the Valley Laboratory, Windsor (15 attendees) *November 17*
- Gave an update on Connecticut's biological control program for mile-a-minute invasive weed, and the development of an artificial diet at the 2011 Mile-A-Minute Biological Control Cooperators' Meeting at the University of Delaware (72 attendees) *February 24, 2011*
- Visited and discussed mile-a-minute and hemlock woolly adelgid projects with cooperators from the Phillip Alampii Beneficial Laboratory, New Jersey Department of Agriculture *February 25*
- Participated in training for the Emerald Ash Borer Incident Management Team at the Connecticut Fire Academy, Windsor Locks *March 2*
- Gave an update on CT's biological control program for mile-a-minute invasive weed at the Forest Health Monitoring Workshop at New Haven (50 attendees) *March 3*
- Participated in a simulation exercise for detection of Emerald Ash Borer at Fort Trumbull *March 10*
- Gave an update on the biological control programs for mile-a-minute invasive weed and hemlock woolly adelgid at the Horticultural Inspectors Meeting, Worcester, MA 13 attendees) *April 13*
- Gave a presentation on biological control options for invasive species management (HWA and MAM) to high school students from the Housatonic Valley Regional High School, Falls Village, at Science Day 2011 hosted by the Mad Gardeners (100 attendees) April 15, 2011
- With Dr. Todd L. Mervosh and Donna Ellis of the University of Connecticut, released a further 5,000 weevils, *Rhinoncominus latipes*, for biological control of mile-a-minute weed in Connecticut. The Weevils were released at four new sites in Newtown, Greenwich, Norwalk, and Sprague *June 13-16*
- Was interviewed about control of mile-a-minute weed by weevils by Dan Kane of WFSB Channel 3 *June 13-16*
- Was interviewed about the release of weevils to control mile-a-minute weed by the Greenwich Times *June 13-16*

- Was interviewed about the release of weevils to control mile-a-minute weed by the Norwich Patch *June 13-16*
- Was interviewed about the release of weevils to control mile-a-minute weed by CBS 880 News *June 13-16*
- Was interviewed about the release of weevils to control mile-a-minute weed by the Associated Press *June 13-16*
- Was interviewed about the release of weevils to control mile-a-minute weed by the Hour *June 13-16*
- Was interviewed about the release of weevils to control mile-a-minute weed by the Norwich Bulletin *June 13-16*

COWLES, RICHARD S.

- Presented "Managing armored scales in Christmas trees" to the Connecticut Christmas Tree Growers Association at the Valley Laboratory (50 attendees) *July 20, 2010*
- Gave the talks "Managing armored scales in Christmas trees" and "Difficult to manage insects" to the Connecticut Christmas Tree Growers Association at their 50th Anniversary Meeting in Shelton, CT (100 attendees) *August 6*
- Gave the presentation "Hemlocks: Control of adelgids and scale insects" at the Valley Laboratory Nursery and Landscape Research Tour in Windsor (20 attendees) *September 22*
- Gave a lecture on "Turf Insects" for the Athletic Turf Maintenance Course at the University of Connecticut in Storrs (10 attendees) *September 28*
- Gave the Entomology Department seminar "Managing Armored Scales in Christmas Trees" at Rutgers University, New Brunswick, NJ (40 attendees) October 8
- Was the keynote speaker for Connecticut's 2010 Outstanding Biology Teacher Award Ceremony, cosponsored by the Connecticut Association of Biology Teachers and Manchester Community College, presenting "A bed bug's worst nightmare: How understanding bed bugs can be put to our advantage" (50 attendees) *October 22*
- Presented "Biological control at the Valley Laboratory" to a Bloomfield High School Environmental Studies class (15 attendees) *October 27*
- Gave a guest lecture "Bed bugs" for Education Connection, a program for four high school science classes held at Manchester Community College (120 attendees) *October 29*
- Gave a guest lecture "Bed bugs" for a non-majors entomology class at Eastern CT State University, Willimantic (12 attendees) *November 5*
- Presented a 3-hour lecture "Insect and mite pests of trees and shrubs" to a horticulture class at Naugatuck Valley Community College, Waterbury (15 attendees) *November 8*
- Spoke about "Facts and fallacies of organic agriculture" to the Garden Gate Club of Mansfield (20 attendees) *November 15*
- Presented the talk "Bark absorption of systemic insecticides" at the Emerald Ash Borer Summit at Captiva Island, FL (20 participants) *November 30*
- Presented "Pyrethroid resistance in bed bugs" at the CAES Bed Bug forum, New Haven (120 participants) *December 7*
- Discussed "Systemic insecticides and their use in trees and shrubs" and "Managing pyrethroid resistant annual bluegrass weevils" at the New Jersey Turf Expo (150 attendees each) *December 8*
- Consulted with staff from the Smoky Mountains National Park and University of Tennessee and visited eastern hemlock conservation areas to help develop guidelines for insecticide treatments for genetic conservation, Gatlinsburg, TN, (5 participants) *January 18-20, 2011*
- Presented an update to the Fir Genetic Improvement Committee of the CT Christmas Tree Growers' Association, Windsor (7 participants) *January 25*
- Gave the lectures "Facts and Fallacies of Organics" and "Systemics Aren't Just for Suckers" to the CT Grounds Keepers Association (15 attendees at each) *January 27 and 28*

- Gave two presentations on "Armored Scale Management in Christmas Trees" to the New Jersey Christmas Tree Growers' Association, Clinton, NJ (60 participants) *January 29*
- Presented "Systemic insecticide use in conifers" and "Systemic insecticide use in hardwood trees" to the Connecticut Tree Protection Association in Hartford (65 attendees each) *February 17*
- Presented the talk "The macrophotography of Jillian Cowles to the Connecticut Entomological Society" in Storrs (20 participants) *February 18*
- Gave the talk "Managing armored scales" to the North Carolina Christmas Tree Growers' Association meeting in Boone, NC (100 attendees) *March 4*
- Presented "Insect and mite management" to the CT Christmas Tree Growers' Association in Middletown, CT (80 participants) *March 5*
- Discussed "Foliar insect pests", directed a laboratory exercise on the same subject, and presented the talk "Calibrating your sprayer" at the New England Christmas Tree Growers' Workshop in Keene, NH *March 16 and 17*
- Gave a webinar on "Black vine weevils" for the North American Strawberry Growers' Association *March 25*
- Presented "Entomology" at a 3rd and 4th Grade career fair, Natchaug Elementary School, Willimantic (150 attendees) *April 8*
- Presented "Managing insect pests with systemic insecticides" at the Interstate Landscape Management Conference in Linthicum, MD (180 participants) *April 18*
- Conducted a walking field tour of Christmas tree pests for the RI Christmas Tree Growers' Association, Cranston, RI (30 attendees) *May 14*
- Presented the talk "Facts and fallacies of organics" for the East Windsor Garden club (25 attendees) *May 17*
- Was the keynote speaker and discussed "Evolution up close and personal: return of the bed bugs" for the New England Biology Association of Teachers at Two Year Colleges in Manchester, CT (40 attendees) *May 24*
- Presented "Systemic insecticides to manage hemlock pests" for the "Treatment Options for Hemlock Woolly Adelgid Workshop sponsored by the University of New Hampshire and held for northern New England foresters in Walpole, NH (50 attendees) *June 8*
- Presented two posters on the same subject at the Griswold Research Farm Field Day (20 attendees) *June 16*
- Provided a hands-on demonstration and discussed using insect pathogenic nematodes, and presented "Insect management on K-8 School Grounds" for the Adjusting to the Pesticide Ban Legislation: K-8 School Grounds Turfgrass Management Workshop sponsored by the University of Connecticut, Hartford, (70 attendees) *June 23*

DINGMAN, DOUGLAS W.

- Was interviewed about issues pertaining to honey bees by Matt Orork of the Waterbury Republican American *July 27, 2010*
- Participated in a group interview on the Len & Lisa show "Garden Talk" at WTIC 1080 radio *July 31*
- Participated in a meeting of the Programs Committee for the Quinnipiac Chapter of Sigma Xi *September 15*
- Presented the seminar "Honeybee (*Apis mellifera*) Biology" to a group of interested citizens at the Manross Memorial Library in Forestville, CT *September 29*
- Hosted a visit by genetics and biotechnology students from the Sound School in New Haven, and brief description of research activities *November 29*
- Participated in an all day planning meeting regarding microbial source tracking with officials from the Westport/Weston Health District and the University of New Hampshire *January 3, 2011*

- Participated in the annual bee school training day presented by beekeepers of the CT Beekeeping Association *February 12*
- Hosted a visit by participating members of NPDN during which he conducted a tour of the facilities in the Department of Biochemistry and Genetics and presented a brief description of honey bee research *February 23*
- Participated in the Southern New England Beekeepers Assembly in Hamden, CT *November 20*
- Hosted a visit by students from Springfield College in Springfield, MA during which he conducted a tour of the facilities in the Department of Biochemistry an Genetics and presented a seminar on honey bee research activities *March 28*
- Presented the seminar "RNAi" to beekeepers of the CT Beekeeping Association *April 9*
- Helped to demonstrate bee hives in the CAES booth at the Norwalk Tree Festival *May 21*
- Participated in a beekeeping planning meeting sponsored by the CT Beekeeping Association regarding the association apiary at Massaro Farm in Orange, CT *May 26*
- Hosted a visit by students from Southern Connecticut State University, Hamden, during which he conducted a tour of the facilities of the Department of Biochemistry and Genetics and discussed honey bee research activities *June 29*

DOUGLAS, SHARON M.

- Was interviewed about the status of late blight of tomato and potato this year by Judy Benson of The New London Day *July 7, 2010*
- Was interviewed about late blight of tomato and potato in 2010 by Julie Grant of Public Radio's "Living on Earth" series *July 7*
- Organized, assisted, and answered questions on tree diseases at the CTPA summer meeting held at the Farmington Club (590 attendees) *July 15*
- Was interviewed about late blight by Leslie Hutchison of the Meriden Record Journal *July 19*
- Gave a presentation about current diseases in Christmas tree plantations and answered questions about conifer problems at the CT Christmas Tree Growers Association twilight meeting at the Valley Laboratory in Windsor (60 attendees) *July 20*
- Was interviewed about how/why plants can grow in a driveway, particularly portulaca and petunia, by Zachary Grabko of the New Britain Herald *July 21*
- Was interviewed about why late blight isn't a problem this year and why it was in 2009 by Paul Singley of the Waterbury Republican-American *July 22*
- Appeared on Garden Talk with Len & Lisa (WTIC-1080 Radio) to publicize Plant Science Day and answer questions on plant diseases *July 31*
- Gave the invited talk "Diseases in Christmas Tree Plantations 2010" and participated in the 50th Anniversary Meeting of the CT Christmas Tree Growers Association hosted by Jones Family Farms in Shelton, CT (95 adult attendees) *August 6*
- Appeared on WNPR's Colin McEnroe show to discuss agriculture in Connecticut and late blight of tomato, and why things were different in 2009 and 2010 *August 9*
- Participated in the August meeting of the Board of Directors of the CT Tree Protective Association *August 9*
- Gave the presentation "Eco-friendly approaches to disease management in the landscape" at the September meeting of the Garden Club of Southbury (45 attendees) *September 3*
- Assisted the CT Tree Protection Examining Board with oral exams for individuals seeking arborist licenses in Connecticut *September 8*
- Participated in the monthly meeting of the Board of Directors of the CT Tree Protective Association *September 14*
- Participated in the monthly conference call of the Board of Directors of the APS Foundation *September 20*

- Participated in the annual Nursery and Landscape Research Tour and gave a talk titled "Highlights of the 2010 season" at the Valley Lab in Windsor (16 attendees) *September 22*
- Was interviewed about this year's fall foliage and the impact of drought and temperature on color by Ryan Hanrahan of Channel 3 TV *September 29*
- Was interviewed about how the recent rainy weather will impact crops in Connecticut by Dana Whalen of WTIC Radio *September 30*
- Chaired and organized a meeting of the CTPA Education Committee to discuss upcoming workshops for Connecticut arborists *October 5*
- Was interviewed about fall color and predictions for the season by Gil Simmons of TV-WTNH, Channel 8 *October 8*
- Participated in a meeting of the CTPA Board of Directors at the Station *October 12*
- Met with Dr. Odile Carisse, Lockwood Lecturer, to discuss the Station and research in the Department of Plant Pathology and Ecology *October 26*
- Participated in the Annual Meeting of the Northeastern Division of The American Phytopathological Society in Northampton, MA (65 adult attendees) *October 28-29*
- Gave a presentation titled "Introduction to Plant Pathology" and organized a visit from Dr. Daryll Borst's botany class from Quinnipiac University (6 attendees) *November 3*
- Participated in a conference call of the Northeast Plant Diagnostic Network (NEPDN) to discuss CAES' role in hosting the upcoming NEPDN meeting in New Haven in February 2011 *November 3*
- Gave a keynote presentation titled "Disease diagnosis and eco-friendly management" at the Tree Care Industry Expo 2010 held at the David L. Lawrence Convention Center in Pittsburgh, PA (850 attendees) *November 11*
- Gave a presentation about molecular and serological tests used in diagnosing plant diseases and organized a visit from George Baldwin's Genetics and Biotechnology II class from The Sound School (9 student and 1 teacher attendees) *November 29*
- Answered questions about diseases of tree fruit at the Annual Meeting of the Connecticut Pomological Society in Glastonbury *December 1*
- Participated in a planning meeting for the 2011 CTPA Annual Meeting of the CTPA Board of Directors at CAES *December 6*
- Was interviewed about Christmas trees and the challenges growers face with Phytophthora root rot by Devin Powell, science reporter for Inside Science News Service *December 7*
- Assisted the CT Tree Protective Examining Board with administering the oral exam for candidates for the CT arborist license *December 8*
- Participated in a conference call of the Board of Directors of the APS Foundation *December 13*
- Participated in the monthly meeting of the CTPA Board of Directors at the Aqua Turf Club in Plantsville *December 14*
- Participated in a special planning meeting for the 2011 CTPA Annual Meeting at CAES *December 21*
- Participated in the monthly conference call of the APS Foundation Board of Directors *January 10, 2011*
- Organized and participated in the 2011 Annual Meeting of the CT Tree Protective Association held at the Aqua Turf Club in Plantsville (632 attendees) *January 20*
- Gave an invited presentation titled "Weather and diseases of woody ornamentals" at the 2011 Annual Meeting of the Rhode Island Nursery and Landscape Association in Warwick, RI (245 attendees) *January 25*
- Gave a lecture titled "Understanding plant diseases" at the 2011 CT NOFA Organic Land Care Course (42 attendees) *January 28*
- Participated in the monthly conference call of the Board of the APS Foundation (14 participants) *February 14*

- Organized and moderated the CT Tree Protective Association Workshop titled "Pesticides – New Products for Control of Old and New Problems" held at the Lyceum in Hartford (89 adult attendees) *February 17*
- Gave the presentation "Diseases in landscape plants – 2011" at Planters' Choice Nursery in Newtown (62 attendees) *March 2*
- Gave the presentation "Update on Canavirgella needlecast of white pine" at the 2011 Forest Health Workshop held in Jones Auditorium (45 attendees) *March 3*
- Gave the presentation "Diseases of Christmas trees – A primer" at the Annual Meeting of the CT Christmas Tree Growers Association held at Snow School in Middletown (100 attendees) *March 5*
- Assisted the CT Tree Protection Examining Board with giving oral exams to candidates for the Connecticut arborist license in New Haven *March 9*
- Participated in the monthly meeting of the Board of Directors of the CT Tree Protective Association in New Haven *March 14*
- Participated in the mid-year meeting of the APS Foundation Board of Directors in St. Paul, MN *March 23-25*
- Gave the presentation "Eco-friendly management of diseases of perennials" at the Olde Ripton Garden Club in Shelton (56 attendees) *April 4*
- Was interviewed about predicting flowering and pollen levels for this year by Amanda Cuda of the Connecticut Post *April 6*
- Participated in the monthly meeting of the CTPA Board of Directors *April 12*
- Organized and participated in a meeting of the Education Committee of the CTPA to discuss workshops for 2011-2012 *April 18*
- Was interviewed about winter injury on rhododendron and other plants this year by Nancy Schoeffler of the Hartford Courant *April 26*
- Participated in conference calls for the Northeast Plant Diagnostic Network to discuss funding and budget issues *May 2 and 26*
- Discussed the research and service programs of the Department of Plant Pathology and Ecology with Dr. Jeanne Romero-Severson, who was at the Station to give a Lockwood Lecture at the invitation of Dr. Douglas *May 6*
- Participated in a conference call for the Board of Directors of the APS Foundation *May 9*
- Participated in the monthly meeting of the Board of Directors of the CTPA in New Haven *May 17*
- Participated in the Cooperative Agricultural Pest Survey (CAPS) meeting to discuss pests of concern for Connecticut for 2012 in Windsor *May 18*
- Was interviewed about the plan to close the Station and the impact on CAES services by Amanda Cuda of the Connecticut Post *June 7*
- Assisted the CT Tree Protective Examining Board in administering the oral part of the arborist licensing exam at the Station *June 8*
- Was interviewed about plants that cause dermatitis by Cindy Decker of the Columbus Dispatch (Ohio) *June 9*
- Discussed the function and services of the Plant Disease Information Office with members of the CT Tree Wardens Association (15 attendees) *June 9*
- Participated in a conference call of the Board of Directors of the APS Foundation *June 13*
- Gave a presentation titled "Eco-friendly management of plant diseases" for members of the Daytime Gardeners of North Haven (18 attendees) *June 14*
- Participated in a meeting of members of the CTPA Board of Directors and Linda Schmidt (CT DEEP) to discuss revising the written exam for the CT arborist license at the Station (12 attendees) *June 14*
- Participated in the CAPS meeting conference call *June 16*
- Participated in the monthly meeting of the CTPA Board of Directors at The Farmington Club in Farmington (14 attendees) *June 16*

- Gave the presentation "Common diseases in the landscape" for the Friends of the Middle Haddam Library at the library (17 attendees) *June 21*

DUGAS, KATHERINE
- Staffed a CAPS and Forest Pest Table at the CNLA summer meeting in Canterbury (200 attendees) *July 14, 2010*
- With Rose Hiskes, Thomas Rathier, and Katelynn King, gave a forest pest presentation to children at the Channel 3 Kids Camp in Andover (100 attendees) *July 22*
- With Rose Hiskes and Chris Donnelly, gave a forest pest training session to Advanced Master Gardeners in Bethel (35 attendees) *July 29*
- Helped conduct a survey of host trees of Asian longhorned beetle and Emerald ash borer in the Norwich Business Park in Norwich *August 19*
- Showed the video "Lurking in the Trees" which is about the Asian longhorned beetle infestation in Worcester, MA, at the Norwich Cooperative Extension Office in Norwich *August 19*
- Staffed a booth on the Asian longhorned beetle, Emerald ash borer, and "Don't Move Firewood" at Hammonasset Beach State Park in Madison *August 21*
- Staffed a booth on the Asian longhorned beetle, Emerald ash borer, and "Don't Move Firewood" at Rocky Neck State Park in East Lyme *August 28*
- Helped conduct a forest pest train-the-trainer session for advanced Master Gardeners in West Hartford (20 attendees) *September 2*
- Worked in the ALB/EAB booth at the Woodstock Fair in Woodstock *September 3 and 6*
- Gave a forest pest presentation to the public at the Putnam Library in Putnam (6 attendees) *September 14*
- Conducted an ALB/EAB train-the-trainer session for the Vernon Conservation Commission in Vernon (11 attendees) *September 16*
- Participated in a conference call for the Forest Pest Outreach and Survey Program *September 23*
- Manned a Master Gardener sponsored ALB/EAB exhibit at the Durham Fair in Durham *September 24 and 25*
- Manned the CAES booth in the Connecticut Building at the Big E in West Springfield, MA *September 28 and 29*
- Conducted an ALB/EAB training session for Yale School of Forestry students (6 participants) *September 30*
- With Rose Hiskes, taught a class on "Insect Pests of Plants" for Advanced Master Gardeners in Norwich (20 attendees*) October 6*
- With Dr. Claire Rutledge, ran the showing of "Lurking in the Trees," a Nature Conservancy documentary about the Worcester Asian longhorned beetle infestation, in Jones Auditorium (8 attendees) *October 8*
- Gave a talk about Asian longhorned beetle and Emerald ash borer to the Windsor Garden Club in Windsor (20 attendees) *October 11*
- Participated in a conference call for the Forest Pest Outreach and Survey Program *October 21*
- Gave a presentation about Asian longhorned beetle and Emerald ash borer to the Hardy Plant Society in Wethersfield (15 attendees) *October 27*
- Conducted an ALB/EAB Train the Trainer session for the Plainville Conservation Commission *November 10*
- Participated by assembling ALB and EAB outreach materials for distribution at the CT Association of Conservation and Inland Wetland Commissions Environmental Conference *November 13*
- Spoke on ALB and EAB to the Portland Garden Club *November 17*
- Conducted an EAB/ALB Train-the-Trainer session in Sharon, CT (20 attendees) *December 11*

- Participated in an EAB preparedness meeting at the Valley Lab in Windsor (20 attendees) *January 6, 2011*
- Staffed a display booth on forest pests, Asian longhorned beetle, and Emerald ash borer at the Connecticut Nursery and Landscape Association Annual Meeting at Mountain Ridge in Wallingford (300 attendees) *January 13*
- Staffed a display booth on forest pests, Asian longhorned beetle, and Emerald ash borer at the 2011 Annual Meeting of the CT Tree Protective Association held at the Aqua Turf Club in Plantsville (632 attendees) *January 20*
- Staffed a display booth on forest pests, Asian longhorned beetle, and Emerald ash borer at the Connecticut RV and Camping Show in Hartford (3,000 attendees) *January 23*
- Staffed a display booth on forest pests, Asian longhorned beetle, and Emerald ash borer at the Connecticut Grounds Keepers Association 2011 Trade Show held at the Mohegan Sun Convention Center in Uncasville *January 28*
- Spoke about Asian longhorned beetle interception in warehouses at the CT Pest Controllers Association Meeting in Jones Auditorium *February 15*
- Assisted with a DEP-run Asian longhorned beetle booth at the Northeastern Hunting and Fishing Show at the CT Convention Center in Hartford *February 20*
- Attended and staffed a display booth about Asian longhorned beetle and Emerald ash borer at the Connecticut Flower Show held at the CT Convention Center in Hartford *February 24, 25, and 27*
- Attended a public screening of the Nature Conservancy documentary "Lurking in the Trees" in Essex; after the film she participated in a discussion concerning the Asian longhorned beetle (50 attendees) *March 3*
- Learned about current delimiting and monitoring efforts for Emerald ash border in the Saugerties, NY area at Lake Katrine, NY *March 15*
- Spoke about pests and beneficial insects found in gardens to the Franklin Garden Club (12 attendees) *March 16*
- Provided information to landscapers about the Asian longhorned beetle and Emerald ash borer at the East Haven Landscape Open House (30 attendees) *March 23*
- Conducted an Asian longhorned beetle and Emerald ash borer event and gave a talk on insects during the Cub Scouts Going Buggy Camp at Camp Tadma in Bozrah (200 attendees) *April 9*
- Gave an Asian longhorned beetle and Emerald ash borer talk to a Cub Scout Pack and their leaders at the Fawn Hollow Elementary School in Monroe (60 attendees) *April 11*
- Staffed the ALB/EAB booth at the Norwalk/Wilton Tree Festival held at Cranbury Park in Norwalk (500 adult and 800 youth attendees) *May 21*
- Gave a presentation on the Asian longhorned beetle and the Emerald ash borer at Nature Day at Panthorn Park in Southington, CT (150 student attendees) *June 2*

DURGY, ROBERT

- Taught a University of Connecticut Master Gardener Program class on vegetables in West Hartford, CT (40 attendees) *February 16, 2011*
- Taught a University of Connecticut Master Gardener Program class on vegetables in Stamford, CT (31 attendees) *February 28*
- Taught Math Calculations and Calibration for Pesticide Applicator's Training in East Haven, CT (32 attendees) *February 24*
- Taught Math Calculations and Calibration for Pesticide Applicator's Training in West Hartford, CT (29 attendees) *February 22*
- Presented a workshop entitled Top 10 Vegetable Insects at the CT Farm Fresh Annual Meeting in Glastonbury, CT (13 attendees) *February 26*

- Taught a University of Connecticut Master Gardener Program class on vegetables in Brooklyn (32 attendees) *March 4*
- Presented two workshops at the CT-NOFA End of Winter conference entitled "Top Ten Vegetable Insect Pests (35 attendees) and "Deer Fencing for Large and Small Farms" (10 attendees) *March 5*
- Taught a University of Connecticut Master Gardener Program class on vegetables in Haddam (52 attendees) *March 8*
- Gave an invited lecture for the University of Connecticut Advanced Master Gardener Program entitled "Diagnosing Plant Problems" (154 attendees) *March 17*
- Taught a University of Connecticut Master Gardener Program class on vegetables in Bethel (43 attendees) *March 24*

EITZER, BRIAN D.

- Participated in the annual FDA Food Emergency Response Network Chemistry Cooperative Agreement Program technical meeting held in Denver, CO *August 16-19, 2010*
- Participated in the grant review panel for the USDA/AFRI Pest and Beneficial Insect Program which met in Washington, D.C. *September 12-17*
- Presented a talk entitled "Analysis of Pesticide Residues in Honey Bee Pollen and Wax Comb" at the 49th Annual Eastern Analytical Symposium in Somerset, NJ *November 16*
- Participated in the Principal Investigator meeting of the Coordinated Agricultural Project on the Sustainable Solutions to Problems Affecting Honey Bees, the meeting of the NC1173 Multi-state Hatch project on Sustainable Solutions to Problems Affecting Bee Health, and presented a paper entitled "The CAP Stationary Apiary Project: Pesticide Analysis" at the American Bee Research Conference in Galveston, TX *January 4-8, 2011*
- Participated in on-site training on the Thermo Fisher Scientific LC-MS/MS Rapid Resolution Exactive System *February 1-3*
- Participated in the EPA NE Regional Pesticide Roundtable Meeting in North Chelmsford, MA *February 8*
- Participated, along with Dr. Kimberly Stoner, in a conference call with Thomas Steeger and colleagues from the US EPA to discuss research on pesticides and pollinators *February 7*
- Gave a presentation on honey bees and pesticides to students from Wesleyan University that were visiting the Station (12 attendees) *February 22*
- Participated in an FDA FERN CAP Chemistry Conference Call for LC-MS Executive users *March 9*
- Was a judge at the Connecticut Science Fair at Quinnipiac University in Hamden, CT *March 16-17*
- Participated in an FDA FERN CAP Chemistry conference call for LC-MS Exactive users *April 13*
- Presented a seminar entitled "Examination of the Role that Pesticides Play in the Decline of Honey Bees at the CAES Annual Spring Open House *April 27*
- Presented the lecture "The Role of Pesticides in Honey Bee Decline" at the annual meeting of the Experiment Station Associates *May 5*
- Participated in an FFDA FERN CAP Chemistry conference call for LC-MS Exactive users *May 5 and 25*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *May 12*
- Participated in the hot-wash call for the FDA Incident Response Drill that we participated in the previous month *May 13*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *June 9*
- Participated in an FDA FERN Chemistry Conference Call for LC-MS Exactive Users *June 15*
- Hosted a tour of the Analytical Department laboratories for students from Central CT State University (12 attendees) *June 15*
- Participated in a Honey Bee CAP Stationary Apiary conference call *June 20*

ELMER, WADE H.

- Delivered an invited seminar titled "Role of mineral nutrition in plant disease" at the International Conference on Plant Nutrition held in Hyderabad, India and he co-chaired the final session (100 attendees) *August 9-13, 2010*
- Participated in the 40th anniversary of the Fusarium Research Center at Pennsylvania State University in State College, PA *September 30*
- Was interviewed about pumpkin culture by Jan Spiegel of The New York Times *October 4*
- Was interviewed about pumpkin culture by Makayla Silva of the CT Post *October 4*
- Presented a talk titled "Use of biochar to increase mycorrhizal colonization and suppress Fusarium crown rot of asparagus in replant soils" and presented the Divisional Forum Representative Report at the business meeting (12 attendees) at the Annual Meeting of the Northeastern Division of the American Phytopathological Society in Northampton, MA (65 attendees) *October 27-29*
- Gave a talk titled "Ecological and pathological significance of the Genus *Fusarium* in Connecticut" to a botany class from Quinnipiac University in Jenkins Conference Room (6 attendees) *November 3*
- Presented a biology seminar titled "Sudden Vegetation Dieback in Connecticut's salt marshes" at Central Connecticut State University in New Britain (25 attendees) *November 15*
- Participated in a meeting of the State Advisory Council for Agricultural Science and Technology at Lyman High School in Wallingford (12 attendees) *November 16*
- Spoke about "Sudden Vegetation Dieback in Connecticut's salt marshes" to students visiting the Station from George Baldwin's Genetics and Biotechnology II class from the Sound School (8 student and 1 teacher attendees) *November 29*
- Presented a workshop lecture on"Earthworms and soil health" to the UConn Fairfield County's Master Gardener Program in Bethel (12 adult attendees) *December 7*
- Was an invited scientist to Dalian Nationalities University in Dalian, China, and gave the following presentations: "Integrated strategies to suppress *Fusarium* disease of ornamentals" to the Freshman biotechnology class (75 attendees) *December 12*; "Role of *Fusarium* in Sudden Vegetation Dieback in Atlantic salt marshes" to the Department of Life Sciences (15 attendees) *December 13*; "Epidemiology and management of Fusarium crown and root rot of asparagus" to the Laboratory students of Dr. Lu Grozhong (7 attendees) *December 14*; "Role of *Fusariuim* in sudden vegetation dieback in Atlantic salt marshes" to the Environmental freshman class at the College of Life Science, Liaoning Normal University (27 attendees) *December 14*; "Earthworms and soil health" to the Laboratory students of Dr. Lu Grozhong (7 attendees) *December 15*; "Epidemiology and management of *Fusarium* crown and root rot of asparagus" to the laboratory students of Dr. Wei Hu (8 attendees) *December 16*; and "Role of *Fusarium* in sudden vegetation dieback in Atlantic salt marshes" to the Department of Crop Protection at China Agricultural University in Beijing, China (17 attendees) *December 21*
- Co-sponsored the UCONN-CAES Spring Bedding Plant Workshop and presented the talk "Update on emerging diseases, fungicides, and nutrition," in Tolland (17 attendees) *February 8, 2011*
- Presented his research findings in the presentation "Role of Plant Pathogens in Sudden Wetland Dieback" at the Connecticut Sea Grant Research Forum held at the University of Connecticut-Avery Point in Groton (22 attendees) *February 14*
- Co-sponsored the UCONN-CAES Spring Bedding Plant Workshop and presented the talk "Update on Emerging Diseases, Fungicides and Nutrition" in Torrington (34 attendees) *February 15*
- Spoke on "Soilborne diseases of food crops in Connecticut" to a group of visiting students from Wesleyan University (14 attendees) *February 22*
- Gave a tour of his laboratory to diagnosticians from the Northeast Plant Diagnostic Network (18 participants) *February 23*
- Attended a tour of Geremia Greenhouses in Wallingford with diagnosticians from the Northeast Plant Diagnostic Network and presented his findings on his flooded floor research (18 attendees) *February 23*

- Participated in the 2nd Annual Meeting of the Northeast Plant Diagnostic Network (NEPDN) in Jones Auditorium *February 24*
- Spoke on "*Fusarium* diseases of crops in Connecticut" to teachers associated with Future Farmers of America (5 participants) *February 25*
- Participated in the Northeastern Regional Extension and Academic Program Committee meeting in Simsbury *March 2*
- Presented the talk "Plant pathogens and marsh crabs associated with Sudden Vegetation Dieback in Connecticut's Salt Marshes" at the 2011 Connecticut Conference on Natural Resources in Storrs (34 a ttendees) *March 7*
- Gave a presentation titled "Role of Plant Pathogens in Sudden Vegetation Dieback in Atlantic Salt Marshes" at the Annual Meeting of the Potomac Division of The American Phytopathological Society held at Rehoboth Beach, DE (65 attendees) *March 9-11*
- Participated in the Divisional Forum of APS and presented the education initiative for high school students (9 attendees) *March 11*
- Gave the talk "Earthworms and soil health" to the Branford Garden Club in Branford (23 attendees) *March 14*
- Gave the presentation "Are there associations between *Fusarium* spp. and marsh crabs in salt marshes affected by sudden vegetation dieback?" at the Annual Meeting of the Caribbean Division of The American Phytopathological Society in San Juan, PR (6 attendees) *March 19-22*
- Spoke about sudden vegetation dieback to a group of college students from the University of Springfield, MA (14 attendees) *March 28*
- Spoke about "Use of biochar to increase mycorrhizal colonization and suppress *Fusarium* crown rot of asparagus in replant soils" to the Climate Energy, Biochar and Agriculture Seminar Series at the University of Massachusetts in Amherst, MA *March 31*
- Presented a seminar titled "Role of plant pathogens in sudden vegetation dieback" at MIT in Cambridge, MA (7 attendees) *May 19*
- Participated in the State Advisory Council for Agricultural Science and Technology at Housatonic Valley Regional High School in Falls Village (12 attendees) *May 24*
- Was interviewed about the effects of the wet weather on vegetable crops this year by Matt Dwyer of WTIC *May 27*
- Spoke about Sudden Vegetation Dieback to groups of students from Central Connecticut State University (15 student attendees) *June 15*
- Presented his plot on the role of earthworms and biochar on asparagus crown rot at the Griswold Research Center Open House (51 attendees) *June 16*
- Spoke about his eggplant plots and the role of earthworms and biochar on Verticillium wilt to Dr. Gerry Frumento's class of high school biology teachers from Southern Connecticut State University at Lockwood Farm (8 attendees) *June 29*

FENGLER, JEFFREY

- Discussed pest and disease problems and export issues with growers at the Summer Meeting of the CT Nursery and Landscape Association at Canterbury Horticulture in Canterbury (200 participants) *July 14* , 2010
- Participated in an observation of the discovery of Emerald Ash Borer in Saugerties, New York. Techniques for detection and identification of the insect in the field were discussed. Approximately 45 state and federal personnel from New York, Massachusetts, and Connecticut participated *August 10*
- Participated in an emergency preparedness summit for EAB, held at the South Mountain Regional Headquarters of the Massachusetts Department of Camping and Recreation (35 participants) *August 31*

- Participated in an emergency preparedness summit on Emerald ash borer in Jenkins Conference Room (45 participants) *September 14*
- Participated in a reaccreditation training for Authorized Certifying Official Status, conducted by Dennis Martin, Export Certification Specialist of the USDA-APHIS-PPQ, held at the Station *September 30*

FERRANDINO, FRANCIS J.
- Was interviewed about the remote access weather station located in the experimental vineyard at the Valley Laboratory by Julie Harrison of WFSB Channel 3 for "Better CT" *August 31, 2010*
- Was featured on a segment on Better Connecticut for WFSB TV-3 *September*
- Hosted a Lockwood Lecturer – Dr. Odile Carisse, a Canadian Plant Pathologist, who gave the lecture "Molecular tracking of airborne inoculum: Impact on grape disease management" *October 25-26*
- Gave a talk titled "How the dynamics of plant disease epidemics depend on the timing of inoculum production" at the Annual meeting of the Northeastern Division of the American Phytopathological Society in Northampton, MA (65 attendees) *October 27-29*
- Gave a talk entitled "Grape powdery mildew" to a Botany class from Quinnipiac University in Jenkins Conference Room (6 attendees) *November 3*
- Gave the talk "Disease risk assessment for southern Connecticut winegrapes using on-site weather data" to visiting students from Wesleyan University (13 attendees) *February 22, 2011*
- Gave the talk "Disease risk assessment for southern Connecticut winegrapes using on-site weather data" to diagnosticians from the Northeast Plant Diagnostic Network (26 attendees) *February 23*
- Spoke about powdery mildew on grapes to visitors at the Griswold Research Center Open House (51 attendees) *June 16*

FOLEY, TESS
- Participated in a conference call with representatives from the Propane Education Resource Council to discuss ongoing support for Forestry Department research on invasive barberry *September 24, 2010*
- With Richard Cecarelli, held a conference call with the New England Grassroots Environment Fund to discuss potential funding support for upkeep of the Bird & Butterfly Garden at Lockwood Farm *October 18*
- Participated in networking activities at the Farm to Chef annual meeting, designed to inform all attendees of the food crop research and agricultural services provided by the Station. Old Saybrook, 225 attendees *January 31, 2011*
- Spoke about the Station's Research Foundation and thanked members for their contributions at the annual meeting of CT Tobacco Growers held in West Suffield *February 23*

GENT, MARTIN P.N.
- Presented a poster on "A model of water movement to relate carbon and nitrogen metabolism in whole plants" at the Conference on Plant Vascular Biology held in Columbus, Ohio *July 24-27, 2010*
- Presented an oral paper "Water use efficiency with rapid watering of potted plants on flooded floors" and a poster "Managing a simple system to recycle nutrient solution to greenhouse tomato grown in rockwool" at the International Horticultural Congress in Lisbon, Portugal *August 21-28*
- Participated in the Farm to Chef annual meeting at Saybrook Point Inn (200 attendees) *January 31, 2011*
- Hosted a class from the Sound School and discussed methods of germinating seeds for hydroponics (6 student and 1 teacher attendees) *February 15*
- Presented a talk on "Life in the Greenhouse at the Connecticut Agricultural Experiment Station" at a seminar series on Careers in Biology at Mitchell College, New London (10 students) *March 24*

- Gave a talk on "Vegetable production in high tunnels, greenhouses, and in hydroponics" to the Fairfield County Farm Bureau in Bethel, CT (50 attendees) *April 2*
- Presented "Composition of hydroponic lettuce: Effect of time of day, plant size, and season" at the NE 1035 regional research committee meeting "Commercial Greenhouse Production: Component and System Development" in Portland, ME (12 extension personnel attending) *June 20-22*

HARDSTONE, MELISSA
- Presented an update on research activities on *Ochlerotatus japonicus* at the Annual Meeting of Multi-State Research Project NE-1043 "Biology, Ecology & Management of Emerging Disease Vectors" held at CAES *March 1-2*

HAWTHORNE, JOSEPH
- Gave a platform presentation entitled "Accumulation and toxicity of engineered nanoparticles to agricultural crops" at the 240th Annual Meeting of the American Chemical Society *August 22-25, 2010*

HISKES, ROSE T.
- With Dr. Todd Mervosh, gave a presentation on invasive plants to Masters students who are high school biology teachers at Southern Connecticut State University in New Haven (12 attendees) *July 1, 2010*
- Gave a presentation on forest pests and firewood at the Nonnewaug High School in Woodbury (14 attendees) *July 7*
- Prepared a display on forest pests for the Somers Garden Tour (175 attendees) *July 10 and 11*
- Staffed a Forest Pest Table and, with Dr. Claire Rutledge, Dr. Robert Marra, and Thomas Rathier, staffed the question-and-answer table at the CTPA summer meeting at the Farmington Club (590 attendees*) July 15*
- With Thomas Rathier, Katherine Dugas, and Katelynn King, gave a forest pest presentation to children at the Channel 3 Kids Camp in Andover (100 attendees) *July 22*
- With Dr. Claire Rutledge, Tim Hay of Bigelow Nurseries, MA, and Chris Donnelly, gave a Forest Pest Training Seminar to members of CNLA and CTPA in Windsor (14 attendees) *July 22*
- Was interviewed about the Emerald ash borer (EAB) by Melissa Traynor of the Hartford Courant *July 23*
- Was interviewed about the Emerald ash borer by Nancy Cohen of WNPR Public Radio *July 26*
- Gave a talk on "Weeds and Forest Pests" at a meeting of the Oxford Garden Club in Oxford (35 attendees) *July 27*
- With Katherine Dugas and Chris Donnelly, gave a forest pest training session to Advanced Master Gardeners in Bethel (35 attendees) *July 29*
- Was interviewed about the Emerald ash borer by Xerxes Wilson of the Waterbury Republican American *July 30*
- Participated in a tour of the Emerald ash borer infestation in Saugerties, NY *August 10*
- Conducted a survey of host trees of Asian longhorned beetle (ALB) and Emerald ash borer (EAB) in the Norwich business park in Norwich *August 19*
- Showed the video "Lurking in the Trees" which is about the Asian longhorned beetle infestation in Worcester, MA, at the Norwich Cooperative Extension Office in Norwich *August 19*
- Was interviewed about Emerald ash borer, Asian longhorned beetle, and the survey completed in Norwich by Stu Bryer of WICH Radio, Norwich *August 24*

- Met with Joe Rodrigues, vocational agriculture teacher in Bloomfield, to plan an educational program about ALB and EAB as well as field survey for these insects to be conducted by his students *August 25*
- Conducted a forest pest train-the-trainer session covering ALB, EAB, and firewood for arborists from the Scotts Company at the Valley Laboratory in Windsor and provided materials for them to train the 30 technicians whom they supervise (4 attendees) *August 25*
- Put on a showing of the "Lurking in the Trees" video and program about ALB and EAB at the South Windsor Library in South Windsor (23 attendees) *August 25*
- Participated in an Invasive Plant Working Group Symposium Planning Committee meeting in Windsor *August 26*
- Participated in a conference call from the Forest Pest Outreach and Survey Program *August 26*
- Helped conduct a forest pest train-the-trainer session for advanced Master Gardeners in West Hartford (20 attendees) *September 2*
- Was interviewed about Emerald ash borer, Asian longhorned beetle, and the training session planned for the Putnam Library by Gary Osbrey of WINY Radio in Putnam *September 3*
- Assisted in a forest pest presentation to Girl Scouts at the Anseox Camp in Seymour (30 attendees) *September 11*
- Gave a forest pest presentation covering ALB, EAB, and firewood, and an insect update at the Nursery and Landscape Research Tour at the Valley Laboratory in Windsor (13 attendees) *September 22*
- Gave a forest pest presentation to the Environmental Science Class of Joe Rodrigues, vocational agriculture teacher, Bloomfield, and conducted a survey of trees and entered data into Beetle Detectives.com (13 students) *September 23*
- Participated in an Invasive Plant Working Group Symposium Planning Committee meeting in Windsor *September 30*
- With Katherine Dugas, taught a class on "Insect Pests of Plants" for Advanced Master Gardeners in Norwich (20 attendees) *October 6*
- With Katherine Dugas and Katelynn King, organized a showing of "Lurking in the Trees," a Nature Conservancy Documentary about the Worcester Asian longhorned beetle (ALB) infestation, in Jones Auditorium (8 attendees) *October 8*
- Organized and moderated a breakout session of the Connecticut Invasive Plant Working Group's biennial symposium at the University of Connecticut in Storrs (350 attendees) *October 14*
- Participated in a Cooperative Agricultural Pest Survey conference call for the eastern region *October 21*
- Conducted a training session on forest pests, Asian longhorned beetle, and Emerald ash borer in Sharon (30 attendees*) December 7*
- Conducted a training session on forest pests, Asian longhorned beetle, and Emerald ash borer for public works employees in Plainville (35 attendees) *December 16*
- Participated in an Emerald ash borer preparedness meeting at the Valley Lab in Windsor (20 attendees) *January 6, 2011*
- Conducted a training session on forest pests, Asian longhorned beetle, and Emerald ash borer for Boy Scout Camp directors in East Hartford (20 attendees) *January 6*
- Gave a presentation on the CAPS program and grape pests to the Grape Grower Board in Farmington (15 attendees*) January 10*
- Gave a talk on "Houseplants and forest pests" to the Orange Garden Club in Orange (35 attendees) *January 11*
- Gave a talk on organic management of landscape and turf pests to the Organic Landcare Couse in Newburyport, MA (45 attendees) *January 19*
- Participated in a Forest Pest conference call *January 20*

- Staffed a display booth on forest pests, Asian longhoned beetle, and Emerald ash borer at the Connecticut RV and Camping show in Hartford (3,000 attendees) *January 21-22*
- Gave the talk "Pests of the Garden and Forest Pests" to the Fairfield Garden Club in Southport (6 adult attendees) *February 17*
- Along with Katherine Dugas, Ira Kettle, Steve Sandrey, Peter Trenchard and Lisa Kaczenski, staffed a display booth on forest pests at the Connecticut Flower Show in Hartford *February 24-27*
- Gave a talk on the Emerald ash borer at the Forest Health Workshop held in Jones Auditorium (45 attendees) *March 3*
- Gave a talk on "Who We Are and What We Do" and "Forest Pests" to the Windsor Civitan Club in Windsor (22 attendees) *March 9*
- Participated in the US Forest Service Delimitation Survey in Saugerties, New York, peeling ash logs looking for Emerald ash borer larvae *March 15*
- Gave a talk on Asian longhorned beetle and Emerald ash borer at the Bloomfield Lecture Series held at the Harris AgriScience Center in Bloomfield (50 attendees) *March 25*
- Staffed an Experiment Station and Forest Pest table at the Connecticut Master Gardener Symposium at Manchester Community College in Manchester (300 attendees) *March 26*
- Participated in a Connecticut Invasive Plant Working Group Steering Committee meeting and general meeting in Windsor *March 30*
- Participated in the Eastern Plant Board Meeting in Worcester, MA, as the Cooperative Agricultural Pest Survey State Survey Coordinator *April 12-14*
- Gave a talk on Butterfly Gardening, the Asian longhorned beetle, and the Emerald ash borer at the Cheshire Library (23 attendees) *April 19*
- Staffed an Insect Inquiry Office and forest pest table at The Station's Open House (75 attendees) *April 27*
- Participated in the Forest Pest Outreach and Survey Program conference call *May 19*
- Led a volunteer survey for Asian longhorned beetle and Emerald ash borer with the Vernon Greenways Volunteers. Data were entered into the Beetle Detectives website (12 attendees) *May 21*
- Participated in the Forest Pest Outreach and Survey Program conference call *June 9*
- Was interviewed about the Emerald ash borer by Bob Miller of the Danbury News Times *June 10*
- Gave a talk on "Pests of the garden" at the Milford Library (25 attendees) *June 15*
- Was interviewed about ants by Harlan Levy of the Manchester Journal Inquirer *June 20*

INMAN, MARY K.

- Assisted with the CAES booth and answered questions about tree diseases at the CTPA summer meeting held at the Farmington Club (590 attendees) *July 15, 2010*
- Gave a presentation on "Needlecast diseases of Douglas fir" as part of the farm tour at the 50th Anniversary Meeting of the CT Christmas Tree Growers Association hosted by Jones Family Farms in Shelton (100 adult attendees) *August 6*
- Gave the presentation "General care and common problems of houseplants" at the Lucy Robbins Welles Library in Newington, as part of their "Water Your Mind" adult summer reading program (19 attendees) *August 19*
- Spoke on "Vegetative propagation of woody ornamental plants" to the Branford Garden Club (Evening Group) in Branford (18 attendees) *September 13*
- Gave a talk on "Plant propagation" to the Branford Garden Club (day group) in Branford (46 attendees*) October 7*
- Gave a talk titled "Pruning woody ornamentals" to the Conservation Committee of the Fairfield Garden Club in Fairfield (19 attendees) *November 18*

- Staffed the CAES Booth and answered questions from arborists at the 2011 Annual Meeting of the CT Tree Protective Association held at the Aqua Turf Club in Plantsville (632 adult attendees) *January 20, 2011*
- Gave a talk titled "Maintaining healthy perennials" for the Caudatowa Garden Club in Ridgefield (28 attendees) *February 8*
- Gave a talk on "Houseplants" at the Cragin Library in Colchester (28 attendees) *February 15*
- Participated in and helped host the 2nd Annual Meeting of the Northeast Plant Diagnostic Network at the Station (26 attendees) *February 22-24*
- Gave the talk "Fruit trees in the home garden" at the Case Memorial Library in Orange (16 adult and 1 youth attendees) *March 28*
- Gave the talk "General care and common problems of houseplants" to the Cheshire Garden Club at St. Peter's Episcopal Church in Cheshire (25 attendees) *April 4*
- Gave the talk "Pruning woody ornamentals" to the Wallingford Garden Club in Wallingford (40 attendees) *May 10*

JUNE-WELLS, MARK
- Presented a talk entitled "Water chemistry preferences of five non-native aquatic macrophyte species in Connecticut, USA" at the CT Conference on Natural Resources at UConn, Storrs *March 7, 2011*
- Presented a talk entitled "Water chemistry preferences of five non-native aquatic macrophyte species in Connecticut, USA" at a meeting of the New England Association of Environmental Biologists held in Sturbridge, MA *March 16*
- Presented a talk entitled "Water chemistry preferences of five non-native aquatic macrophyte species in Connecticut, USA" at a meeting of the Society of Ecological Restoration in Baltimore, MD *April 4*
- Presented a talk entitled "Water chemistry preferences of five non-native aquatic macrophyte species in Connecticut, USA" at a meeting of the New England Chapter of The North American Lake Management Society *June 4*

KETTLE, IRA
- Gave a talk on honey bees and pollinators to The Quinnipiac River Watershed authority at their pollinator garden in Meriden (25 attendees) August 21, 2010
- Did a honey bee presentation for the Rosh Hashanah Apple and Honey Family Festival held at Brooksvale Park in Hamden (150 attendees) *August 29*
- Presented a honey bee display and manned the ALB and EAB table at the Woodstock Fair in Woodstock *September 3-6*
- Participated in a training session on ALB and EAB at the Putnam Library in Putnam (10 attendees) *September 7*
- Had a honey bee display and manned the ALB and EAB table at the Hebron Fair in Hebron *September 9-11*
- Had a honey bee display and manned the ALB and EAB table at Harkness Park Family Day in Waterford (1,042 visitors to the table) *September 12*
- Had a honey bee display and manned the ALB and EAB table at Celebrating Agriculture Day at the Woodstock Fair Grounds in Woodstock *September 25*
- Had a honey bee display and manned the ALB and EAB booth in the Connecticut Building at the Big E in West Springfield, MA *September 28 and 29*
- Gave a honey bee presentation at the Brooksvale Park Fall Festival in Hamden. He displayed honey bees and gave out handouts (361 visitors*) October 6*
- Gave a honey bee presentation for three classes at The Children's Tree Montessori School in Old Saybrook (37 youth and 11 adult attendees) *October 20*

- Manned a table on the Asian longhorned beetle/Emerald ash borer and Don't Move Firewood at the Connecticut RV and Camping Show held at the Convention Center in Hartford *January 22 and 23, 2011*
- Manned the Asian longhorned beetle and Emerald ash borer booth at the Connecticut Grounds Keepers Association 2011 Trade Show held at the Mohegan Sun Convention Center in Uncasville *January 28*
- Gave a talk on the importance of registering bee colonies in Connecticut, reported on findings concerning last season's inspections, and spoke with beekeepers concerning beekeeping practices at the Bee School of the Connecticut Beekeepers Association held in Jones Auditorium (155 adult attendees) *February 12*
- Manned the honey bee display and the Asian longhorned beetle/Emerald ash borer table at the Connecticut Flower Show in Hartford *February 24-27*
- Gave a honey bee educational talk with live honey bees, spoke on the importance of honey bees as pollinators, and had a question-and-answer period after the lecture at the after-school agricultural program at Lake Street School in Vernon (25 youth and adult attendees) *April 11*
- Showed honey bees and spoke on the importance of pollination by these insects in Connecticut and the nation at Agricultural Day at Chester Elementary School in Chester (275 student and 20 adult attendees) *April 27*
- Presented live honey bees and had a display of honey, varroa mites in alcohol, and preserved bees in alcohol with deformed wing virus. There was also a cup of propolis and 100% beeswax samples, and the children got to see a bee suit and a smoker at the Norwalk/Wilton Tree Festival at Cranbury Park in Norwalk (500 adult and 800 youth attendees) *May 21*
- Gave a honey bee presentation on the importance of pollination at Nature Day at Panthorn Park in Southington, CT (150 student attendees) *June 2*
- Gave a presentation on honey bees and the importance of pollinators in Connecticut at the June meeting of The Friends of Harkness held at the Harkness Mansion in Waterford, CT (35 attendees) *June 6*
- Manned the display on honey bees and the importance of pollination and the Asian longhorned beetle/Emerald ash borer informational table at the Griswold Research Center Open House (66 attendees) *June 16*
- Manned a booth on honey bees and the importance of pollination and gave informational talks on the Asian longhoned beetle and the Emerald ash borer at the Bristol Flower show held at the carousel Museum in Bristol, CT (200 attendees) *June 18*
- Participated in a honey bee workshop where he opened hives, showed bees on frames, showed a queen on a frame from another hive and held a question and answer segment at Massaro Community Farm in Woodbridge, CT (40 attendees) June 25

KING, KATELYNN

- Staffed a CAPS and Forest Pest Table at the CNLA summer meeting in Canterbury (200 attendees*) July 14, 2010*
- Gave a presentation to Girl Scouts at Camp Merrie-Wood in Manchester (45 attendees) *July 15*
- Gave a presentation to elementary school students at summer camp at the Common Ground School in New Haven (50 attendees) *July 16*
- With Rose Hiskes, Thomas Rathier, and Katherine Dugas, gave a forest pest presentation to children at the Channel 3 Kids Camp in Andover (100 attendees) *July 22*
- Helped staff an ALB, EAB, "Don't Move Firewood booth at the Sharon Audubon Festival in Sharon *August 15*
- Helped conduct a survey of host trees of ALB and EAB in the Norwich Business Park in Norwich *August 19*

- Participated in a showing of "Lurking in the Trees," a video about the ALB infestation in Worcester, MA at the Norwich Cooperative Extension Office in Norwich *August 19*
- Staffed an ALB, EAB, and Don't Move Firewood booth at Hammonasset Beach State Park in Madison *August 28*
- Helped staff an ALB, EAB, and Don't Move firewood booth at Rocky Neck State Park in East Lyme *August 28*
- Helped conduct a forest pest train-the-trainer session for advanced Master Gardeners in West Hartford (20 attendees) *September 2*
- Staffed a forest pest booth at the Ansonia Nature Center's Sustainability Fair in Ansonia (20 attendees) October 16

KROL, WALTER J.

- Participated in the annual FDA Food Emergency Response Network Chemistry Cooperative Agreement Program technical meeting held in Denver, CO *August 16-19, 2010*
- Participated in a EPA Region 1 Conference call to finalize the arrangements for a meeting to be held in Chelmsford, MA on February 8, 2011 *January 10, 2011*
- Participated in on-site training on the Thermo Fisher Scientific LC-MS/MS Rapid Resolution Exactive System *February 1-3*
- Participated in the EPA NE Regional Pesticide Roundtable Meeting in North Chelmsford, MA *February 8*
- Participated in an FDA FERN proficiency testing teleconference *February 9*
- Participated in the FDA FERN training webinar on laboratory accreditation *February 15*
- Was interviewed by Kate Deubert of Publix GreenWise Market for an article on pesticide residues on food *February 24*
- Participated in a National Center for Food Protection and Defense Webinar entitled "New Food Models: Bioterrorism Risk Assessment (BTRA)" *March 5*
- Participated in an FDA FERN CAP Chemistry Conference Call for LC-MS Exactive Users *March 9*
- Participated in an FDA FERN CAP Chemistry conference call for LC-MS Exactive users *April 13*
- Presented a poster entitled "The Deepwater Horizon Oil Spill: The Role of the Connecticut Agricultural Experiment Station" at the Quinnipiac University Earth Day Celebration (600 attendees) *April 14*
- Participated in an FDA FERN CAP Chemistry conference call for LC-MS Exactive users *May 5 and 25*
- Served as a judge for the ACS Award for Excellence in Chemistry at the New Haven Science Fair held on the campus of Yale University *May 10*
- Presided as Secretary at the New Haven Section of the American Chemical Society Executive Board Meeting *May 11*
- Participated in an FDA FERN Chemistry Cooperative Agreement CAP Laboratory conference call *May 12*
- Presented the talk "Catching Pesticide Residues in the Food We Eat" at the White Memorial Conservation Center in Litchfield (40 attendees) *May 18*
- Organized an awards banquet as part of the New Haven Section of the American Chemical Society National Chemistry Week (100 student, teacher, and parent attendees) *May 24*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *June 9*
- Participated in an FDA FERN CAP Chemistry conference call for LC-MS Exactive users *June 15*
- Participated in an FDA FERN-wide conference call *June 29*

LAMONDIA, JAMES A.

- Participated in the Executive Board meeting (as Vice-President), met with committee chairs, and presented a poster entitled "Rotation and green manure crops for management of lesion and dagger nematodes" at the annual meeting of the Society of Nematologists held in Boise, ID *July 9-15, 2010*
- Participated in a USDA block grant review of strawberry research at the Valley Laboratory *July 29*
- Was interviewed about the tobacco crop and tobacco diseases by Dana Whalen of WTIC Radio *August 9*
- Discussed tobacco breeding and the Connecticut program for resistance to plant pathogens with officials of Lancaster Leaf *August 10*
- Was interviewed about tobacco blue mold severity and potential fungicide resistance by Dan Chunglo for the Insurance Industry *August 11*
- Was interviewed about grape harvest and grape diseases by July Simmons Harrison of WFSB, "Better CT" *August 24 and 31*
- Examined candidates for the Connecticut arborist license and participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven *September 8*
- Welcomed participants and spoke about biology and management of foliar nematode pathogens of nursery and landscape plantings as a part of the Valley Lab Nursery and Landscape Research Tour (16 attendees) *September 22*
- Spoke on progress toward release of disease-resistant tobacco breeding lines to the CAES Board of Control at the Valley Laboratory *October 13*
- 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 (40 attendees) *October 13*
- Spoke about research results at the annual meeting of the Northeast Regional Multistate Nematology Technical Committee (NE-1019) held in Northampton, MA (15 attendees) *October 25-27*
- Served as Past-President, Chair of the Awards Committee, and presented an invited nematology symposium presentation on "Implementing Alleopathic Chemical and Cultural Controls, and presented a research paper entitled "Early Season Potyvirus Epiphytotic Effects on Cigar Wrapper Tobacco in Massachusetts and Connecticut" at the Northeast Division Meeting of the American Phytopathological Society in Northampton, MA (45 attendees) *October 27-29*
- Was interviewed about Valley Laboratory services and research by Julian McKinley, editor of Patch.com *November 3*
- Participated in a planning meeting of the Connecticut Agricultural Information Council *January 11, 2011*
- Spoke about "*Phytophthora* moves to beans" at the Connecticut Vegetable and Small Fruit Growers Conference in Vernon, CT (175 attendees) *January 20*
- Spoke about "Berry root problems" at the Empire State Fruit and Vegetable Expo in Syracuse, NY (84 attendees) *January 27*
- Spoke about controlling nematodes with cover crops as a part of the University of Rhode Island SARE "Making Cover Crops Work for You" meeting held in Sturbridge, MA (27 attendees) *February 17*
- Organized the CAES tobacco research meeting and spoke about research on management of tobacco pathogens including poty viruses, target spot, and progress of the breeding program for multiple pathogen resistance in Suffield, CT (135 participants) *February 23*
- Examined candidates for the Connecticut arborist license and participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven *March 9*
- 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 (45 attendees) *March 9*

- Participated in a meeting of the Connecticut Agricultural Information Council to select the Connecticut Outstanding Young Farmer Award winner and prepare for Ag Day at the Capitol *March 10*
- Spoke about "Nematodes and root rot diseases" during a webinar for the North American Strawberry Growers Association *March 25*
- Spoke about research and services at the Valley Laboratory and science as a career to a Girl Scout group from Avon, CT (7 attendees) *March 25*
- Was interviewed about tobacco culture and the potential use of biochar in tobacco production by a graduate student in Business, and Research Analyst for the Connecticut Center for Entrepreneurship and Innovation and two colleagues from Business and Engineering at the University of Connecticut *March 29*
- Spoke about management of tobacco pathogens including poty viruses, target spot and progress of the breeding program for multiple pathogen resistance at the CPS tobacco growers meeting in East Windsor (115 attendees) *April 4*
- Visited with the Department of Entomology and Plant Pathology faculty, met with graduate students and presented an invited seminar on the use of allelopathic rotation and cover crop plants for nematode management at Auburn University in Alabama (45 attendees) *April 11-12*
- Was interviewed about Valley Laboratory services and research by Julian McKinley of Windsor Patch.com *April 15*
- Hosted a Bolton High School student for a job shadowing program at the Valley Laboratory *May 4*
- Examined candidates for the Connecticut arborist license and participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven *June 8*
- Conducted a tour of the Valley Laboratory and discussed research and careers in science with students from Rockville High School Vo-Ag Advances in Agriculture Class (4 attendees) *June 9*
- Met with representatives from Leaf Tc from the United Kingdom to discuss social responsibility initiatives in cigar wrapper tobacco production in Connecticut *June 15*
- Participated in the Griswold Research Farm Open House *June 16*
- Gave a tour of the Valley Laboratory and discussed research and services with the curator of the Luddy/Taylor Connecticut Valley Tobacco Museum located in Northwest Park in Windsor *June 29*

LATTAO, CHARISMA V.

- Gave the presentation "Probing Sorption Selectivity of Neutral Organic Compounds to Soil/Sediment Organic Matter Through Advanced Solid State NMR and Nuclear Paramagnetic Relaxation Probes" at the Humic Science and Technnology XIV Conference in Northeastern University, Boston, MA *March 11, 2011*
- Gave the presentation "Probing Sorption Selectivity of Neutral Organic Compounds to Soil/Sediment Organic Matter Through Advanced Solid State NMR and Nuclear Paramagnetic Relaxation Probes" at the European Geosciences Union General Assembly 2011 in Vienna, Austria *April 5*

LI, DE-WEI

- Visited Shandong Academy of Forestry, Shandong Agricultural University, Qingdao Forestry Bureau, Hubei Academy of Forestry, and Jiangsu Polytechnic College of Agriculture and Forestry in China. During his visit, he gave presentations on "Mycology, Forest Pathology, and Forestry" and "Forestry and Forest Diseases in the US" at Shandong Academy of Forestry and Shandong Agricultural University, respectively, and had a round table discussion on biocontrol of plant diseases with forest protection specialists at Qingdao Forestry Bureau. In Hubei Province he made a field trip to the western area of the province with Dr. Jingyuan Chen of Hubei Academy of Forestry Research and 106 hyphomycete specimens were collected. De-Wei obtained three type cultures *of Stachybotrys nielamuensis*, *Stachybotrys variabilis*, and *Stachybotrys zhangmuensis* from Professor Tian-Yu Zhang of Shandong Agricultural University and four cultures of *Stachybotrys* spp. from The

Fungal Culture Center, Chinese Forestry Academy. De-Wei also worked on his collaborative research of biocontrol of blue stain fungi on wood of hybrid poplar with Professor Guihua Zhao at Jiangsu Polytechnic College of Agriculture and Forestry. This project is sponsored by State Forestry Administration, PR China, Program 948 *June 25-July 15, 2010*

- Was interviewed by Robert Miller, a journalist from The News-Times in Danbury about the appearance of giant puffballs, *Calvatia gigantean* in CT *October 20*

LI, YONGHAO

- Presented a poster titled "Evaluation of resistance to *Pucciniastrum hydrangea* in *Hydrangea arborescens*" at the Annual Meeting of the American Phytopathological Society in Charlotte, NC *August 6-11*
- Gave the talk "Needlecast diseases in conifers" at an Extension Meeting (12 attendees) and gave a second talk "Anthracnose of *Miscanthus sinensis* caused by *Colletotrichum graminicola*" at the Annual Meeting of the Northeastern Division of the American Phytopathological Society in Northampton, MA (65 attendees) *October 27-29*
- Gave a talk titled "Plant disease diagnostics" to a botany class from Quinnipiac University in Jenkins Conference Room (6 attendees) *November 3*
- Participated in the Annual Meeting of Connecticut Pomological Society in Glastonbury *December 1*
- Staffed the CAES booth and answered questions from arborists at the 2011 Annual Meeting of the CT Tree Protective Association held at the Aqua Turf Club in Plantsville (632 adult attendees) *January 20, 2011*
- Participated in the UCONN-CAES Spring Bedding Plant Workshop held in Tolland *February 8*
- Participated in the 2nd Annual Meeting of the Northeast Plant Diagnostic Network at the Station *February 22-24*
- Presented the talk "Introduction to the Plant Disease Information Office" at the Northeast Plant Diagnostic Network Meeting in Room 12 of Jenkins Laboratory (23 attendees) *February 23*
- Presented "Highlights from the Plant Disease Information Office" at the Northeast Plant Diagnostic Network Meeting in Jones Auditorium (18 attendees) *February 24*
- Gave a lecture on "Diseases of trees" to the Arboriculture 101 class in Stamford (15 attendees) *March 3*
- Participated in the Lab Accreditation Training for the National Plant Diagnostic Network STAR-D Project in Ames, IA *April 11-15*
- Spoke about the Plant Disease Information Office and plant disease diagnostics to Dr. Gerry Frumento's class of high school teachers from Southern Connecticut State University (8 attendees) June 29

MAGNARELLI, LOUIS A.

- Attended a meeting at the DEEP in Hartford and spoke about proposed new EPA pesticide regulations for aquatic systems *July 12, 2010*
- Was interviewed by Laura Collier of News 12 in Norwalk about bird and butterfly gardens *July 12*
- Was interviewed about Station research programs by Ray Bendici of Connecticut Magazine *July 21*
- Was interviewed about Experiment Station research and Plant Science Day by Ray Andrewsen of WQUN Radio in Hamden *July 28*
- Was interviewed about Station scientists testing seafood from the Gulf of Mexico by Ed Stannard of the New Haven Register *July 29*
- Was interviewed about Station scientists testing seafood from the Gulf of Mexico by Nancy Cohen of WNPR Radio *July 29*

- Was interviewed about Station scientists testing seafood from the Gulf of Mexico by Judy Benson of the New London Day *July 29*
- Spoke about Experiment Station programs at the 50th anniversary of the CT Christmas Tree Association in Shelton *August 6*
- Was interviewed about seafood testing by Doug Hardy of the Journal Inquirer *August 16*
- Was interviewed about Experiment Station programs by Anders Helm of MooDog Press *August 19*
- Was interviewed about mosquitoes and West Nile virus by Bob Miller of the Danbury News Times *August 20*
- Gave a presentation to 6 members of the Legislative Senate Democrats Office on research activities at the Experiment Station *September 8*
- Described regulatory procedures to the Invasive Plants Council in Windsor *September 14*
- Was interviewed about ticks by Mary Jasch of Dig-IT Magazine *September 16*
- Gave a presentation on research progress at the Station to the Experiment Station Associates Board *September 20*
- Was interviewed about ticks and Lyme disease by Amy Barth of Discover Magazine *October 8*
- Was interviewed about Lyme disease by Abigail Dumes of Yale University *October 8*
- Spoke about the Experiment Station's research programs at the New Haven Farm Bureau meeting in Hamden *October 19*
- Welcomed the Landscape Design School class in Jones Auditorium and gave an update on research *November 8*
- Participated in a meeting of the Invasive Plants Council in Hartford *November 9*
- Welcomed architects to the Station and answered questions on the staff and science initiative related to the Jenkins Building (16 attendees) *November 10*
- Welcomed participants in a landscape educational course in Jones Auditorium and reported on Station research (28 participants) *November 12*
- Spoke to legislators in Hartford about Experiment Station research *December 1*
- Spoke about Station research at an Experiment Station Associates meeting in the Slate Board Room *December 7*
- Was interviewed about the brown marmorated stink bug by Stephanie Reitz of the Associated Press *December 29*
- Was interviewed about the brown marmorated stink bug by WTNH-TV 8 *January 3, 2011*
- Welcomed visitors of the Northeast Plant Diagnostic Laboratories in Jones Auditorium *February 22*
- Gave opening remarks to the tobacco growers at their annual meeting in Suffield, CT *February 23*
- Testified before the Appropriations Committee in Hartford by giving a brief report on Experiment Station accomplishments *February*
- Participated in an Invasive Plants Council Meeting in Hartford *March 8*
- Welcomed Federated Garden Club members in Jones Auditorium and gave a brief report on Station research *March 22*
- Was interviewed about the brown marmorated stink bug by Bob Miller of the Danbury News Times *March 31*
- Gave a report on Station research and activities at the Annual Meeting of the Tree Wardens in Portland *March 31*
- Was interviewed about mosquitoes by Abe Katz of the New Haven Independent *April 4*
- Was interviewed about the Experiment Station's open house program by Greg Little of WQUN radio *April 26*
- Welcomed state residents during the Station's open house and gave a brief report on research *April 27*
- Was interviewed about the possible elimination of the Experiment Station by Nancy Cohen of NPR *May 11*

- Was interviewed about the possible elimination of the Experiment Station by Ann DeMatteo of the New Haven Register *May 11*
- Was interviewed about the possible elimination of the Experiment Station by Melinda Tuhus of WQUN Radio *May 12*
- Was interviewed about the possible elimination of the Experiment Station by Will Rowlands of the CT Gardener *May 13*
- Was interviewed about the Emerald ash borer by Fran Schneido of WCBS Radio *May 19*
- Was interviewed about the Experiment Station's budget by WQUN Radio in Hamden, CT *June 1*
- Gave a report on Station research and other activities to the Experiment Station Associates *June 6*

MAIER, CHRIS T.

- Exhibited specimens of the brown marmorated stink bug and an uncommon dung beetle and briefly discussed their biology at a meeting of the Connecticut Entomological Society in Jones Auditorium *October 22*
- Spoke about a survey for the European wood wasp and about the brown marmorated stink bug at a meeting of the Cooperative Agricultural Pest Survey Advisory Committee at the Valley Laboratory in Windsor *November 17*
- Spoke about the conservation status of horse and other flies at a meeting of the Invertebrate Subcommittee of Connecticut's Endangered Species Committee at the Station *November 19*
- Displayed the Connecticut species of wood wasps in the family Siricidae at a meeting of the Connecticut Entomological Society held at Yale University (30 adult attendees) *November 19*
- Presented a display on and spoke about the "Invasive Brown Marmorated Stink Bug" at the Annual Meeting of the Connecticut Pomological Society in Glastonbury (70 attendees) *December 1*
- Participated in the Annual Meeting of the Entomological Society of America in San Diego, CA *December 12-15*
- Was interviewed about the brown marmorated stink bug by Matt O'Rourke of the Waterbury Republican-American *January 3, 2011*
- Was interviewed about the brown marmorated stink bug by Dan Kain of Channel 3 News *January 5*
- Worked on the collection of longhorned beetles at the American Museum of Natural History in New York, NY *January 18*
- Displayed a poster on "The Invasive Brown Marmorated Stink Bug" at the 2011 Annual Meeting of the CT Tree Protective Association held at the Aqua Turf Club in Plantsville (632 attendees) *January 20*
- Worked on a collection of longhorned beetles at the American Museum of Natural History in New York, NY *February 8*
- Displayed entomological literature, including the 1895 field guide titled "Beetles of New England" at a meeting of the Connecticut Entomological Society held at the University of Connecticut in Storrs *February 18*
- Spoke about the "Invasive Brown Marmorated Stink Bug" at the Forest Health Workshop held in Jones Auditorium (45 attendees) *March 3*
- Was interviewed about the brown marmorated stink bug by Theresa Sullivan-Barger, a freelance reporter writing an article for the Hartford Courant April 5
- Displayed new entomological literature at the Annual Dinner Meeting of the Connecticut Entomological Society in Jones Auditorium and was elected President of the Society for 2011-2012 (35 attendees) *April 15*
- Spoke at a planning meeting of the officers of the Connecticut Entomological Society at the University of Connecticut in Storrs *May 20*

- Spoke about the biology and control of the brown marmorated stink bug at a twilight meeting of the Connecticut Entomological Society held at March Farms in Bethlehem *May 31*

MARRA, ROBERT E.

- Assisted with the CAES booth and answered questions about tree diseases at the CTPA summer meeting held at the Farmington Club (590 attendees) *July 15, 2010*
- Gave the talk "Fungi of the forests: Friends and foes" to the Naugatuck Valley Audubon at the Kellogg Environmental Center in Derby (30 adult and 5 teenager attendees) *September 21*
- Gave a lecture titled "*Phytophthora ramorum*: Molecular diagnostics in plant pathology" to a biology class at Central Connecticut State University in New Britain (24 student attendees) *October 15*
- Gave a presentation titled "Can bacteriophage be used to control bacterial leaf spot of peach?" at the Annual Meeting of the Northeastern division of the American Phytopathological Society in Northampton, MA (65 attendees) *October 28-29*
- Staffed a table and presented posters on two research projects, "The population genetics of the perennial canker fungus, *Neonectria ditissima*" and "Use of sonic and electrical impedance tomography to assess internal decay in trees" at the annual Connecticut Urban Forest Council meeting in Wallingford (168 attendees) *November 3*
- Spoke about *Phytophthora ramorum*, Sudden Oak Death, and Molecular Diagnostics to seniors visiting the Station from a Genetics and Biotechnology II class at The Sound School, 8 student and 1 teacher attendees) *November 29*
- Spent three weeks in Bangladesh conducting a training workshop in plant disease diagnostics for ten young scientists in the Plant Pathology Department at the Bangladesh Agricultural Research Institute in Joydepur, Bangladesh. He provided knowledge and taught them skills to carry out disease diagnostics using state-of-the-art equipment which had never been used by them since it was acquired several years ago *December 25, 2010 – January 2011*
- Served as a member of the Steering Committee and presented two talks, the first titled The Sudden Oak Death Pathogen, *Phytophthora ramorum*: are Connecticut's forests at risk?" (50 attendees), and the second titled "A new species of *Fusarium: F. palustre*, a pathogen of *Spartina alterniflora* associated with wetland dieback in eastern marshes" (34 attendees) at the 5th Connecticut Conference on Natural Resources held in Storrs *March 7*
- Attended the Ph.D. dissertation defense of student at the University of Massachusetts in Amherst, as a member and advisor on the student's committee *March 31*
- Spoke about plant pathology and the science behind plant disease diagnostics to two groups of students visiting the Station from Greens Farms Academy (25 student and 2 teacher attendees) *April 12*
- Spoke with the West Haven Tree Commission at West Haven City Hall about issues to consider in choosing street trees (4 Commission members, 3 adults and 1 student attendees) *April 19*
- Served as a special awards judge at the New Haven Public Schools Science Fair in New Haven *May 10-12*
- Participated in the West Haven Tree Commission's Leadership Training Program in preparation for the city's street tree inventory *May 14*
- Participated in the CT Cooperative Agricultural Pest Survey meeting held at the Valley Lab in Windsor *May 18*
- Helped staff the Experiment Station's booth at the Norwalk-Wilton Tree Festival at Cranbury Park in Norwalk *May 21*
- Spoke about forensics in plant pathology to Tom Mione's class visiting from Central Connecticut State University (20 attendees) *June 15*
- Participated in the CAPS meeting conference call *June 16*
- Discussed the West Haven Street Tree Inventory in West Haven at a meeting of the West Haven Tree Commission *June 23*

- Spoke about his research and about the Station's efforts to keep on the lookout for the Ramorum blight pathogen using the tools of molecular plant pathology to Gerry Frumento's class of high school teachers from Southern Connecticut state University (10 attendees) *June 29*

MAYNARD, ABIGAIL A.

- Spoke about the New Crops Program with officials from the Connecticut Department of Agriculture and the United States Department of Agriculture at Lockwood Farm *July 29, 2010*
- Spoke about Plant Science Day and the New Crops Program on the radio show "Garden Talk" on WTIC 1080 Radio *July 31*
- Gave a talk on composting and utilization of compost at the Cheshire Library (18 attendees) *September 22*
- Gave a tour of Lockwood Farm and talked about the New Crops Program to the Pre-Kindergarten and 3rd grade from Hamden Hall Country Day School (36 students, 6 adults) *October 13*
- Talked about the New Crops Program at the Hindinger Farm in Hamden *November 2*
- Participated in the annual meeting of the Connecticut Pomological Society in Glastonbury *December 1*
- Was interviewed about leaf composting by Michael Camp of Ohio State University *December 2*
- Participated in a meeting of the State Technical Committee in Storrs *December 8*
- Reported on Station activities at a quarterly meeting of the Council on Soil and Water Conservation in Windsor (15 attendees) *December 9*
- Gave a talk about the New Crops Program to the Milford Garden Club (42 adults) *January 11, 2011*
- Participated in the Connecticut Vegetable and Small Fruit Conference in Vernon *January 20*
- Gave a talk about careers in agricultural research to juniors and seniors at Hamden Hall Country Day School (45 student, 3 teacher attendees) *January 28*
- Spoke about the New Crops Program to students from Wesleyan University who were visiting the Station (16 student and 2 teacher attendees) *February 22*
- Assisted Upper School students with their science projects at Hamden Hall Country Day School (26 student and 1 teacher participants) *February 24*
- Assisted in the planning of a spring garden for preschool and kindergarten students (28 student and 3 teacher participants) *February 24*
- Spoke about the New Crops Program to Future Farmers of America teachers who were visiting the Station (6 adult and 1 student participants) *February 25*
- Assisted Lower School teachers at Hamden Hall Country Day School in planning a vegetable garden *March 10*
- Participated in a Department of Agriculture workshop about the Specialty Crop Block Grant at Jones Auditorium *March 11*
- Spoke on composting and the utilization of compost to residents of the Manson Youth Institution in Cheshire (32 students, 3 adults) *April 6*
- Advised pre-kindergarten and kindergarten teachers at Hamden Hall Country Day School about spring gardening for young children *April 21*
- Spoke about the New Crops Program to tour groups in the greenhouse from the Spring Open House (30 adults) *April 27*
- Assisted ninth graders with their Honors Biology projects at Hamden Hall Country Day School (29 students, 1 teacher) *May 19*
- Spoke about the New Crops Program at the Offinger Farm in Wilton *May 20*
- Participated in a meeting of the State Technical Committee in Tolland *May 24*
- Talked about the New Crops Program to a class from Southern Connecticut State University at Lockwood Farm (7 teachers) *June 29*

MCHALE, NEIL A.

- Taught a mini-course on "Botany for Gardeners" for the Federated Garden Clubs of CT *November 8, 2010*
- Presented an accomplishment report on NIFA grant #252 "LAM1 regulation of blade formation in Nicotiana leaves" at a project directors meeting at NIFA headquarters in Washington, DC *May 24 and 25*

MERVOSH, TODD L.

- Spoke about his research on invasive plant management to a group of high school and middle school science teachers as part of the ISIS (6^{th}-year certificate education) program at Southern Connecticut State University in New Haven (12 teachers) *July 1, 2010*
- Organized the meeting and gave a talk on weed management at the Connecticut Christmas Tree Growers Association twilight meeting at the Valley Laboratory in Windsor (60 attendees) *July20*
- Presented two demonstrations on control of Oriental bittersweet vines and biological control of mile-a-minute vine at Plant Science Day (80 attendees) *August 4*
- Spoke to six separate tour groups about weed control in Christmas trees at the 50^{th} annual meeting of the Connecticut Christmas Tree Growers Association at Jones Family Farm in Shelton, CT (150 attendees) *August 6*
- Was interviewed on a public radio station (WHDD 91.9FM, Sharon, CT) about the Station and invasive plants *August 15*
- Gave a presentation on biocontrol of mile-a-minute vine at the Sharon Audubon Festival (15 attendees) *August 15*
- Participated in a symposium planning meeting for the Connecticut Invasive Plant Working Group at the Valley Lab *August 26*
- Was interviewed about several invasive plant issues by John Burgeson of the Connecticut Post Newspaper *September 2*
- Presented a display of CAES activities and answered questions at Hilltop Farm's annual FarmFest in Suffield (300 attendees) *September 6*
- Presented a talk on mile-a-minute weed and was meeting coordinator at the Nursery and Landscape Research Tour at the Valley Lab (20 attendees) *September 22*
- Participated in a symposium planning meeting for the Connecticut Invasive Plant Working Group at the Valley Lab *September 30*
- Gave a talk and demonstration on tree leaf identification and fall foliage to a group of senior citizens in East Granby (24 attendees) *October 8*
- Served as a session moderator, presented the talk "Management Options for Japanese Stiltgrass: Research in a Connecticut Woodland", and was a co-author with Dr. Carole Cheah and Donna Ellis (UConn) of a poster "Biological Control of Mile-a-minute Weed in Connecticut" at the Connecticut Invasive Plant Working Group Symposium at the University of Connecticut in Storrs (350 attendees) *October 14*
- Participated in a meeting regarding management of mile-a-minute weed in New England at the USDA-NRCS office in Tolland *November 4*
- Hosted a meeting of the Invasive Plant Symposium Planning Committee at the Valley Laboratory *November 19*
- Presented a talk "Biological control program for mile-a-minute vine in Connecticut" (co-authors: Dr. Carole Cheah and Donna Ellis (UConn) at the annual meeting of the Northeastern Weed Science Society in Baltimore, MD (50 attendees) *January 5, 2011*
- Spoke about herbicide issues at the Tobacco Research Meeting in Suffield, CT (135 attendees) *February 23*

- Answered questions at the Connecticut Invasive Plant Working Group exhibit at the Connecticut Flower & Garden Show in Hartford (50 visitors) *February 27*
- Spoke about weed management for Christmas tree fields at the CT Christmas Tree Growers' Association annual meeting in Middletown (70 attendees) *March 5*
- Presented research (co-authors: Dr. Jeffrey S. Ward and Joseph P. Barsky) on "Management options for Japanese stiltgrass (*Microstegium vimineum*) incursions" at the Connecticut Conference on Natural Resources at UConn in Storrs (30 attendees) *March 7*
- Served on the Scholarship Selection Committee for the Connecticut Nurserymen's Foundation at two meetings at the Valley Laboratory in Windsor *March 15 and 30*
- Participated in a steering committee meeting (14 attendees) and a general meeting (60 attendees) of the Connecticut Invasive Plant Working Group where he served on a panel discussing vegetation management, at the Valley Laboratory *March 30*
- Spoke about weed management for gladiolus and other flowers at a Connecticut Gladiolus Society meeting at the Valley Laboratory in Windsor (12 attendees) *April 9*
- Was interviewed about biological control of mile-a-minute weed by Chase Wright of The Hour *June 15*
- Was interviewed about biological control of mile-a-minute weed by a Channel 12 News reporter in Norwalk, CT *June 15*
- Was interviewed about biological control of mile-a-minute weed by Adam Benson of the Norwich Bulletin in Sprague *June 16*

MOLAEI, GOUDARZ
- Presented an invited talk entitled "To Bite or Not to Bite: Host-feeding Patterns of Mosquito Vectors Governing Epidemiology of West Nile Virus in Northeastern USA" at the Annual Conference of the Pennsylvania Vector Control Association *November 15, 2010*
- Presented an invited talk entitled "Discerning Blood Feeding Mosquitoes and their Catholic Counterparts Influencing West Nile Virus Transmission in Northeastern USA" at the 56th Annual Meeting, Northeastern Mosquito Control Association, held in Hyannis, MA *December 6*
- Presented the invited talk entitled "Discriminating Blood-feeding Mosquitoes, Their Catholic Counterparts, and Transmission Dynamics of West Nile Virus" at the Annual Meeting of Multi-State Research Project NE-1043 "Biology, Ecology & Management of Emerging Disease Vectors" held at CAES *March 1-2, 2011*
- Presented an invited symposium talk entitled "To bite or not to bite: blood-feeding patterns of the *Culex pipiens* complex mosquitoes in the USA at the 77th Annual Meeting of the American Mosquito Control Association held in Anaheim, CA *March 22-23*
- Presented the invited lecture "Mosquitoes and transmission of viruses in the metropolitan area of New York City" at the Office of Vector Surveillance and Control, NYC Department of Health and Mental Hygiene, NY *May 19*

MUSANTE, CRAIG
- Presented a seminar entitled "Nanoparticle Contamination of Agricultural Crops" at the CAES Annual Spring Open House April 27

NAIL, WILLIAM R.
- Presented a poster presentation "Dry Matter Accumulation and Partitioning in Response to Fruit Thinning in Pinot Noir Grapevines" at the American Society of Enology and Viticulture – Eastern Section annual meeting in Geneva, NY *July 13, 2010*
- Participated in the annual ASEV-ES Business Meeting *July 14*
- Participated in two Board of Directors meetings of the ASEV-ES *July 11, 15*

- Served on the judging panel for Best Student and Enology presentations at the ASEV-ES meeting held in Geneva, NY *July 13*
- Attended the National Viticulture Research Conference held in conjunction with the annual ASEV-ES meeting *July 12-15*
- Met with staff and toured the grape-related facilities at the New York Agricultural Experiment Station in Geneva, NY *July 14*
- Participated in the National Viticulture Extension Leadership Conference and joined the Extension Grape Community of Practice (CoP) in Fresno, CA *August 30-September 2*
- Participated in a meeting of the Connecticut Farm Wine Development Council at the Department of Agriculture in Hartford *September 9*
- Was interviewed about Connecticut wineries by Anne Vandermey of the Hartford Courant *October 13*
- Was interviewed for a book on Connecticut wineries by John Dube at Lockwood Farm *October 27*
- Participated as outgoing Secretary and Chair-Elect in the annual meeting of NE-1020: Multistate Evaluation of Winegrape Cultivars and Clones, Traverse City, MI *November 7-8*
- Participated in a regional grower meeting at Greenvale Vineyards in Middletown, RI *November 19*
- Participated in a Board of Directors meeting of the American Society of Enology and Viticulture – Eastern Section in Baltimore, MD *December 8*
- Participated in a meeting of the Connecticut Farm Wine Development Council at the Department of Agriculture in Hartford *December 9*
- Participated in a Steering Committee meeting of the New England Vegetable and Fruit Conference in Manchester, NH *December 13*
- Participated in a conference call meeting of the National Grape Community of Practice (GCoP) hosed by Eric Stafne of Oklahoma State University *January 31, 2011*
- Participated in a Steering Committee meeting of the New England Vegetable and Fruit Conference in Manchester, NH *February 7*
- Presented a lab tour, demonstration, and talk to students from Wesleyan University (16 student and 2 teacher participants) *February 22*
- Participated in a conference call meeting of the National Grape Community of Practice (GCoP hosted by Eric Stafne of Oklahoma State University *February 25*
- Participated in a meeting of the Connecticut Farm Wine Development Council at the Department of Agriculture in Hartford *March 24*
- Participated in a conference call meeting of the National Grape Community of Practice hosted by Eric Stafne of Oklahoma State University *March 25*
- Was interviewed by Annie deBoer and two other students from Wesleyan University at Lockwood Farm to discuss the state of the Connecticut winegrape industry for a classroom project *April 7*
- Met with Steve and Ann Sawyer and their vineyard crew at Preston Ridge vineyards in Preston to discuss pruning and training young vines and pest management strategies for the upcoming growing season *April 18*
- Participated in a conference call meeting of the National Grape Community of Practice (GCoP) hosted by Eric Stafne of Oklahoma State University *April 28*
- Was interviewed by Jordan Ross, a freelance writer, for an article to be published in Practical Winery and Vineyard Magazine *May 12*
- Met with an official at Southern Connecticut State University to evaluate a site and cultivar selection for a proposed vineyard at the University as part of their Plant It Forward Initiative *May 27*
- Co-hosted a grower meeting and gave a tour of experimental hybrid training trials at Gouveia vineyards in Wallingford (21 attendees) *June 9*
- Was interviewed about hybrid grape research in Connecticut and other northeastern states by Russell Blair of the Wallingford Post *June 9*

- Participated in a meeting of the Connecticut Farm Wine Development Council at Gouveia Vineyards *June 9*
- Presented a poster "Effect of Graft Union Height on Vine Performance and Winter Survival of Chardonnay Grapevines" and attended a seminar on grapevine viruses at the American Society of Enology and Viticulture annual conference in Monterey, CA *June 21-24*

PETERSON, RICHARD B.
- Gave a presentation to students from the Sound School's Genetics and Biotechnology Class *November 29, 2010*
- Was one of the judges at the New Haven K-12 Science Fair at Yale University *May 10, 2011*

PIGNATELLO JOSEPH J.
- Presented the talk "Unexpected Adsorption Behavior of a Polar Ionizable Compound (Sulfamethazine) on Black Carbon (Biochar)" at the 240th American Chemical Society National Meeting , Boston, MA *August 22-26, 2010*
- Presented a report on research progress at the annual meeting of Multistate Research Project W2083 held in Honolulu, Hawaii *January 5-6, 2011*
- Presented a keynote talk entitled "Insights into dynamic events taking place during sorption of xenobiotics by NOM in Soil" in a Workshop on Co-Evolution of Soils and Organic Substances: Links Between Soil Forming Processes and the Stabilization of Organic Substances held in Landau, Germany *March 4-6*
- Presented the talk "Adsorption of ionizable compounds to charcoal black carbon, the example of phenolic acids" at Northeastern University, Boston, MA *March 9-12*
- Presented the invited seminar entitled "Structure-activity relationships and speciation in the adsorption of organic compounds and ions to environmental black carbon" to the Department of Analytical Chemistry, University of Barcelona, Barcelona, Spain *May 16*
- Presented the talk "Sorption of phenolic acid anions by black carbon is accompanied by release of hydroxide into Solution" at the SETAC Europe Annual Meeting, Milano, Italy *May 15-18, 2011*

RATHIER, THOMAS M.
- Spoke about conifer culture and nutrition at a twilight meeting for Christmas tree growers at the Valley Laboratory (65 attendees) *July 20, 2010*
- Spoke about Forest and Shade Tree Health to campers at Channel 3 Kids Camp in Andover (75 attendees) *July 21*
- Spoke about tree identification and health at an Asian longhorned beetle and Emerald ash borer training session for landscapers at the Valley Laboratory (12 attendees) *July 25*
- Spoke to farm tour participants about Christmas tree culture and fertility at the Connecticut Christmas Tree Growers Association's 50th anniversary annual meeting at Jones Family Farms in Shelton (150 attendees) *August 6*
- Spoke to farm tour participants about soil and crop conservation at the Connecticut Christmas Tree Growers Association's 50th anniversary annual meeting at Jones Family Farms in Shelton (100 attendees) *August 7*
- Taught a class on Tree and Soil Relationships for Arboriculture 101 at Jones Auditorium (45 attendees) *September 15*
- Organized a twilight meeting for the Connecticut Christmas Tree Growers Association and discussed soil and fertility issues at Maple Spring Farm in Washington (25 attendees) *September 16*
- Discussed physical characteristics of container media at the annual Nursery and Landscape Research Tour at the Valley Laboratory (25 attendees) *September 22*

- Judged Christmas trees at the Durham Fair in Durham *September 22*
- Taught a session on Tree Health and Pest Management at the Tree Warden School in Middlefield (25 attendees) *October 7*
- Moderated a session at Connecticut Invasive Plant Working Group's biannual Invasive Plant Symposium at the University of Connecticut in Storrs (65 attendees) *October 14*
- Discussed and demonstrated tree diseases at a tree conditions laboratory session of Arboriculture 101 at Jones Auditorium (45 attendees) *October 20*
- Taught a class on Tree and Soil Relationships for Arboriculture 101 at Jones Auditorium (45 attendees) *February 9, 2011*
- Spoke on climate, fertility and cultural issues at the annual Tobacco Meeting in Suffield (110 attendees) *February 23*
- Organized the scientific portion of the program and spoke about the fundamentals of conifer nutrition at the annual winter meeting of the Connecticut Christmas Tree Growers Association in Middletown (110 attendees) *March 5*
- Presented a paper entitled "Developing practical strategies for prediction, identification and remediation of metal contamination in urban soils" at the Connecticut Conference on Natural Resources at the University of Connecticut in Storrs (25 attendees) *March 7*
- Discussed aspects of Christmas tree culture with visitors to the Connecticut Christmas Tree Growers Association's display at the state capitol in Hartford (150 attendees *March 16*
- Discussed and demonstrated tree diseases at a tree conditions laboratory session of Arboriculture 101 at Jones Auditorium (45 attendees) *March 16*
- Participated in a review session for students in Arboriculture 101 at Jones Auditorium (45 attendees) *April 13*
- Organized the scientific portion of and spoke about conifer culture and nutrition at a twilight meeting for the Connecticut Christmas Tree Growers Association at Red Hill Tree Farm in East Windsor (45 attendees) *June 15*

RIDGE, GALE E.

- Spoke to residents and officials of the East Hartford Housing Authority, Health Department officials, and aldermen of the East Hartford Council about bed bugs and their management (110 attendees) *July 21, 2010*
- Was interviewed about bed bugs by the Hartford Courant *July 23*
- Was interviewed about weather-related insect activity by John DeCaro of Channel 3 *July 27*
- Was interviewed about bed bugs by the Waterbury Republican-American *July 28*
- Was interviewed about bed bug issues in the Davenport and Dunbar Apartments in New Haven by the New Haven Register *July 29*
- Met with staff from the Southern Nevada Health Department in Las Vegas upon their request. She was invited to help them write a best practices document for the reuse of used mattresses, bedding, and upholstered furniture with regard to the management of bed bugs *August 13*
- Was invited to inspect and talk with West Haven Housing Authority staff on the management of bed bugs in multi-unit housing *August 21*
- Was interviewed about bed bugs by the Danbury News-Times *September 10*
- Presented a talk on bed bugs to students at the University of Bridgeport (80 attendees) *September 14*
- Spoke about bed bugs on the Chaz & A. J. morning radio show with a listening audience of 800,000 *September 21*
- Spoke about bed bugs to staff from the Uncas Health District and Foxwoods Casino (150 attendees) *September 21*
- Spoke about bed bugs on WTIC radio with a listening audience of over 3 million *September 28*

- With Judy Dicine and Mike Lipsett, board members of CCABB, were recorded for a future broadcast on bed bugs by Charter Television *September 28*
- Talked about bed bugs to two groups of students at the University of Bridgeport (170 attendees) *September 29*
- Spoke to dorm room students at the University of Bridgeport (60 attendees) *October 6*
- Was interviewed about bed bugs by Jill Konopka of Channel 3 TV at the Station *October 7*
- Was interviewed about canine bed bug detection by The Day newspaper *October 13*
- Spoke about bed bugs at the annual conference of the Association for Professional Infection Control and Epidemiologists in Springfield, MA (130 attendees) *October 14*
- Spoke with an editor from the Encyclopedia Britannica fact checking on the worldwide bed bug pandemic *October 15*
- Manned a table at the University and City of Bridgeport Health Fair (400 visitors) *October 21*
- Gave a lecture about insects in general, modes of pesticide resistance, and bed bugs to the Pest Management Professional Supervisors who were renewing their licenses with the DEEP (100 attendees) *October 26*
- Spoke about bed bugs at the Vermont Pest Control Professionals annual meeting in Montpelier, VT (190 attendees) *October 27*
- Spoke about bed bugs at a luncheon of the National Association of Housing and Redevelopment Officials (40 attendees) *October 28*
- Lectured about bed bugs and hospital protocols to doctors at Waterbury Hospital (50 doctors attended) *October 29*
- Was interviewed about bed bugs and travel during the holidays by Channel 3 TV *November 4*
- Launched the CCABB Bed Bug Listserv. It has 314 members serving health departments, housing authorities, pest management professionals, hospitals, colleges and universities, and many other organizations that are involved with bed bugs in Connecticut *November 5*
- Talked about self-protection and bed bugs to staff members of the Department of Children and Families in Middletown (40 adult attendees) *November 9*
- Spoke about bed bugs to the Bethel Garden Club in Bethel (30 adult attendees) *November 12*
- Was interviewed about bed bugs in schools by the Stamford Advocate *November 16*
- Was an invited delegate to the Congressional Bed Bug Forum in Washington, DC *November 18*
- With the Connecticut Coalition Against Bed Bugs, organized Bed Bug Forum IV, which included talks on research, law, pesticide resistance, and heat treatment techniques, in Jones Auditorium (114 attendees) *December 7*
- Was interviewed about the discovery of the novel species of human-feeding bed bug by Channel 3 TV *December 7*
- Was interviewed about Bed Bug Forum IV and the new species of bed bug by Channel 8 TV *December 8*
- Was interviewed about Bed Bug Forum IV and the new species of bed bug by The New Haven Register *December 8*
- Spoke about her research on the entomopathogenic fungus M*etarhizium anisopliae*, which effectively kills bed bugs, as well as alerting to the discovery of the second species of human-feeding bed bug in North America, at the annual meeting of the Entomological Society of America held in San Diego, CA (200 attendees) *December 12-15*
- Spoke about the brown marmorated stink bug in a live broadcast on Chaz & AJ in the Morning on WPLR Radio *January 11, 2011*
- Advised the Yale Peabody Museum on a live human bed bug display as part of a planned exhibit on blood-feeding arthropods *January 13*
- Spoke about bed bugs and self-protection to a nursing association in Rocky Hill (45 attendees) *February 15*

- Was interviewed about the increase of bed bug populations in Connecticut by Fox News TV *February 22*
- Spoke about bed bug management to officials from the Danbury Health Department and Housing Authority at Western Connecticut State University in Danbury (30 attendees) *February 22*
- Spoke about bed bugs and self-protection to students at Bridgeport University (58 attendees) *February 23*
- Discussed the use of beneficial insects in agriculture to a visiting group of Future Farmers of America (10 attendees) *February 25*
- Talked to staff members at the Agency on Aging in New Haven about proactive management of bed bugs for the poor, elderly, and handicapped (50 attendees) *March 2*
- Spoke to a Torrington Health Department-sponsored program on bed bugs (120 attendees) *March 7*
- Was interviewed about comparing the Western conifer seed bug with the brown marmorated stink bug to help citizens identify the insects by the Hartford Courant *April 4*
- Was interviewed about bed bugs and human behavior by the online newspaper The Patch *April 5*
- Testified as an expert at a National Mattress Stewardship meeting in Hartford sponsored by the Product Stewardship Institute based on Boston, MA (80 attendees) *April 11*
- Talked about canine bed bug scent detection at WPLR in Orange on the Chaz and AJ morning show with Charles from Harlem River Hounds *April 12*
- Presented a combined talk on bed bugs for a national webinar sponsored by Healthy Homes out of Yale University *April 19*
- Spoke about bed bugs at Bed Bug Forum V sponsored by CCABB and the Norwalk Health Department in Stamford; the meeting was recorded by Community TV Channel 21 (30 attendees) *April 28*
- Delivered a speech on bed bug biology and relevance to control methods at the National Pest Management Association, Northeastern Conference in Boston, MA *April 29*
- Installed a display population from her colony of bed bugs at the Peabody Museum exhibit titled the "Invasion of the Bloodsuckers: Bed Bugs and Beyond" *May 18*
- Spoke about bed bugs to the Department of Public Health, local health administration inspectors, and daycare providers in Hartford, CT (35 attendees) *June 1*
- Spoke about bed bugs to staff from the Agency on Aging of South Central Connecticut and was filmed by Connecticut Public Television for a future broadcast, in New Haven, CT (60 attendees) *June 9*
- Was interviewed about insects of Connecticut and the European honey bee by Judy Benson of The Day *June 9*
- Spoke about entomology to visiting students from Central Connecticut State University (20 attendees) *June 15*
- Spoke about bed bugs to staff from the Agency on Aging of South Central Connecticut in Meriden, CT (30 attendees) *June 23*
- Spoke about entomology to visiting group of teachers led by Dr. Gerry Frumento of Southern Connecticut State University (10 attendees) *June 29*

ROBB, CHRISTINA S.

- Participated in Biobus at Watertown High School as a visiting scientist. She helped students run experiments on "Genetically modified organisms" and "Glowing from permutation". She also explained her job and career as a chemist and answered student questions on careers in science. Biobus is run by the organization Connecticut United for Research Excellence *October 4, 2010*
- Organized and chaired the "Food Analysis" session at the 49th Annual Eastern Analytical Symposium held in Somerset, New Jersey *November 15-18*

- Presented a lecture entitled "ELISA Analysis of Abrin" at the 49th Annual Eastern Analytical Symposium held in Somerset, New Jersey *November 15*
- Participated in on-site training on the Thermo Fisher Scientific LC-MS/MS Rapid Resolution Exactive System *February 1-3, 2011*
- Participated in the FDA Northeast Regional FERN conference call *February 8*
- Participated in an FDA FERN training webinar on laboratory accreditation *February 15*
- Participated in a webinar presented by Kevin Schug of UTexas at Arlington entitled "Electrospray Ionization (ESI) for LC-MS (Part 1)" *February 24*
- Presented a lecture entitled "Screening the food supply routinely and in emergencies" to the staff and students of the Chemistry Department of Western Connecticut State University in Danbury (25 attendees) *February 25*
- Participated in a webinar presented by Dr. Michael Dong and LCGC Publications entitled "Implementing Ultra High-pressure LC (UHPLC): Perspective, Performance, Practice and Potential Issues" *February 28*
- Participated in an Agilent webinar concerning powder and surface analysis by FTIR *March 3*
- Participated in a National Center for Food Protection and Defense webinar entitled "New Food Models: Bioterrorism Risk Assessment (BTRA)" *March 5*
- Participated in an FDA FERN CAAP Chemistry Conference Call for LC-MS Executive Users *March 9*
- Participated in a conference call for the Association of Public Health Laboratories Working Group on ELISA Based Methods for the FSIS FERN Network *March 16*
- Participated in an FDA FERN CAP Chemistry conference call for LC-MS Exactive users *April 13*

RUTLEDGE, CLAIRE

- Helped conduct a forest pest train-the-trainer session for advanced Master Gardeners in West Hartford (20 attendees) *September 2, 2010*
- Participated in the conference "Biological Control for Natural Environments" in Northampton, MA *October 5*
- Taught about "Insects that Attack Trees" for the CTPA's Arboriculture 101 course in Jones Auditorium (45 attendees) *October 6*
- Presented the talk "Emerald Ash Borer" at a Lunch Club in Jones Auditorium (25 attendees) *October 8*
- Presented the talk "*Cerceris fumipennis*, the beetle hunting wasp" at the Sigma Xi seminar at Quinnipiac University in Hamden (35 attendees) *October 18*
- Taped an interview on Emerald Ash Borer in Connecticut for Branford Community Television with Lindsey Mathews of the Branford Community Forest Commission *November 30*
- Gave the talk "Emerald ash borer update" at the NOFA Landcare Update Course at UCONN in Storrs (200 attendees) *December 7*
- Staffed a display booth on forest pests, Asian longhorned beetle, and Emerald ash borer at the 2011 annual meeting of the Connecticut Tree Protective Association held at the Aqua Turf Club in Plantsville (632 attendees) *January 20, 2011*
- Spoke on "Pest management: ticks and Lyme disease" at the Organic Land Care Course in Jones Auditorium (67 attendees) *January 30*
- Taught "IPM and insects that attack trees" at an arboriculture class at Bartlett Arboretum in Stamford (15 attendees) *February 10*
- Gave a talk on "Emerald ash borer and Asian longhorned beetle" to the North Stonington Garden Club in North Stonington (40 attendees) *February 15*
- Taught "Insects that attack trees" at the CTPA Arboriculture 101 class held in Jones Auditorium (45 attendees) *February 23*

- Participated in an Emerald ash borer delimitation survey workshop in Kingston, NY *March 2*
- Gave a talk titled "Volatile pheromones in Cerambycidae with a focus on small Japanese Cedar Borer and Asian Longhorned Beetle" at the Forest Health Workshop held in Jones Auditorium (45 attendees) *March 3*
- Participated in the Emerald Ash Borer Incident Management Team Simulation as a scientific advisor in Windsor Locks and New London *March 3, 9, 10*
- Gave the talk "Bio-surveillance: Detecting invasive wood-boring beetles using a native wasp" at the 5th Connecticut Conference on Natural Resources in Storrs (10 attendees) *March 7*
- Taught the "Tree Conditions Laboratory" session of Arboriculture 101 in Jones Auditorium (40 attendees) *March 16*
- Spoke about Emerald ash borer with students visiting the Station from Greens Farms Academy (30 attendees) *April 12*
- Taught a review session for Arboriculture 101 in Jones Auditorium (40 attendees) April 23
- Participated in a "Joint Training and Skills Exchange" with the *Cerceris fumipennis* working group at Archbold Biological Station in Venus, FL (11 attendees) *April 23-26*
- Was a judge for the New Haven Public Schools Science Fair in New Haven *May 10 and 11*
- Participated in the Norwalk/Wilton Tree Festival with a booth "The Asian Longhorned Beetle and the Emerald Ash Borer" at Cranbury Park in Norwalk *May 21*
- Conducted a training session for the WaspWatcher Program held at White Memorial Conservation Center in Litchfield (27 attendees) *June 28*

SANDREY, STEPHEN
- Discussed pest and disease problems and export issues with growers at the Summer Meeting of the CT Nursery and Landscape Association at Canterbury Horticulture in Canterbury (150 participants) *July 14, 2010*
- Participated in an observation of the discovery of Emerald Ash Borer in Saugerties, New York. Techniques for detection and identification of the insect in the field were discussed. Approximately 45 state and federal personnel from New York, Massachusetts, and Connecticut participated *August 10*
- Participated in an emergency preparedness summit for EAB, held at the South Mountain Regional Headquarters of the Massachusetts Department of Camping and Recreation (35 participants) *August 31*
- Participated in an emergency preparedness summit on Emerald ash borer in Jenkins Conference Room (45 participants) *September 14*
- Participated in a reaccreditation training for Authorized Certifying Official Status, conducted by Dennis Martin, Export Certification Specialist of the USDA-APHIS-PPQ, held at the Station *September 30*

SHEPARD, JOHN J.
- Spoke to a group of students from Post University about mosquito biology and the state mosquito trapping and testing program *November 22, 2010*
- Presented an invited talk entitled "Arbovirus Activity in Connecticut, 2010" at the 56th Annual Meeting of the Northeastern Mosquito Control Association, held in Hyannis, MA *December 6*
- Presented an invited talk entitled "The Status of Invasive Mosquito Species in Connecticut" at the 5th Connecticut Conference on Natural Resources, held at the University of Connecticut, Storrs *March 7, 2011*

SHORT, MICHAEL R.
- Met with officials at Joshua's Land Trust to discuss invasive control *August 12, 2010*

- Helped give a demonstration on small mammal trapping to the Wildlife Techniques Class of the Department of Natural Resources and Environment at the University of Connecticut, Storrs, CT (6 students,1 professor) *September 23*
- Administered the Forestry Equipment Identification Exam at the FFA Forestry Career Development Event at UConn, assisted by Elizabeth White and Caroline Ariori (28 students) *November 5*
- Spoke on DR Field and Brush Mower Safety and Operation at a department hosted workshop on Japanese barberry control for members of Joshua's Trust and interested citizens at Preston Sanctuary in Hampton *December 21*
- With Dr. Scott Williams, met with representatives from Bobbex, Inc. to discuss deer repellent trials *February 9, 2011*
- Participated in the Annual Forest Health Workshop at CAES, New Haven *March 3*
- With Joseph P. Barsky, was interviewed about invasive control techniques by James Fisher of The White Memorial Foundation for their newsletter *May 11*
- With Joseph P. Barsky, presented a CAES Research Display on "Agriculture, Natural Resources, and Public Health" at the Audubon Bent of the River Festival in Southbury (325 attendees) *May 21*

SMITH, HUGH
- Gave a presentation entitled "Reducing Insecticide Use on Guatemalan Snow Peas" at the annual meeting of the Florida Entomological Society in West Palm Beach (30 attendees) *July 27, 2010*
- Gave a presentation entitled "Basic Biology of Some Common Biocontrol Agents" during a meeting, which was sponsored by the University of Connecticut Cooperative Extension and University of Massachusetts Cooperative Extension, at Grower Direct Nursery in Somers, CT (67 attendees) *August 11*

SMITH, VICTORIA L.
- Participated in the annual summer meeting of the CT Nursery and Landscape Association, held at Canterbury Horticulture in Canterbury (150 participants) *July 14, 2010*
- Participated in a meeting of the Board of Directors for the National Plant Board, which was held at the Indianapolis Marriott Downtown in Indianapolis, IN (12 participants) *July 25*
- Participated in the National Plant Board Meeting, held at the Indianapolis Marriott Downtown in Indianapolis, IN, as Vice President of the Eastern Plant Board, a member of the agenda committee, and as the Co-Chair of the *Phytophthora ramorum* Protocols working Group (200 participants) *July 26-29*
- Participated in a joint meeting of the National Plant Board's Board of Directors and USDA-APHIS-Plant Protection and Quarantine Leadership Team, held at the Indianapolis Marriott Downtown in Indianapolis, IN (45 participants) *July 29*
- Participated in an observation of the discovery of Emerald Ash Borer in Saugerties, New York. Techniques for detection and identification of the insect in the field were discussed. Approximately 45 state and federal personnel from New York, Massachusetts, and Connecticut participated *August 10*
- Worked with personnel from the USDA-APHIS-PPQ Office in Wallingford, CT to certify cold-storage facilities of apples for export from a local fruit grower to Israel *August 18*
- Participated in an emergency preparedness summit for EAB, held at the South Mountain Regional Headquarters of the Massachusetts Department of Camping and Recreation (35 participants) *August 31*
- Participated in an emergency preparedness summit on Emerald ash borer in Jenkins Conference Room (45 participants) *September 14*
- Participated in a panel discussion on Chrysanthemum White Rust regulations, held at the CT Greenhouse Growers meeting at Karabin Farms in Southington (60 participants) *September 15*

- Participated in a meeting of the Yale Biosafety Committee Meeting in New Haven (20 participants) *September 16*
- Was interviewed for an article about beekeeping by Lois Barker of the Waterbury Republican-American *September 21*
- Participated in the annual Nursery and Landscape Research Tour with a presentation on Chrysanthemum White Rust and *Phytophthora ramorum*, held at the Valley Lab in Windsor, CT (20 participants) *September 22*
- Participated in a panel discussion on Chrysanthemum White Rust regulations, held at Milikowski Corporation Customer Appreciation Day in Stafford Springs (60 participants) *September 29*
- Participated in a reaccreditation training for Authorized Certifying Official Status, conducted by Dennis Martin, Export Certification Specialist of the USDA-APHIS-PPQ, held at the Station *September 30*
- Participated in a meeting to discuss regulatory aspects of a potential Emerald ash borer detection, held at the USDA-APHIS-PPQ office in Wallingford (6 participants) *October 19*
- Participated in a meeting of the Yale Biosafety Committee in New Haven (25 participants) *October 21*
- Participated in a meeting of the *Phytophthora ramorum* Regulatory Working Group Co-Chairs, held at the Red Lion Hotel in Salem, OR, and at Silver Falls State Park, outside of Salem (26 participants) *October 25-29*
- Participated in a planning meeting on Emerald ash borer regulatory preparedness held at Connecticut Forest and Park Association headquarters in Rockfall (8 participants) *November 3*
- Moderated and participated in the Fall meeting of the Connecticut Cooperative Agricultural Pest Survey meeting at the Valley Laboratory in Windsor (15 participants) *November 17*
- Participated in a meeting on Emerald ash borer emergency response at the Valley Laboratory in Windsor (30 participants) *November 17*
- Participated in a meeting of the Yale Biosafety Committee in New Haven (30 participants) *November 18*
- Chaired a meeting of the National Plant Board representatives, and took notes in 2 sessions at the National CAPS Conference, held in Kansas City, MO (220 participants) *November 30-December* 3
- As the Eastern Plant Board representative to the CAPS Committee, and a member of the Planning Committee, participated in the National Cooperative Agricultural Pest Survey Conference, Kansas City, MO (200 participants) *November 30-December 3*
- Participated in the annual winter meeting of the CT Nursery and Landscape Association, held at Mountain Ridge in Wallingford, by manning a table in the exhibit hall (300 attendees) *January 14, 2011*
- Participated in a meeting of the Yale Biosafety Committee in New Haven (24 participants*) January 20*
- Participated in a meeting of the National Cooperative Agricultural Pest Survey Committee as the representative of the Eastern Plant Board, held at Eastern Region USDA-APHIS-Plant Protection and Quarantine Headquarters in Raleigh, NC (25 participants) *January 26-27*
- Hosted a visit by officials from the US Forest Service, Durham (NH) field Office by organizing visits with Station staff and a visit to the Chestnut Plantation at Lockwood Farm *February 9*
- Participated in a multi-town meeting of parks and recreation staff, with a presentation on Emerald ash borer, held at the New Haven Regional Fire Training Academy in New Haven (50 participants) *February 17*
- Participated in a tour of Station facilities by the Northeast Plant Diagnostic Network diagnosticians, organized by Dr. Sharon Douglas, with a presentation on the roles and responsibilities of the Office of the State Entomologist (26 attendees) *February 23*

- Gave a talk entitled "EAB identification, impacts on forests and reporting possible finds" at the annual meeting of the Yankee Division of the Society of American Foresters held at the Middlesex County Extension Center in Haddam (60 participants) *February 25*
- Organized the annual Forest Health Workshop, consisting of presentations by Station Staff on various aspects of research and findings of concern to DEP Foresters, USDA-APHIS-PPQ, and the forest health community, and presented a talk titled "TCD: the Latest Addition to the Alphabet Soup" (45 attendees) *March 3*
- Participated in the monthly meeting of the Yale Biosafety Committee in New Haven (20 participants) *March 17*
- As Vice President of the Eastern Plant Board, participated in a meeting of the National Plant Board Board of Directors, held at the USDA-APHIS Miami Introduction Station in Miami, FL (10 participants) *March 21-24*
- Participated in Aerial Survey-Aviation Safety & Management, a course sponsored by the US Forest Service, held at the Rachel Carson Office Building in Harrisburg, PA (37 participants) *March 28-31*
- Participated in Wilderness First Aid, a course sponsored by the US Forest Service, held at the Rachel Carson Office Building in Harrisburg, PA (16 participants) *April 1*
- Presented the talk "How to recognize Emerald Ash Borer and Asian Longhorned Beetle" at the Connecticut Urban Forest Council Municipal Tree Workshop held at the Beardsley Zoo in Bridgeport (50 participants) *April 5*
- Presented the talk "How to Recognize Emerald Ash Borer and Asian Longhorned Beetle" at the Connecticut Light and Power and Lewis Tree Service annual Alliance Safety Meeting held at CL&P in Torrington (50 participants*) April 6*
- Participated in an Emerald Ash Borer Emergency Response Meeting at the Valley Lab in Windsor (20 participants) *April 7*
- Participated in the 86th annual meeting of the Eastern Plant Board as the State Plant Regulatory Official of CT and as President of the Eastern Plant Board, held at the Hilton Garden Inn, Worcester, MA (75 participants) *April 11-14*
- Participated in a meeting of the Yale Biosafety Committee in New Haven (15 participants) *April 21*
- Presented the talk "How to Recognize Emerald Ash Borer and Asian Longhorned Beetle" to Connecticut Light and Power and Lewis Tree Service at CL&P in Cheshire (40 participants) *April 27*
- Participated in an Emerald ash borer response team meeting, held at USDA-APHIS-PPQ offices in Wallingford (6 participants) *May 6*
- Participated in the CT Cooperative Agricultural Pest Survey meeting held at the Valley Lab in Windsor (20 participants) *May 18*
- Participated in an Emerald ash borer publicity event, held at DEP Headquarters in Hartford (20 participants) *May 19*

STAFFORD, KIRBY C.

- Participated in a conference call on the Asian longhorned beetle infestation in Boston *July 7, 2010*
- Participated in a conference call of the EPA's Network for Lyme Disease Prevention *July 7*
- Participated in the joint meeting of the Northeastern Regional Association of Experiment Station Directors (NERA) and Extension Directors (NEED) and a meeting of the Multi-States Activity Committee in Baltimore, MD *July 11-13*
- Participated in a Forest Pest Outreach and Survey Project conference call *July 22*
- Was interviewed about the Emerald ash borer by Robert Miller of the Danbury News Times *July 23*
- Was interviewed about the Emerald ash borer by Mark Sims of CT Radio Network *July 23*
- Was interviewed about tick control research by Laura Landro of the Wall Street Journal *July 26*
- Was interviewed about bed bugs by Mike Patrick of the Republican-American *July 28*

- Was interviewed about the Asian longhorned beetle and Emerald ash borer by Sheryl Shaker of New Canaan Patch.org *July 30*
- Spoke on Plant Science Day on the history of summer field days at the Station's Lockwood Farm *August 4*
- Participated in a conference call on preparedness for Emerald Ash Borer *August 5*
- Participated in a conference call of the EPA's Lyme Disease Prevention Network *August 5*
- Participated in a conference call on planning for an EPA-sponsored Lyme Disease Prevention Workshop for Spring 2011 *August 19*
- At the request of the CT Beekeepers Association, answered questions as a panel member following a showing of the documentary "Vanishing of the Bees" at Real Art Ways in Hartford (55 attendees) *August 20*
- Conducted Diversity Training for seasonal and new full-time employees *August 23*
- Was interviewed about beekeeping in CT by Christopher Brooks of The New York Times *August 30*
- Participated in a regional meeting of state and federal officials in Pittsfield, MA to review and discuss plants to address the Emerald Ash Borer (55 attendees) *August 31*
- Participated in an EPA Lyme Disease Prevention Network conference call *September 9*
- Helped organize and supervise a meeting on the Emerald ash borer for the CT DEEP, USDA-APHIS-PPQ, and CAES in the Jenkins Conference Room (32 attendees) *September 14*
- Participated in a meeting of the CT Coalition Against Bedbugs in the Board Room (8 attendees) *September 16*
- Presented the Forest Pest Outreach and Survey Project at a regular meeting of the Plainville Town Council (50 attendees) *September 20*
- Spoke on ticks, Lyme disease, and deer at a Representative Town Meeting on white-tailed deer in the Westport Town Hall (65 attendees) *September 22*
- Was interviewed about ticks by Mary Jasch of DIG-IT Magazine *September 27*
- Participated in a conference call of the EPA's Lyme Disease Prevention Network *October 7*
- Participated in a NIFA reporting webinar *October 14*
- Participated in an Emerald ash borer regulatory working group meeting at the USDA-APHIS office in Wallingford *October 19*
- Participated by manning a booth and talking to students at the Gateway Community College Jobs Café in New Haven (spoke with 15 students) *October 20*
- Participated in a conference call for the Forest Pest Outreach and Survey Program *October 21*
- With Dr. Gale Ridge, spoke to visiting students from the Hooker School about research and activities in the Department of Entomology (11 attendees) *October 22*
- Spoke about the Asian longhorned beetle and Emerald ash borer and about developing a train-the-trainer session for scout camp leaders at a meeting of Connecticut Leaders of the Boy Scouts of America in Killingworth *November 1*
- Participated in an EPA Lyme Disease Prevention Network conference call *November 9*
- Represented the Station at a Connecticut Farm Bureau luncheon in South Windsor *November 5*
- Participated in a meeting of the State Cooperative Agricultural Pest Survey Committee at the Valley Laboratory in Windsor (8 attendees) *November 17*
- Participated in an Emerald ash borer preparation meeting at the Valley Laboratory in Windsor (31 attendees) *November 17*
- Participated in a conference call of the Forest Pest Outreach and Survey Project *November 18*
- Was interviewed about the role rodents and brush play in Lyme disease by Vinti Singh of the Danbury News Times *November 19*
- Presented a display and answered questions from legislators about ticks and bed bugs at a luncheon at the Legislative Office Building. The luncheon was sponsored by the Experiment Station Associates *December 1*

- With Dr. Anuja Bharadwaj, presented a poster "Field trials of the natural compounds, nootkatone and garlic, for the control of blacklegged tick, *Ixodes scapularis*" at the 58th Annual Meeting of the Entomological Society of America held in San Diego, CA December 12-15 (56 attendees) *December 14*
- Participated in an Emerald ash borer working group meeting at the USDA/APHIS/PPQ office in Wallingford (3 attendees) *January 3, 2011*
- Participated in an Emerald ash borer planning group meeting at the Valley Lab in Windsor (20 attendees) *January 6*
- Participated in a conference call to evaluate proposals for NERA Planning Grants *January 10*
- Spoke on ticks and bed bugs at the Department of Laboratory Medicine, Yale University, in New Haven (49 attendees) *January 14*
- Participated in a conference call about a CDC tick management research funding opportunity with the Centers for Disease Control and Prevention *January 20*
- Spoke on "Pest management: ticks and Lyme disease" at the Organic Land Care Course in Jones Auditorium (67 attendees) *January 30*
- Participated in a conference call on the preparation of the EPA Tick IPM Conference scheduled in March *February 3*
- Participated as Administrative Advisor at a meeting of the multi-state collaborative potato breeding project (NE-1031) in Beltsville, MD (16 attendees) *February 7-8*
- Participated in a meeting of the Emerald ash borer working group at the Valley Laboratory (23 attendees) *February 17*
- Spoke on tick management at the NOFA Organic Land Care Course at the Save the Bay Center in Providence, RI (32 attendees) *February 22*
- Was interviewed about deer and deer management as an approach to control ticks and Lyme disease by Elizabeth Gehran of the Boston Globe *February 25*
- Discussed department research and regulatory responsibilities to a visiting group of Future Farmers of America teachers (10 attendees) *February 25*
- Participated as Administrative Advisor at a meeting of the Multistate Project NE-1043, "Biology, Ecology and Management of Emerging Disease Vectors" in Jones Auditorium (19 adult attendees) *March 1-2*
- Prepared and presented a poster on tick research at Ag Day at the Capitol *March 16*
- Participated in a meeting of the Northeast Area Experiment Station Directors and the Multistate Activities Committee in Baltimore, MD, and provided a talk on the brown marmorated stink bug *March 21-23*
- Was interviewed about tick activity and control by Liz Mitchell of the Fairfield Patch *March 24*
- Presented a talk on the landscape management of the blacklegged tick and participated in discussions at the US EPA conference "Promoting Community IPM for Preventing Tick-Borne Diseases" in Arlington, VA (100 participants, plus a webinar audience) *March 30-31*
- Participated in an Emerald ash borer preparedness meeting at the Valley Laboratory in Windsor (26 attendees) *April 7*
- Attended the spring meeting of the Connecticut Beekeeping Association held in Jones Auditorium *April 9*
- Presented a talk on ticks and tick management at a Lyme disease symposium in Westport organized by the Westport Weston Health Department (45 attendees) *April 14*
- Participated in a meeting of the Connecticut Coalition Against Bed Bugs with Representative Andres Ayala in Hartford (9 attendees) *April 15*
- With Dr. Anuja Bharadwaj, presented a display on ticks and Lyme disease for Biodiversity Day at the Yale Peabody Museum in New Haven (1,000 attendees) *April 21*

- Presented a talk on ticks and tick-associated diseases at the Holcomb Farm in West Granby (15 attendees) *April 26*
- Presented a talk on ticks and Lyme disease at a meeting of the CT Hardy Plant Society in Wethersfield (28 attendees) *April 27*
- Spoke about ticks and tick research to members of the North Branford Land Trust in North Branford (36 attendees) *May 4*
- Was interviewed about ticks, tick activity, and Lyme disease by Sam Gingerella of WTIC-Radio *May 5*
- Was interviewed about how to "tick-proof" for the summer by Claire Constant for Men's Health Magazine *May 10*
- With Dr. Anuja Bharadwaj and Heidi Stuber, met with Redding Health Officers to review potential tick study sites *May 16*
- Participated in a meeting of the state CAPS Committee at the Valley Laboratory in Windsor (18 attendees) *May 18*
- Spoke about the Emerald ash borer at a press conference held at the DEEP headquarters in Hartford, attended by several press organizations *May 19*
- Assisted photographer John Rosen of Broadcast Med, Inc. in filming video footage of living *Ixodes scapularis* nymphs and adults *May 19*
- Was interviewed about ticks and Lyme disease by Maria Matthews of NBC-CT News *May 24*
- Was interviewed about tick control and the prevention of Lyme disease by Lisa Carberg of NBC-CT *May 26*
- Was interviewed about the influence of weather on tick activity by Karena Garrity of Patch.com *May 27*
- Was interviewed about his upcoming talk on tick management in Weston on June 7, 2011 by Patty Gay of the Weston Forum *May 31*
- Spoke on "Tick Management and Lyme Disease" to members of the Weston Select Committee on Sustainability and the Public at the Weston Town Hall (20 attendees) *June 7*
- Was interviewed about tick activity by Judy Benson of The Day *June 13*
- Spoke on "Insect Pests of Poultry and Pest Management" at a poultry biosecurity and pest management workshop at the University of Connecticut (8 attendees) *June 15*
- Spoke with visitors, including Representative Steven T. Mikutel, at the Griswold Research Center Open House (80 attendees) *June 16*
- Was interviewed about human babesiosis by George Kennedy of the Republican American *June 22*
- Was interviewed about the current status of Lyme disease and tick activity by Page Gance of the Norwalk Hour *June 28*
- Was interviewed about tick activity by William Weir of the Hartford Courant *June 30*
- Was interviewed about tick activity and prevention by Debbie Handley of WLAD, Danbury, CT *June 30*

STONER, KIMBERLY A.

- Participated in a meeting of the NOFA Organic Land Care Committee at the Valley Laboratory in Windsor (12 attendees) *July 13, 2010*
- Participated in a meeting of the Board of Directors of CT NOFA in Manchester (12 attendees) *July 18*
- Was interviewed about losses of honey bees in Connecticut in relation to national surveys of bee losses by Melinda Tuhus of the Connecticut News Service *July 19*
- Was interviewed about losses of honey bees in Connecticut in relation to national surveys of bee losses by Heath Goldman of the Greenwich Time *July 19*
- Was interviewed about losses of honey bees in Connecticut in relation to national surveys of bee losses by the Waterbury Republican-American *July 26*

- Participated as a representative of Connecticut in the Interstate Council Meeting of the seven state chapters of NOFA at the University of Massachusetts in Amherst, MA (16 attendees) *August 13*
- Participated in a meeting of the Board of Directors of CT NOFA in West Hartford (12 attendees) *September 26*
- Participated in a meeting of the NOFA Organic Land Care Committee at the Valley Laboratory in Windsor (10 attendees*) October 12*
- Participated in a joint meeting of the NOFA Organic Land Care Committee and the Board of Directors of CT NOFA (20 attendees) *October 14*
- Participated in a meeting of the Board of Directors of CT NOFA by conference call (12 participants) *October 17*
- Co-organized the 5th annual Community Farming Conference with Bill Duesing of CT NOFA, and led the session where representatives of community farms across the state shared the current status of their farms, their resources, and their needs (42 attendees) *October 31*
- Gave the keynote address, "Carrying Forward the Values of NOFA," at the Annual Meeting and Harvest Festival of CT NOFA (60 attendees) *November 6*
- Led the review and revision of NOFA Standards for Organic Land Care: Practices for Design and Maintenance of Ecological Landscapes" as the Chair of the Standards Review Committee of the NOFA Organic Land Care Program (15 attendees) *November 12-13*
- Presented the talk "Pollinators in the Landscape" and served on a Question-and-Answer panel with other speakers at the NOFA Organic Land Care Annual Meeting held at UConn in Storrs (277 attendees) *December 7*
- Spoke about "Organic pest management" at a meeting organized by the Fairfield Organic Teaching Farm in Fairfield (25 attendees) *January 22, 2011*
- Taught "Principles and Procedures," "Overview of Pest Management," and a case study on pest management in the NOFA Organic Land Care Course held in Jones Auditorium (45 attendees) *January 24, 26, and 28*
- Spoke about resources for farmers at the Experiment Station, research on organic pest management, and pollinators at the "Getting Started in Organic Farming Conference" held in Jones Auditorium (45 attendees) *January 29*
- Was interviewed about research on honey bees, native bees, and pesticides by Chris Woodside for CT Woodlands Magazine *January 31*
- Spoke on "Movement of systemic insecticides into pollen and nectar" at the Bee School of the Connecticut Beekeepers Association held in Jones Auditorium (155 attendees) *February 12*
- Presented the Introduction to the NOFA Organic Land Care Accreditation Course at the Save the Bay Center in Providence, RI (55 attendees) *February 17*
- Presented the Pest Management Overview to the NOFA Organic Land Care Accreditation course at the Save the Bay Center in Providence, RI (32 attendees) *February 22*
- Was interviewed about the decline in honey bees and bumble bees across the US on "The Organic Farmstead" program on WPKN Radio *March 10*
- Spoke on "Why Organic?" at the Healthy Yards, Safe Waters Conference at the Yale School of Environmental Studies and Forestry (250 attendees) *March 19*
- Spoke on "Measuring pesticides in pollen and nectar" as part of a scientific symposium on "Pesticides and Pollinators" at the Eastern Branch Meeting of the Entomological Society of America held in Harrisburg, PA (30 attendees) *March 20*
- Was interviewed about Farm Based Education in Connecticut by Valerie Bannister for the Spring Supplement of the Hartford Courant *March 31*
- Spoke about the use of insecticides toxic to bees in suburban landscapes and ways for beekeepers to protect their bees to the Backyard Beekeepers Association in Weston (75 attendees) *April 26*

- With Dr. Brian Eitzer, participated in a meeting to develop grant proposals for research on improving the effectiveness of honey bees and other managed bumble bees for crop pollination at the University of Massachusetts in Amherst, MA *June 6*
- Was interviewed about organic land care and bee research on camera by Amy Dziobek of NBC-TV *June 16*
- Was interviewed about the results of the union elections and the possibility of closure of the Station by Jesse Buchanan of the Meriden Record Journal *June 27*

THIEL, PETER W.
- Spoke about Dr. Wade Elmer's salt marsh research to a workshop group from the Institute for Science Instruction and Study at the Cove River Conservation Property in West Haven (12 attendees) *July 1, 2010*

THOMAS, MICHAEL C.
- Demonstrated insect collecting techniques to the UConn Entomology and Yale University EEB Terrestrial Arthropods class at the Yale Forestry Camp in Norfolk, CT (30 student attendees) *September 18, 2010*
- Discussed the conservation status of state-listed invertebrates and funding priorities at a subcommittee meeting of Connecticut's Endangered Species Advisory Committee at the Station *November 19*
- Spoke to a group of students from Post University about mosquito biology and the state mosquito trapping and testing program *November 22*

TRENCHARD, PETER
- Discussed pest and disease problems and export issues with growers at the Summer Meeting of the CT Nursery and Landscape Association at Canterbury Horticulture in Canterbury (150 participants) *July 14, 2010*
- Was interviewed about Asian longhorned beetle and Emerald ash borer by Kevin Hogan of WFSB-TV-3 at Nye-Holeman State Forest in Tolland *July 30*
- Participated in an observation of the discovery of Emerald Ash Borer (EAB) in Saugerties, New York. Techniques for detection and identification of the insect in the field were discussed. Approximately 45 state and federal personnel from New York, Massachusetts, and Connecticut participated *August 10*
- Worked with personnel from the USDA-APHIS-PPQ Office in Wallingford, CT to certify cold-storage facilities of apples for export from a local fruit grower to Israel *August 18*
- Participated in an emergency preparedness summit for EAB, held at the South Mountain Regional Headquarters of the Massachusetts Department of Camping and Recreation (35 participants) *August 31*
- Participated in an emergency preparedness summit on Emerald ash borer in Jenkins Conference Room (45 participants) *September 14*
- Participated in a reaccreditation training for Authorized Certifying Official Status, conducted by Dennis Martin, Export Certification Specialist of the USDA-APHIS-PPQ, held at the Station *September 30*
- Participated in a meeting of the Emerald Ash Borer Survey Working Group at the USDA-APHIS-PPQ Office in Wallingford, CT *October 12*
- Participated in a meeting of the Emerald Ash Borer Survey Working Group at the UConn Middlesex Extension Service Office, Haddam *November 9*
- Reported on the Nursery Bundle survey at the Fall Meeting of the CT Cooperative Agricultural Pest Survey Committee at the Valley Lab, Windsor *November 17*

- Discussed the Emerald Ash Borer Ash Stand Survey at the emergency preparedness meeting on Emerald ash borer at the Valley Lab in Windsor *January 6, 2011*
- Staffed the Station exhibit and presented material about Asian longhorned beetle, Emerald ash borer, and other invasives at the CNLA Winter Meeting held at Mountain Ridge in Wallingford *January 13*
- Staffed the Station exhibit and presented material about Asian longhorned beetle, Emerald ash borer, and other invasives at the 2011 Annual Meeting of the CT Tree Protective Association held at the Aqua Turf Club in Plantsville (632 attendees) *January 20*
- Participated in a meeting of the Emerald Ash Borer survey Working Group at the UConn Middlesex Extension Service Office, Haddam *February 14*
- Spoke on survey strategies at the Emergency Preparedness Meeting on Emerald Ash Borer at the Valley Lab, Windsor *February 17*
- Participated in the Emerald Ash Borer Exercise Orientation Meeting at the Connecticut Fire Academy, Windsor Locks *March 2*
- Participated in an Emerald Ash Borer Preparedness Exercise as Deputy Operations Officer, Fort Trumbull State Park, New London, Harkness Memorial State Park, Waterford, and Rocky Neck State Park, East Lyme *March 9-10*
- Was interviewed by Judy Benson and Tim Martin from the Day of New London newspaper about the Emerald Ash Borer and the EAB training exercise *March 10*
- Staffed the Station exhibit at the Escape to Spring Expo at Van Wilgen's Garden Center, North Branford, and talked to the public about EAB/ALB and the Experiment Station *March 12*
- Participated in Aerial Survey-Aviation Safety & Management, a course sponsored by the US Forest Sevice, held at the Rachel Carson Office Building in Harrisburg, PA (37 participants) *March 28-31*
- Participated in Remote/Wilderness First Aid, a course sponsored by the US Forest Service, held at the Rachel Carson Office Building in Harrisburg, PA (16 participants) *April 1*
- Participated in an Emerald Ash Borer Emergency Response meeting, held at the Valley Lab in Windsor (20 participants) *April 7*
- Participated in the 37th Annual Meeting of the Horticultural Inspection Society, Eastern Chapter, in Worcester, MA and spoke on "The Life of a Nursery Inspector" as part of a panel of inspectors from the Eastern Chapter in a joint meeting with CAPS *April 11-14*
- Participated in an Emerald Ash Borer publicity event, held at DEEP Headquarters in Hartford (20 participants) *May 19*

VOSSBRINCK, CHARLES R.

- Met with officials of the Sligan Plastics Corporation, Deep River, CT, manufacturers of plastic bottles for use in the medical industry for compounds such as polyethylene glycol. The bottles become contaminated with insects and spiders on shipment - over a million bottles were rejected because of this problem. He is helping to do visual and molecular identification of the insects in an effort to identify where and how they are getting in to shipments to Florida *August 26, 2010*
- Presented an update on research activities on molecular phylogeny of West Nile virus at the Annual Meeting of Multi-State Research Project NE-1043 "Biology, Ecology & Management of Emerging Disease Vectors" held at the Station *March 1-2, 2011*

WARD, JEFFREY S.

- With Dr. Scott Williams, Joseph P. Barsky, and Michael R. Short, attended the Connecticut Tree Protective Association annual meeting in Farmington *July 15, 2010*
- With Dr. Paul Waggoner, met with Pekka Kauppi (University of Helsinki), Iddo Wernick (Rockefeller University, and Liisa-Maija Harju (United Nations) to discuss forests, their measurement and growth in developed nations *July 26*
- Was an invited guest on "Garden Talk" and offered advice on tree care, WTIC AM 1080 radio *July 31*

- Was interviewed about forest change in Connecticut by Ann DeMatteo of the New Haven Register *August 4*
- Spoke on controlling invasive shrubs with the Aspetuck Land Trust in Weston (10 attendees) *August 19*
- Was interviewed about effect of drought on fall leaf colors by Gil Simmons of WTNH TV-8 *August 19*
- Participated in the summer meeting of the Connecticut Chapter of the Society of American Foresters at the Pomfret School, Pomfret *August 20*
- Spoke on "Flame Weeding, A Technique for Killing Exotic Invasive Shrubs" at Vermont Woodlands Association's Forestry School Series Workshop in Brattleboro, VT (43 attendees *August 28*
- Was interviewed about fall foliage by Michael Mako of the Connecticut Post *August 28*
- Was interviewed about fall foliage by Steve Grant, freelance writer *September 3*
- Administered practical and oral examinations to arborist candidates for the Connecticut Tree Protection Examining Board *September 8*
- Presented an invited lecture "Assessing deer impacts on forests" at the 46th Annual Northeast Deer Technical Committee Meeting, Old Saybrook, CT (20 attendees) *September 14*
- Was interviewed about fall foliage by Steve Grant of the Hartford Courant *September 3*
- Was interviewed about the effect of drought on fall leaf colors by Bob Miller of the Danbury News Times *September 21*
- Participated in a Connecticut Forestlands Council Executive Board Meeting in New Haven *September 29*
- Was interviewed about impacts of deer browse on forest regeneration by Dave Mance of Northern Woodlands Magazine *September 30*
- Along with Dr. Scott Williams, Joseph P. Barsky, and Michael Short, attended a CT-DEEP Wildfire Training workshop in Torrington *October 13*
- Spoke on "Controlling Japanese Barberry: Alternative Methods and Impact on Tick Populations" at the 2010 Connecticut Invasive Plant Working Group Invasive Plant Symposium in Storrs (150 attendees) *October 14*
- Taught "Introduction to Forest Ecology" for Coop High School, New Haven (6 students, 1 teacher) *October 20*
- Presented the paper "Alternative Methods of Controlling Japanese Stiltgrass" at the 2010 Natural Areas Conference in Osage Beach, MO (25 attendees) *October 29*
- Lead a talking tour of Van Wie/Santa Croce property to discuss forest management for the Branford Land Trust (12 attendees) *November 13*
- Spoke on the impacts of invasives on forests at a department hosted workshop on Japanese barberry control for members of Joshua's Trust and interested citizens at Preston Sanctuary in Hampton *December 21*
- Participated in a Connecticut Urban Forest Council meeting in New Haven *December 1*
- Administered practical and oral examinations to arborist candidates for the Connecticut Tree Protection Examining Board *December 8*
- Gave two webinars on "Crop tree release of hardwoods for improved growth and survival" in cooperation with Cornell University (120 attendees) *December 15*
- Spoke on "Tree Biology" for the Arboriculture 101 class sponsored by The Connecticut Tree Protective Association, Jones Auditorium (50 students) *January 5, 2011*
- Spoke on "Homeowner tree care" for the Fairfield Garden Club in Southport (4 attendees) *January 6*
- Spoke on "How trees grow and tree care" to 12 students and 2 teachers at the Manson Youth Institute in Cheshire *January 11*
- Along with Dr. Scott Williams, participated in a Connecticut Urban Forest Council conference call *January 13*

- Participated in the 89th Annual Meeting of the Connecticut Tree Protective Association in Plainville *January 21*
- Spoke on tree care at a workshop for municipal tree workers of New Haven, Hamden, North Haven, and North Branford (50 attendees) *February 17*
- Spoke on "Fire history and research" for the Fire Science and Policy Class at Yale University (12 students) *March 1*
- Spoke on "Advances in barberry control" at the 16th annual Forest Health Monitoring Workshop in Jones Auditorium (33 attendees) *March 3*
- Spoke on "Crop tree management" at the CT NOFA 29th Annual Winter Conference in Manchester (7 attendees) *March 5*
- Administered practical and oral examinations to arborist candidates for the Connecticut Tree Protection Examining Board *March 9*
- Spoke about controlling invasives at Lyme Hall High School in Wallingford (4 student, 1 teacher attendees) *March 11*
- Gave two webinars on "Integrated Vegetation Management of Barberry Helps Control Lyme Disease" in cooperation with Cornell University (120 attendees) *March 16*
- Spoke on "Using propane torches to control barberry" at the Flame-Weeding for Invasive Shrub Control workshop sponsored by the USDA-NRCS in Vernon (42 attendees) *March 22*
- Was interviewed about controlling Japanese barberry by Beth Jones of Scientific American *March 23*
- Spoke on "Management Options for Japanese Stiltgrass Control" at the New England Society of American Foresters annual conference in Fairlee, CT (35 attendees) *March 30*
- Spoke on tree care at a workshop for municipal tree workers of Bridgeport, Fairfield, and Norwalk (28 attendees) *April 5*
- Presented an invited lecture "Interaction of invasive plants and herbivory on tree seedlings and herbaceous plants" at the Northeast Natural History Conference 2011 in Albany, NY (43 attendees) *April 8*
- Spoke on departmental research to students of Green Farms Academy *April 12*
- Spoke on controlling invasive shrubs to the North Branford Land Conservation Trust (40 attendees) *May 4*
- Spoke on "Homeowner tree care" for the Women's Club of Madison (27 attendees) *May 10*
- Participated in a Connecticut Urban Forest Council meeting in Southbury *May 19*
- Gave four talks on "Fruits of the Forests" to 4th grade students at the Southington School Nature Day (118 students, 18 adults) *June 2*
- Administered practical and oral examinations to arborist candidates for the Connecticut Tree Protection Examining Board *June 8*
- Provided an overview of horticulture and forestry research for Connecticut Tree Wardens (8 attendees) *June 9*
- Was interviewed about controlling Japanese barberry by Judy Benson of the New London Day *June 13*
- Spoke on "Dating vegetation at crime scenes" at the Clandestine Grave Workshop at the University of New Haven in West Haven (18 attendees) *June 14*
- Spoke on using propane torches to control invasive shrubs to staff of The Nature Conservancy, and members of the Salem Haddam, and Lyme Land Conservation Trusts (11 attendees) *June 17*
- Was interviewed about controlling Japanese barberry by Bob Miller of the Danbury News-Times *June 21*
- Spoke on "A Short History of the Connecticut Forest" to the Orchard Valley Garden Club in Southington, CT (34 attendees) *June 28*
- Provided an overview of horticulture and forestry research for teachers studying at Southern Connecticut State University (7 teachers) *June 29*

WHITE, JASON C.

- Participated in a conference call sponsored by the US EPA concerning the planning of the upcoming International Phytotechnology Society Meeting in Parma, Italy this September *July 8 and 22, 2010*
- Participated in conference calls with the FDA Forensic Chemistry Center to discuss the development of extraction and analysis methods for chemical contamination of seafood due to the Deepwater Horizon Oil Spill *July 7, 12, 16, 21, and 23*
- With his staff, participated in several FERN Chemistry Cooperative Agreement Laboratory conference calls *July 8-July 27*
- Gave a tour of the Department laboratories and described key programs to Ray Bendici, a reporter from Connecticut Magazine *July 21*
- Participated in a meeting at the FDA Forensic Chemistry Center in Cincinnati Ohio where he, along with representatives from the Minnesota Department of Agriculture, presented a new LC-Fluorescence method for the detection of oil contaminants in seafood to scientists from the FDA Center for Food Safety and Applied Nutrition *July 24*
- Was interviewed about the Department's testing of seafood from areas of the Gulf of Mexico impacted by the Deepwater Horizon Oil Spill by Bob Pollack who writes the Experiment Station Associates Bulletin *July 28*
- Was interviewed about the Department's testing of seafood from areas of the Gulf of Mexico impacted by the Deepwater Horizon Oil Spill by Ed Stannard of the New Haven Register *July 29*
- Was interviewed about the Department's testing of seafood from areas of the Gulf of Mexico impacted by the Deepwater Horizon Oil Spill by Judy Benson of The New London Day *July 30*
- Was interviewed about the Department's testing of seafood from areas of the Gulf of Mexico impacted by the Deepwater Horizon Oil Spill by Dan Cain of Channel 3 News (CBS) *July 30*
- Was interviewed about the Department's testing of seafood from areas of the Gulf of Mexico impacted by the Deepwater Horizon Oil Spill by Keisha Grant of NBC Connecticut 30 News *July 30*
- Briefed the Station's Board of Control on the current activities in the Analytical Chemistry Department related to nanoparticle research and the testing of seafood from areas of the Gulf of Mexico impacted by the Deepwater Horizon Oil Spill *August 4*
- Together with staff from the Analytical Chemistry Department, participated in a FERN Chemistry Cooperative Agreement Laboratory conference call *August 5*
- Was interviewed on the Department's testing of seafood from areas of the Gulf of Mexico impacted by the Deepwater Horizon Oil Spill by the Waterbury Republican American *August 5*
- Was interviewed on the Department's testing of seafood from areas of the Gulf of Mexico impacted by the Deepwater Horizon oil spill by NPR Public Radio *August 9*
- Was interviewed on the Department's testing of seafood from areas of the Gulf of Mexico impacted by the Deepwater Horizon oil spill by Fox News *August 9*
- Was interviewed on the Department's testing of seafood from areas of the Gulf of Mexico impacted by the Deepwater Horizon oil spill by the Hartford Courant *August 9*
- Together with staff, participated in a Northeast Regional FERN conference call, speaking on the Gulf seafood testing being done in the Analytical Chemistry Department *August 10*
- Along with Dr. Brian Eitzer, Dr. Walter Krol and Ms. Terri Arsenault, attended the annual FDA Food Emergency Response Network Chemistry Cooperative Agreement Program technical meeting in Denver, Colorado. Dr. White and Ms. Arsenault gave a research update presentation on the activities within the Department of Analytical Chemistry over the last 12 months *August 16-19*
- Was interviewed about the analysis of organic compounds potentially released from crumb rubber used as artificial turf by the Waterbury Republican American *September 7*
- Described department programs and gave a tour of the laboratory to representatives from the Senate Democrats Office in Hartford *September 8*

- Participated in a FERN Chemistry Cooperative Agreement Laboratory conference call *September 9*
- Was interviewed about the Analytical Chemistry Department's testing of seafood from areas of the Gulf of Mexico impacted by the Deepwater Horizon Oil spill by Robert Pollack of the Experiment Station Associates Bulletin *September 9*
- Provided a summary of the Analytical Chemistry Department's FDA FERN testing program on seafood coming from the Gulf impacted by the Deepwater Horizon Oil spill to a representative from Congresswoman Rosa DeLauro's Office in New Haven *September 9*
- Participated in the monthly Laboratory Preparedness Network meeting at the Department of Public Health in Hartford *September 13*
- Hosted a representative from Congresswoman Rosa DeLauro's New Haven office and gave her a demonstration on the procedure developed for the screening of seafood from areas of the Gulf of Mexico *September 14*
- Participated in a conference call with the FDA Forensic Chemistry Center and the MN Department of Agriculture on the implementation of a new analytical reporting technique for seafood samples from areas of the Gulf of Mexico impacted by the Deepwater Horizon oil spill *September 22*
- Gave two presentations entitled "Phytoremediation of soils contaminated with persistent organic pollutants" and "Phytotoxicity of engineered nanoparticles to agricultural crops" and chaired the annual Editorial Board meeting of the International Journal of Phytoremediation (he is Managing Editor of the Journal) at the 7th International Conference on Phytotechnologies in Parma, Italy (He is Executive Vice President of the Society) *September 25-30*
- Was interviewed about the department's testing of seafood from areas of the Gulf of Mexico impacted by the Deepwater Horizon oil spill by Jeffrey Ball of the Wall Street Journal *October 13*
- With staff from Analytical Chemistry, participated in a FERN Chemistry Cooperative Agreement Laboratory conference call *October 14*
- Co-chaired the Phytoremediation Session and presented a talk entitled "Phytoremediation of soils contaminated with persistent organic pollutants" at the 26th Annual International Conference of Soils, Sediments, Water, and Energy at the University of Massachusetts *October 19*
- Presented an invited lecture at the Occupational and Environmental Medicine Program at the Yale School of Medicine entitled "The Connecticut Agricultural Experiment Station Department of Analytical Chemistry: 115 Years of Food Safety Research" *October 26*
- Participated in a conference call with the International Phytotechnology Society, of which he is Vice President, to discuss past and future meetings *October 27*
- Participated in an EPA-sponsored webinar on upcoming BP and EPA requests for proposals focused on the impacts of the Deepwater Horizon Oil Spill in the Gulf of Mexico *October 28*
- Participated in the monthly Laboratory Preparedness network meeting at the Department of Public Health in Hartford *November 1*
- Met with and hosted special Agent Michael Syrax of the FBI who toured the Department facilities and gave a lecture focused on agroterrorism *November 5*
- Led a WebEx conference call with representatives of General Electric Global Research on the potential use of biochar amendments to reduce the toxicity and exposure associated with PCBs in Hudson River sediments *November 10*
- Participated with Department staff in a FERN Chemistry Cooperative Agreement Laboratory conference call *November 18*
- Participated in a conference call with representatives of Boos, Allen, and Hamilton on the potential automated data exchange of the Department of Analytical Chemistry sample database with the US FDA database entitled eLEXNET *November 30*
- Participated in the monthly Laboratory Preparedness Network Meeting at the Department of Public Health in Hartford *December 6*

- Participated with the Department staff in a FERN Chemistry Cooperative Agreement Laboratory Conference Call *December 9*
- Participated in the USDA NIFA Nanotechnology Program Directors Meeting in Washington, DC *December 9-11*
- Participated with the Department staff in a FERN Northeast Regional Conference Call *December 14*
- Participated in the monthly Laboratory Preparedness Network meeting at the Department of Public Health in Hartford and presented a lecture entitled "Deepwater Horizon Oil Spill Response: Role of the CT Agricultural Experiment Station Department of Analytical Chemistry*" January 10, 2011*
- Gave two presentations remotely for the Kansas State University Symposium on Brownfields and Urban Gardening entitled "Plant Uptake of Organic Contaminants: Fate and Transport" and "Sampling and Analysis of Organic Contaminants in Plants" *January 11*
- Participated with Department staff in a FERN Chemistry Cooperative Agreement Laboratory conference call *January 13*
- Participated in a conference call of the Planning Committee for the upcoming 8th International Phytotechnologies Conference *January 13*
- Participated with Department staff in the US FDA FERN "hotwash" call on the agency and network response to the Deepwater Horizon Oil Spill *January 25*
- Was interviewed by Ruth Kassinger about phytoremediation for her Harper Collins book on the history of plant physiology entitled "A Garden of Marvels" *February 2*
- Participated in the monthly Laboratory Preparedness Network Meeting at the Department of Public Health in Hartford *February 7*
- Participated in the EPA NE Regional Pesticide Roundtable Meeting in North Chelmsford, MA and presented two lectures entitled "Connecticut Agricultural Experiment Station Department of Analytical Chemistry – Laboratory Update" and "Deepwater Horizon Oil Spill Response: Role of the Connecticut Agricultural Experiment Station's Department of Analytical Chemistry" (20 attendees) *February 8*
- Presented a lecture entitled "Phytotechnologies: Fundamentals and Mechanisms" at Harvard University's Department of Landscape Architecture (12 attendees) *February 9*
- Participated with Department staff in a FERN Chemistry Cooperative Agreement (Laboratory Conference Call *February 10*
- Participated in the FDA FERN training webinar on laboratory accreditation *February 15*
- Attended a lecture at the CT Department of Public Health entitled "Food as a Vehicle for Terrorism: Tetramine and Other Convulsants" *February 17*
- Participated in a conference call with US FDA on the merging of our Departmental Sample Database with the Federal eLEXNET system *February 22*
- Described the Analytical Chemistry Department's programs and research during a tour of the Laboratory for visitors from the Northeast Plant Diagnostic Network (20 attendees) *February 23*
- Was interviewed about phytoremediation of PCBs by poplar plants by Catherine Cooney of the American Chemical Society *February 24*
- Described the Analytical Chemistry Department's programs and research during a tour of the Laboratory for teachers from the Future Farmers of America (5 attendees) *February 25*
- Participated in a conference call of the organizing committee for the upcoming 8th International Phytotechnologies Conference to be held in Portland, OR in September 2011 *February 25*
- Participated in a National Center for Food Protection and Defense webinar entitled "New Food Models: Bioterrorism Risk Assessment (BTRA)" *March 5*
- Participated in the monthly Laboratory Preparedness Network meeting at the Department of Public Health in Hartford March 7
- Participated in an FDA FERN CAP Chemistry conference call for LC-MS Executive Users *March 9*

- Participated in an on-line (Internet Assisted Review) Grant Review Panel for the National Institute of Health *March 15*
- Presented a poster entitled "Role of the Connecticut Agricultural Experiment Station Department of Analytical Chemistry in the Deepwater Horizon Oil Spill Response" at Agriculture Day at the Capitol" *March 16*
- Participated with department staff in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *March 17*
- With department staff, participated in an FDA Incident Response Drill *April 1-8*
- Participated in the monthly Laboratory Preparedness Network meeting at the Department of Public Health in Hartford *April 4*
- Met with a group from the Green Farms Academy High School and gave them an overview of the Department of Analytical Chemistry (12 students and 2 teachers) *April 12*
- Participated in an FDA FERN CAP Chemistry Conference Call for LC-MS Exactive users *April 13*
- With department staff, participated in an FDA FERN Chemistry Cooperative Agreement Laboratory Conference Call *April 14*
- Participated in a conference call of the Organizing Committee for the 8th International Phytotechnologies Conference in Portland, OR from September 13-16 *April 14 and 20*
- Met with representatives from the Natural Resources Conservation Service *April 18*
- Presented a seminar entitled "Role of the Connecticut Agricultural Experiment Station Department of Analytical Chemistry in the Deepwater Horizon Oil Spill Response" at the CAES Annual Spring Open House (80 attendees) *April 27*
- Hosted three tour groups in the department's laboratories for the CAES Annual Spring Open House *April 27*
- Participated in the monthly Laboratory Preparedness Network meeting at the Department of Public Health in Hartford *May 2*
- Presented a lecture entitled "Role of the Connecticut Agricultural Experiment Station Department of Analytical Chemistry in the Deepwater Horizon Oil Spill Response" at the annual meeting of the Experiment Station Associates (12 attendees) *May 5*
- Participated in an FDA FERN CAP Chemistry conference call for LC-MS Exactive users *May 5 and 25*
- Participated with Department staff in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *May 12*
- Participated with Department staff in the hot-wash call for the FDA Incident Response Drill that we participated in the previous month *May 13*
- Participated in a conference call with the FDA FERN National Program Office and other CAP Laboratory Directors on modifying grant reporting requirements *May 26*
- Presented a poster entitled "Nanomaterial contamination of agricultural crops" at a Gordon Conference in Waterville Valley, New Hampshire focusing on Environmental Nanotechnology (150 attendees) *May 29-31*
- Held a project directors' meeting for a USDA grant on nanoparticle uptake and toxicity in agricultural plants *May 31*
- Presented a lecture entitled "Role of the Connecticut Agricultural Experiment Station Department of Analytical Chemistry in the Deepwater Horizon Oil Spill Response" at the annual meeting of the Connecticut Hospital Association (25 attendees) *June 2*
- Participated in the monthly Laboratory Preparedness Network Meeting at the Department of Public Health in Hartford *June 6*
- Participated with Department staff in an FDA Fern Chemistry Cooperative Agreement Laboratory Conference Call *June 9*
- Hosted a tour of Analytical Chemistry laboratories for the CT Tree Wardens (12 attendees) *June 9*

- Participated with Department staff in a Northeast Regional FDA FERN Conference Call and updated members on the current budget situation at CAES *June 14*
- Presented the lecture "CT Agricultural Experiment Station Department of Analytical Chemistry: 115 Years of Food Safety Research" at the Northeast Environmental and Public Health Laboratory Directors Quarterly Meeting in Concord, NH (12 attendees) *June 15*
- Participated in a conference call of the organization of the 8th International Phytotechnology Society Meeting to be held on September 13-16 in Portland, OR *June 22*
- Held a conference call of project directors from UMass-Amherst, SUNY ESF, and Southern Illinois University for the department's USDA Food Safety Grant *June 24*
- Presented the lecture "Nanotoxicology" to a graduate class on Nanotechnology at the University of New Haven (12 attendees) *June 28*
- Hosted a tour of the Analytical Chemistry Department laboratories for students from Southern Connecticut State University (10 attendees) *June 29*
- Participated with Department staff in an FDA FERN-wide conference call *June 29*
- Hosted a tour of the Department laboratories and programs for Yale University Department of Chemical and Environmental Engineering graduate students (2 participants) *June 30*

WILLIAMS, SCOTT
- Met with officials from Joshua's Land Trust to discuss invasive control, Hampton *August 12, 2010*
- Presented the invited lecture "Aerial Deer Survey Technique Using a Digital Sketch Mapper" at the 46th Annual Northeast Deer Technical Committee Meeting, Old Saybrook, CT (20 attendees) *September 14*
- Gave a lecture and demonstration on small mammal trapping to the Wildlife Techniques Class of the Department of Natural Resources and Environment at the University of Connecticut, Storrs, CT (6 students,1 professor) *September 23*
- Gave a lecture on "Effects of Japanese Barberry Removal and Resulting Microclimatic Changes on Blacklegged Tick Abundances in Connecticut" at the Yale University School of Forestry and Environmental Studies Forest Forum, New Haven, CT (20 student attendees) *September 30*
- Was interviewed about deer sterilization by Dave Mance of Northern Woodlands Magazine *September 30*
- Spoke on "Impacts of Japanese Barberry and Browsing White-Tailed Deer on Forest Regeneration" at the Connecticut Invasive Plant Working Group Symposium at the University of Connecticut, Storrs (150 attendees) *October 14*
- Moderated the "Urban Wildlife Issues" session at the Connecticut Urban Forest Council's 22nd Annual Conference in Wallingford, CT (50 attendees) *November 3*
- Participated in the Safe Capture International, Inc.'s workshop on humane capture and handling of animals through chemical immobilization, in Bridgeport, CT *November 4-5*
- Spoke on brush saw safety and operation at a department hosted workshop on Japanese barberry control for members of Joshua's Trust and interested citizens at Preston Sanctuary in Hampton *December 21*
- With Dr. Jeffrey Ward, participated in a Connecticut Urban Forest Council conference call *January 13, 2011*
- Gave the invited lecture "Wildlife Laws and Deer Damage Avoidance" at the 5-day accreditation course of the Northeast Organic Farming Association (35 attendees) *January 31*
- With Michael Short, met with representatives from Bobbex, Inc. to discuss deer repellent trials *February 9*
- Met with biologists from the CT Department of Energy and Environmental Protection, Wildlife Division, and a representative from the Great Mountain Forest to discuss habitat improvement and Japanese barberry management *February 17*

- Spoke on "It's not the heat, it's the humidity: deer ticks thrive in Japanese barberry" at the Forest Health Workshop, New Haven (35 attendees) *March 3*
- Spoke on "It's not the heat, it's the humidity: deer ticks thrive in Japanese barberry" at the 5th Connecticut Conference on Natural Resources, Storrs (60 attendees) *March 7*
- Staffed a CAES information booth at the Escape to Spring Expo at Van Wilgen's Nursery, North Branford *March 13*
- Spoke to the Town of Guilford Conservation Commission on ongoing Japanese barberry research in the Department of Forestry and Horticulture, Guilford (10 attendees) *March 16*
- Presented a wildlife monitoring techniques lecture at Lyman Hall High School, Wallingford (5 student, 1 teacher attendees) *March 18*
- Was interviewed about the relationship between Japanese barberry and blacklegged ticks by Scientific American guest blogger Beth Jones *March 23*
- Gave an invited lecture entitled "Interconnectedness between a native ectoparasite, an alien invasive shrub, a native rodent and a native invasive mammal and potential impacts to humans" at the Quinnipiac Sigma Xi Chapter's Albert Notation Memorial Seminar Series, Hamden (40 attendees) *March 31*
- Spoke to members of the Guilford High School's Environmental Club about invasive plant species and their control (15 students) *April 2*
- Participated in a round table discussion about white-tailed deer overabundance at the Northeast Natural History Conference in Albany, NY *April 8*
- Presented the talk "Survival and Dispersal of Rehabilitated White-tailed Deer Fawns in Connecticut" at the 67th Annual Northeast Fish and Wildlife Conference, Manchester, NH (55 attendees) *April 17-19*
- Gave an invited lecture titled "Ecological Interconnectedness Between a Native Ectoparasite, an Alien Invasive Shrub, a Native Rodent, and a Native Invasive Mammal and Potential Impacts to Humans" at the Department of Biology Seminar Series at Western Connecticut State University (65 attendees) *April 27*
- With Dr. Jeffrey Ward, Joseph P. Barsky, and Michael Short, met with representatives from the Nature Conservancy, Lord Creek Farm, and Audubon Connecticut in Lyme, CT to discuss impact of invasive species control on birds and native vegetation *April 29*
- Spoke on impacts of deer and invasive plant removal on blacklegged tick populations to members of the North Branford Land Conservation Trust (40 attendees) *May 4*
- Hosted a Connecticut Urban Forest Council Conference Planning Meeting *May 9*
- Met with officials of the Shake Away, Inc. to discuss deer repellents *May 19*
- Spoke on relationship of Japanese barberry and Lyme disease risk to staff of The Nature Conservancy, and members of the Salem, Haddam, and Lyme Land Conservation Trusts (11 attendees) *June 17*

ZARRILLO, TRACY

- Visited the lab of Mr. Sam Droege of the USGS in Maryland to review her bee species determinations and further her studies in bee identification skills. She has also designed a logo for his Bee Inventory and Monitoring Lab, and will be helping him in his ongoing efforts to expand the online DiscoverLife Apoidea Identification Guide *December 13-16*

ADVANCES IN KNOWLEDGE

DEPARTMENT OF ANALYTICAL CHEMISTRY

The format adopted in the previous years' Records will be continued in order to focus on the work of the Department of Analytical Chemistry from July 1, 2010 through June 30, 2011. Narratives will be brief and presented in bulleted outlines where possible. Sources of more detailed information are provided, when available. This format should provide information more conveniently and be of more use to the public.

FOCUS AREAS

Service, research, and outreach activities in the Department are conducted within two Focus Areas:

Environmental Monitoring/Remediation
Food Safety

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

I. SERVICE ACTIVITIES

Analyses are conducted across a wide range of sample matrices submitted to the Department of Analytical Chemistry by other State agencies, municipalities, police departments, non-profit groups, businesses, and other departments at the Connecticut Agricultural Experiment Station (CAES). This list is not intended to be all-inclusive.

1. ANALYSES ON BEHALF OF CONNECTICUT DEPARTMENT OF AGRICULTURE

Analytical Chemistry has two long-standing programs with the CT Department of Agriculture involving the analysis of feed and fertilizer products.

a. Animal Feeds:

- Analysts: Craig Musante, John Ranciato
- Goal: To assure products are in compliance with stated label guarantees.
- Summary: This was one of the primary analyses of the Station at its founding in 1875.
- Products for both household pets and commercial agricultural operations are included.
- Samples are collected by inspectors from the CT Department of Agriculture. Analytical results are reported to CT Department of Agriculture, who in turn reports findings to the product dealer and product manufacturer.
- From July 1, 2010 to June 30, 2011, we completed analysis of 189 feed samples. These samples were analyzed for parameters such as protein, fat, moisture, fiber, and micronutrients. Samples deficient in one or more analytes (determined according to the investigational allowances outlined in the Official Publication of the Association of American Plant Food Control Officials) numbered 90 (47.6%). Analytical findings were turned over to the CT Department of Agriculture for regulatory response.

b. Fertilizers:

- Analysts: Craig Musante, John Ranciato
- Goal: To assure products are in compliance with stated label guarantees.
- Summary: This was one of the primary analyses of the Station in 1875.
- Products from residential and commercial agricultural operations are included.
- Samples are collected by inspectors from the CT Department of Agriculture. Analytical results are reported to CT Department of Agriculture, who in turn reports findings to the product dealer and product manufacturer.
- From July 1, 2010 to June 30, 2011, we completed analysis of 126 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. Samples deficient in one or more analytes (determined according to the investigational allowances outlined in the Official Publication of the Association of American Plant Food Control Officials) numbered 47 (37.3%). Analytical findings are turned over to the CT Department of Agriculture for regulatory response.

2. ANALYSES ON BEHALF OF CONNECTICUT DEPARTMENT OF CONSUMER PROTECTION, FOOD AND STANDARDS DIVISION

Analyses conducted by the Analytical Chemistry department for the CT Department of Consumer Protection (DCP) are important to public safety. The results of these 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.

a. Pesticide residues in food:

- Analysts: Walter Krol, Brian Eitzer
- Goal: To determine concentrations of agrochemicals in fresh and processed foods from local, domestic, and imported sources offered for sale in CT and to assure compliance with established tolerances.
- Market basket survey samples are collected by Inspector Ellen Sloan of the DCP.
- Results are published in an annual Station bulletin available by mail and at www.ct.gov/caes.
- From July 1, 2010 through June 30, 2011, 195 samples of fresh (136; 69.7%) and processed (59; 30.3%) samples were analyzed for pesticide residues. Beginning January 1, 2006, all market basket samples were analyzed using the QuEChERS method, providing lower limits of detection and increased number of detectable agrochemicals (Figure 1). Please see past Records of the Year and Station bulletins for details.
- Of the 195 samples analyzed, 132 (67.7%) contained a total of 507 residues. There were 74 different pesticide active ingredients found. The three most commonly detected residues were the fungicide and metabolite carbendazim (8.5%), the fungicide boscalid (7.9%), and the insecticide imidacloprid (7.3%). The average residue found was 0.242 ppm, and the average number of pesticide residues per sample containing residues was 3.78. The impact on our program of fully implementing QuEChERS is shown graphically in Figure 1. Note that 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 at much lower concentrations

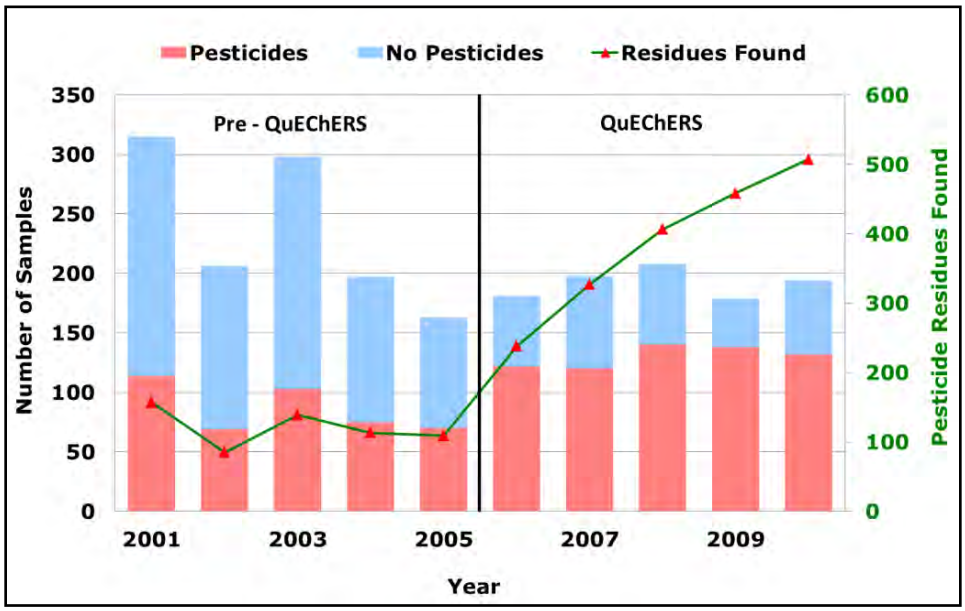


Figure 1. Pesticide Residue Data 2001 -2010

• In 2010, the CT Department of Public Health (DPH) received a grant from the United States Department of Agriculture (USDA) Food Safety and Inspection Service (FSIS) to test food in the marketplace for potentially harmful pathogens linked to human illness. Part of this grant included working with the Department of Analytical Chemistry at the CAES in its capacity as a chemistry Cooperative Agreement Program (cCAP) laboratory in the Food Emergency Response Network (FERN). Utilizing the collection and regulatory arm of the CT DCP, a pilot study was undertaken in which 68 of the aforementioned samples of food collected in the marketplace underwent concurrent pesticide residue *and* microbial analysis testing. In analyses conducted by DPH, three of the samples were found to contain the pathogenic bacteria *Listeria monocytogenes*.

b. Peanut allergens

• Analyst: Christina Robb

• Summary- In February of 2011, we received approximately 13 samples from CT DCP to screen for the presence of peanut allergens. The analysis is by enzyme-linked immunosorbent assay (ELISA); funding to purchase the analytical kits was through the FDA. At this time, the study is focused mainly on shelf-stable imported foods. Of the samples analyzed, none tested positive for peanut allergens.

c. Miscellaneous samples

• Analyst: John Ranciato

• Summary: From July 1, 2010 to June 30, 2011, 222 samples were submitted for analytical requests such as foreign material identification, possible product adulteration or

tampering. For some samples, we rely on the expertise in other departments, including Plant Pathology & Ecology, Entomology, and Forestry & Horticulture.

3. ANALYSES ON BEHALF OF DEPARTMENT OF CONSUMER PROTECTION, LIQUOR CONTROL DIVISION

a. Beverages/products for ethanol content

- Analyst: John Ranciato, Terri Arsenault
- Goal: To provide % ethanol by volume for label registration and taxation purposes.
- Summary: We analyzed 23 products such as beers, wines, and liquors for ethanol content. The average % ethanol content for beers, wines and liquors were 5.20, 13.5, and 31.4%, respectively.

b. Beverage authenticity

- Analyst: Brian Eitzer
- Goal: To determine if products offered to customers at CT establishments are authentic as to brand.
- Summary: 53 alcoholic products were examined for authenticity; 7 samples were found to not match the chromatographic profile of comparison authentic samples. These results are returned to the Division of Liquor Control, who then determine appropriate regulatory action.

4. ANALYSES ON BEHALF OF DEPARTMENT OF CONSUMER PROTECTION, PRODUCT SAFETY DIVISION

- Analyst: Craig Musante, John Ranciato, Terri Arsenault
- Summary: From July 1, 2010 to June 30, 2011, we analyzed 9 samples for product safety. One sample was a painted wooden toy, which was analyzed for lead and cadmium; levels were found to be below current regulatory guidelines. Eight samples of blown-in insulation were analyzed for formaldehyde content; current state statutes indicate that no formaldehyde is permitted in spray foam insulation products.

Impact: All samples of blown-in insulation were found to have formaldehyde. The content of 4 of the samples ranged from 20-52 ppm (parts per million) but the two of the remaining samples had levels of 2000-2100 ppm. The Product Safety Division of DCP is currently handling the regulatory response.

5. ANALYSES ON BEHALF OF DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION (DEEP), WASTE MANAGEMENT BUREAU

a. Analysis of PCBs (polychlorinated biphenyls)

- Analysts: Brian Eitzer, William Berger
- Goals: To ascertain the extent of polychlorinated biphenyl (PCB) contamination. Common matrices include soils, waters, oils, sediments, surface wipes.
- Summary: From July 1, 2010 to June 30, 2011, a total of 40 samples were analyzed from pre-existing sites and/or spill locations in CT. The sample collection by DEEP is part of mandatory long-term monitoring of these areas. As such, the findings are reported to DEEP for assessment of continued regulatory compliance.

b. Analysis of pesticides

- Analysts: Brian Eitzer, Terri Arsenault, Christina Robb
- Goals: To ascertain pesticide concentration associated with misapplication or drift in support of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Additional samples are analyzed in support DEEP surface and groundwater monitoring programs. Matrices include, but are not limited to soils, waters, oils, sediments, surface wipes. Water, vegetation and soil samples can now be analyzed for glyphosate using liquid chromatography-mass spectrometry (LC/MS).
- Summary: From July 1, 2010 to June 30, 2011, a total of 129 samples were analyzed under this program.

Impact: In past years, the processing of samples for DEEPs surface and groundwater monitoring program for pesticides was done in two parts. DEEP staff would initially perform the enzyme-linked immunosorbent assay (ELISA) on samples for atrazine, imidacloprid, alachlor, and 2,4-dichlorophenoxyacetic acid (2,4-D). The DEEP inspector would then bring the positive samples to our laboratory for confirmation by chromatography (gas [GC] and liquid [LC]) with mass spectrometry. This year, due to resource limitations at DEEP, our laboratory assumed responsibility for performing the ELISA screening test in addition to our chromatographic analysis. We have discovered that the ELISA screen produces a large number of false positive results for atrazine. This finding is significant as other water monitoring programs may rely exclusively on the ELISA test, which overestimates the presence of atrazine in the environment. For instances where the ELISA test is used as a screen, the high cost of the supplies/kits may lead one to question the value of this assay since a large number of "positive" samples need to be analyzed by GC/LC-MS.

6. ANALYSES ON BEHALF OF MUNICIPAL AND FEDERAL AGENCIES

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

- Analysts: Terri Arsenault, William Berger, Brian Eitzer, Craig Musante, Christina Robb, Walter Krol
- Summary: The Analytical Chemistry department has a Cooperative Agreement with the US FDA to conduct research and analyses related to chemical contaminants in food. The Department has successfully participated in proficiency tests and surveillance exercises for various chemical contaminants on several different analytical instruments.

b. Analysis of samples for municipalities

- Analysts: Terri Arsenault, William Berger, Brian Eitzer, Craig Musante,
- Summary: From July 1, 2010 through June 30, 2011, Department staff analyzed 22 samples for municipalities. Several samples were analyzed for poisons and toxins, including a set of juice samples from the Town of Greenwich Health Department and a meat sample from the Montville Police Department; both came back negative. A frog from the Town of Fairfield Health Department was identified as to genus and species with the help of herpetologists from the Peabody Museum. Soil samples from Eastern Connecticut State University, the Town of Bristol Parks Department, The City of New Haven Parks, and the Connecticut Agricultural Education Foundation (CTAEF) were analyzed for organic and inorganic contaminants.

Impact: The soil samples from the CTAEF were from taken from areas that were to be used by school-age children for vegetable gardens. The program is called "Ag in the classroom" and students will be planting, growing, and harvesting vegetables on school grounds. The food would then be donated to the school cafeterias for general consumption. Our results were returned with instructions to consult the CT Department of Public Health and the CT DEEP for data review. The "Ag in the classroom" program is currently underway at two Connecticut schools.

7. ANALYSES ON BEHALF OF OTHER STATION DEPARTMENTS

a. Analysis for Soils- Department of Forestry and Horticulture

- Analyst: Craig Musante, John Ranciato
- Summary: From July 1, 2010 through June 30, 2011, a total of 317 soil samples from various sites across Connecticut were extracted and analyzed as part of a Forest Health Project being coordinated by Dr. Jeffrey Ward of the Department of Forestry and Horticulture. The soil extracts were analyzed for nutrient content, including nitrogen, aluminum, calcium, potassium, magnesium and phosphorus.

b. Analyses related to pollinator decline- Department of Entomology

- Analyst: Brian Eitzer
- Summary: Upon request from Dr. Kim Stoner in the Entomology Department, we determine concentrations of agrochemicals in pollen and wax to ascertain possible relationship to bee health. LC/MS methods have been developed for low level detection of pesticides. See Research section below.

c. Analyses of samples for Nootkatone- Department of Entomology

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

d. Analysis of Xenon- Department of Environmental Sciences

- Analysts: Terri Arsenault
- Summary: Dr. Joseph Pignatello and Dr. Charisma Lattao of the Department of Environmental Sciences have been working with Department staff on the analysis of xenon in soil systems. The project is focusing on using xenon to measure contaminant induced alterations in soil organic matter structure and plasticity.

e. Analysis of Pesticides in Tobacco Leaves- Valley Laboratory

- Analysts: Walter Krol
- Summary: The Department received approximately 20 samples of tobacco leaves from Dr. James Lamondia at the Valley Laboratory. Department staff extracted and analyzed these samples for pesticide residues.

f. Analysis of Pesticides in Irrigation Water- Department of Plant Pathology and Ecology

- Analysts: Terri Arsenault

• Summary: The Department received 4 samples of irrigation water that were collected by Dr. Yonghao Li of the Department of Plant Pathology and Ecology. Department staff extracted and analyzed these samples for pesticide residues.

8. Analysis of Check Samples

• Analysts: Walter Krol, Terri Arsenault, William Berger, Christina Robb, Brian, Eitzer, Craig Musante

• Summary: Annual performance evaluation samples required by our certifying agency, Connecticut Department of Public Health, as well as annual proficiency testing samples related to our FDA FERN work, were completed during the reporting period. Our reported results exceeded required criteria in all instances.

II. 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.

1. FOOD SAFETY

Project 1: *Comparison of Methods for Determination of Pesticide Residues in Food*

• Investigators: Walter Krol, Terri Arsenault, Brian Eitzer,

• Summary: The implementation and validation of more sensitive extraction methods for pesticides in food more accurately reflects the residues present in food commodities. This information increases the effectiveness of food safety surveillance and also more accurately informs the consumer as to the residues present in the food they purchase. An extensive comparison of our previous extraction method, the VegPrep, with the Quick, Easy, Cheap, Effective, Rugged, Safe (QuEChERS) method is ongoing. In summary, the QuEChERS method can detect greater numbers of pesticides at concentrations up to ten-times lower than previously used methods.

Project 2: *Improvement to FERN Methods: Using an Exactive LC-MS for Pesticide Surveillance and Identification*

• Investigators: Brian Eitzer

• Summary: Integral to our Cooperative Agreement with the FDA is assessment of procedures for detecting toxins and pesticides in foods. The development of rapid, sensitive and accurate methods for chemical detection increases the robustness of food safety and security systems in the United States. This year we received a new High Resolution Liquid Chromatograph-Mass Spectrometer (LC-MS) from FDA and have been working with the Forensic Chemistry Center (FDA), as well as the CA and FL FERN laboratories on a new pesticide screening method with this instrument. This instrument calculates the exact molecular mass of detected analytes to four decimal places, permitting precise identification of chemical residues, and is currently being validated with a screening method looking for more than 250 different pesticides.

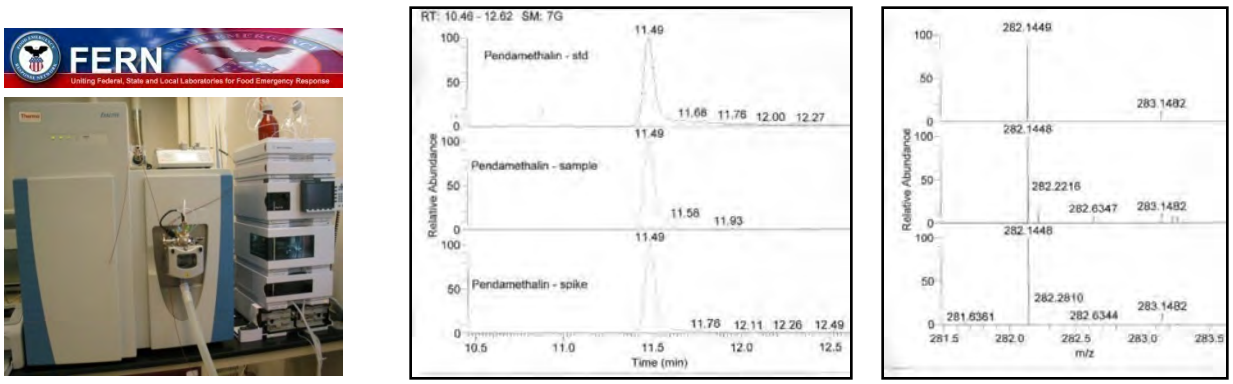


Figure 2. The Exactive LC-MS calculates molecular mass to four decimal places and enables accurate determination of violative pesticide residues and toxins in food.

Project 2: *Improvement to FERN testing: Deepwater Horizon Oil Spill*

- Investigators: Walter Krol, Terri Arsenault, Jason C. White

- Summary: As described last year's Record of the Year, we developed and validated a new screening method to rapidly test for oil contamination in seafood from the Gulf of Mexico. This program was part of our food safety cooperative agreement with FDA FERN. As the release of oil from the Deepwater well began, large areas of commercial fisheries in the Gulf were closed. The Forensic Chemistry Center (FCC), the CAES Department of Analytical Chemistry and the MN Department of Agriculture used the new PAH screening method to test nearly 450 reopening samples from the Gulf of Mexico. Specifically, our laboratory analyzed 104 samples with a total analytical time of 312 hours. These samples included shrimp, finfish and crab from LA waters; finfish and shrimp from FL waters; and finfish, crab and shrimp from AL waters. In coordination with the FERN National Program Office (NPO), select samples were forwarded for parallel testing to laboratories performing the traditional NOAA method. Three members of our laboratory (Dr. Jason C. White, Dr. Walter Krol, and Ms. Terri Arsenault) have each received a Group Recognition Award signed by the FDA Commissioner and the "Second to None" Medal from the Public Health Service (Figure 3).

- Impact: The new analytical procedure developed and validated by CAES and its partner laboratories has been adopted by the FDA, and has been accepted for publication in the peer reviewed journal *J. AOAC International*. The results produced by our laboratory were used to determine that oil contamination in specific closed fisheries was below that which cause a public health concern. As such, select waters off of LA, FL, MS, and AL were reopened for commercial fishing and shellfish harvest.

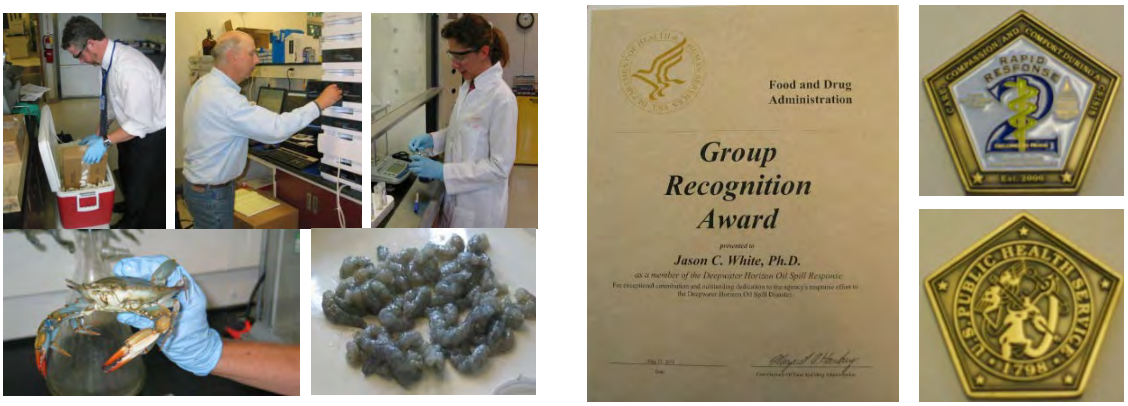


Figure 3. Department of Analytical Chemistry staff working with Deepwater Horizon seafood samples and two Federal awards given in response to that work.

2. ENVIRONMENTAL MONITORING/REMEDIATION

Project 1: *Nanoparticle contamination of agricultural crops*

- Investigators: Craig Musante, Jason C. White
- Summary: Nanomaterials (NM) have at least one dimension less than 100 nm and this small size results in unique properties not observed with equivalent bulk particles. Current nanomaterial use is ubiquitous; over 1300 NM-containing products are commercially available in areas such as electronics, health-care, cosmetics, agriculture, pharmaceuticals, and food processing. Of special concern to our laboratory is the use of nanomaterials in agriculture, including pesticides and fertilizers directly applied to food crops. From a regulatory perspective, nanomaterials are considered to have the same risk and toxicity profile as the equivalent bulk material. However, recent data out of our laboratory and others have suggested that this assumption may not be true. This potential lack of understanding on NM fate and effects in agricultural systems is disconcerting given that food crop contamination could be significant uncharacterized pathway of human exposure. A new USDA competitive grant is funding research to defining the impact of NMs on food crops, with a focus on the risk posed to humans from exposure to these contaminated plants. In preliminary hydroponic experiments, we have shown the toxicity of a given nanoparticle may be significantly greater than that of the corresponding bulk material (Figure 4).

Impact: Our research demonstrates that the toxicity of nanoparticles to agricultural plant species can be significantly greater than that observed for the corresponding non-nano or bulk material. These findings have implications for the widespread use of nanomaterials in commercially available products.

Project 2: *Phytoremediation of soils contaminated with weathered persistent organic pollutants (POPs)*

- Investigators: William Berger, Jason C. White
- Summary: This project illustrates the overlap of service and research in the Department. In 1990, samples from our market basket survey were found to contain chlordane, although the registration for this insecticide had long been terminated. Our research has shown that some agrochemicals such as DDT and chlordane have half-lives in soil of years or decades. Several separate lines of investigation were pursued to determine the potential of plants to remediate soils contaminated with these pollutants.

a. Previous data showed that zucchini cultivars have remarkable abilities to phytoextract the weathered residues but that significant crop variability may exist down to the subspecies level. Specifically, zucchini cultivars have the ability to accumulate contaminants whereas other squash do not. In previous field trials, traditional breeding techniques were used to create hybrid F1, F1 backcross, and hybrid F2 cultivars. In the current year, the abilities of these various cultivars were evaluated. In field experiments at our CAES campus, different zucchini and squash cultivars were grown in soil containing weathered chlordane. Analysis from this experiment is ongoing at the writing of this report but this investigation is an extension of a

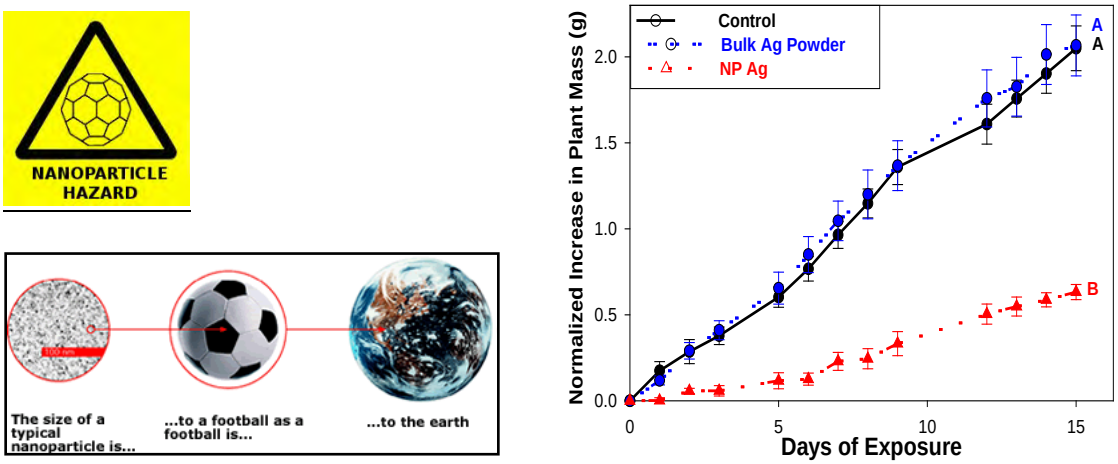


Figure 4. Growth of hydroponically grown zucchini plants in the presence of nanoparticle (NP) or bulk silver (Ag) particles. Control plants were not exposed to Ag.

previous trial. In that preliminary study (described in last year's Record), the ability of plants to accumulate DDE changed upon hybridization. Non-accumulating squash that are crossed with DDE-accumulating zucchini acquire the ability to extract the pesticide but then lose *some* of that potential when backcrossed with the original parent. Similarly, DDE-accumulating zucchini that are crossed/pollinated with squash retain partial ability to extract the pesticide but do not fully regain the capacity upon backcrossing with the original parent. The current study is evaluating greater numbers of cultivars and hybrid generations in two contaminated soils.

b. Additional hydroponic investigations have been conducted to evaluate the role of aquaporins, water channels in the membranes of plant root cells, in providing entry into the cell for POPs. These root pores are known to transport a variety of small solutes. Hydrogen peroxide (H_2O_2) is known to close aquaporin channels and previous hydroponic studies have shown that this closure corresponds to decreased chlordane uptake by zucchini. In subsequent soil-based studies, the reverse effect was observed as hydrogen peroxide addition increased chlordane uptake (Figure 5). However, this observation was shown to be the result of peroxide induced dissolution of soil organic matter and the resulting large-scale release of chlordane into solution.

Impact: The ability to accumulate and translocate weathered POPs is a unique ability presumably restricted to zucchini. Mechanistic and inheritance studies such as these will enable elucidation of the underlying molecular basis for this phytoextraction ability, which will then permit optimization of this ability in zucchini or transfer of the gene(s) to other plant species.

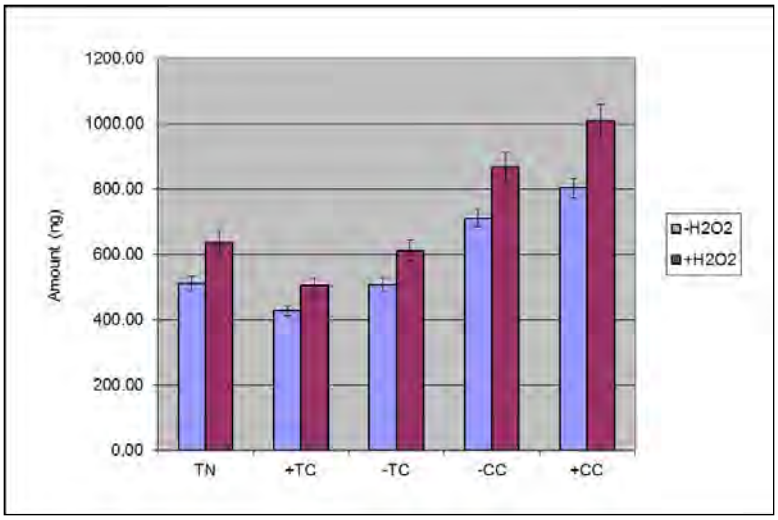


Figure 5. Amount of chlordane accumulated by zucchini grown in contaminated soil; chlordane measured as the content of 5 components- TN, +TC, -TC, -CC, +CC. Half of the plants were amended with hydrogen peroxide during growth.

c. In collaborative experiments with Dr. Om Parkash of the University of Massachusetts, the DDE-accumulating potential of crambe (*Crambe abyssinica*) was compared to that of zucchini. In the last 12 years, over 60 different plant species have been compared to zucchini and none have been found to have comparable remedial potential. However, in a preliminary hydroponic study, crambe was shown to accumulate twice the amount of DDE as zucchini (Figure 6). A field trial is currently underway to further assess the remedial potential of crambe in contaminated soils.

Impact: The ability to accumulate and translocate weathered DDE was thought to be a unique ability restricted to zucchini (*C. pepo* ssp *pepo*). The potential discovery of another plant with similar abilities will provide another system in which to focus studies on the isolation of the molecular/genetic controls for this ability. Once those controls are understood, the development of a plant-based system for use at contaminated sites should be feasible.

Project 3: *Mechanisms controlling the uptake and distribution of arsenic in plants*

- Investigators: Craig Musante, Jason C. White
- Summary: In collaborative experiments with Dr. Om Parkash of the University of Massachusetts, investigators are seeking to elucidate the mechanisms controlling the uptake and translocation of arsenic. Current plant systems being investigated include crambe and rice.

Impact: A molecular understanding of this process will enable further detailed investigations on enhancing uptake for remediation purposes (crambe) or excluding/preventing uptake for food safety (rice).

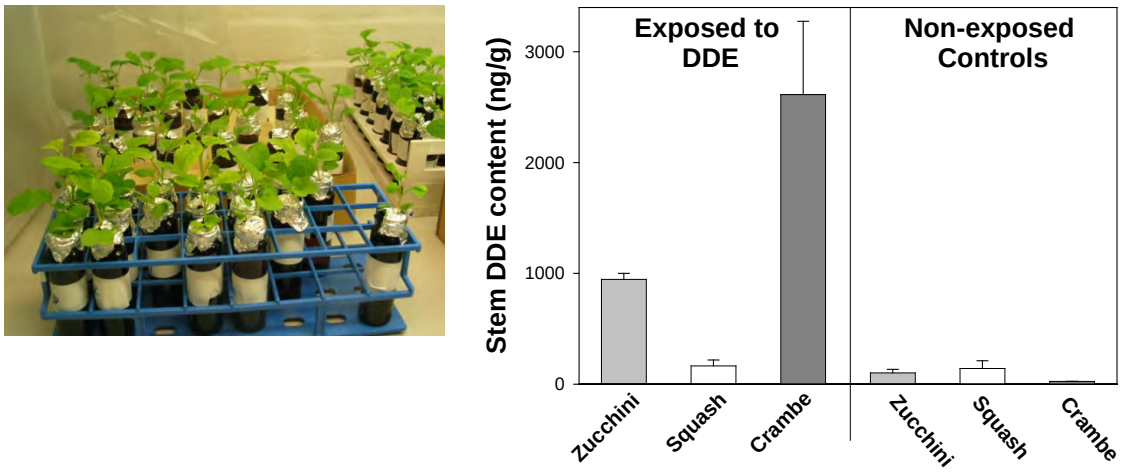


Figure 6. Uptake potential of crambe, zucchini, and squash for DDE under hydroponic conditions.

Project 4: *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 during foraging. A honey bee can travel up to two miles away from its hive as it collects pollen to bring back to the hive for use as food. During this time, the honey bee can be exposed to 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 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 by 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. During the past year, we have found an average of 4 pesticides per sample, with a single sample having as many as 10 different pesticide residues. Pesticide concentrations also vary with time and location. Observed concentrations in 2010 were mostly in the low ppb range but some residues were as high as several hundred parts per billion.

Impact: Honey bees are being exposed to pesticides. Long-term monitoring from the same hives and locations provides baseline data that can be used to assess trends and changes in pesticide exposure.

Project 5 : *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)

- Summary: This two year project has now been completed. We were interested in learning how much of a systemic pesticide applied as a part of a normal agricultural practice would be found in the pollen of the plant when it blooms. To conduct the study, we grew 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 (Figure 7). These analyses were conducted using the QuEChERS extraction procedures followed by LC/MS/MS. Our analyses have shown that the residues of these systemic pesticides can be found in the flowers of blueberry and cranberry (nectar and pollen samples were not submitted) and in the flowers, nectar and pollen of summer squash. These data indicate the potential exposure to these chemicals by foraging bees.

Impact: Knowledge of the pesticide residue levels in pollen and nectar from differing plant treatment protocols can allow us to choose an application procedure that will minimize the exposure to honey bees.

Figure 7. Honey bees may be exposed to pesticides through contaminated pollen. Pollen collection from male squash flowers.

Project 6: Coordinated Agricultural Program on Honey Bee Health

- Investigators: Brian Eitzer and Keith Delaplane (University of Georgia, Lead Principal Investigator)
- Summary: This is a large multi-institutional project (over 20 funded investigators from 15 different institutions) that is considering issues related to the health of honey bees and other native pollinators. These issues relate to various pathogens and parasites (colony collapse disorder, *Nosema*, *Varroa* mites, etc.), as well as 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 CAES within this project is the analysis of pesticide residues. These residues will be examined as a part of several separate research projects included within the overall program. 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 a co-factor in studies on honey bee health. In addition, the wax from these hives will also be examined. Our results from these apiaries show that the pesticide content varies not only with sampling date and location but also within hives from the same location and time. The pesticide data are currently being correlated against various measures of hive health.

Impact: Analysis of pesticide residues from apiaries that are being intensively monitored for infectious agents and colony health will allow us to determine if they are a co-factor in some of the problems being faced by honey bees.

Project 7: Quantifying routes of exposure of honey bees to neo-nicotinoid seed treatments of corn

- Investigators: Brian Eitzer, Greg Hunt, and Christian Krupke (Dr. Hunt and Dr. Krupke are at Purdue University – Dr. Krupke is the PI)
- Summary: Production of corn for food, feed (and recently fuel), represents the largest single use of arable land in North America. Pest management in corn (which includes scouting/monitoring and applying pesticides as needed) has been replaced by a form of risk management, where each seed is treated for management of a broad suite of pests (primarily insects and nematodes). Neonicotinoids thoroughly dominate this market. Virtually every corn kernel planted in North America (the lone exception being organic production = 0.2% of total acreage) is coated with neonicotinoid insecticides at approximately 0.5 mg/kernal. The nature of these molecules ensure that insecticide activity extends not only to the roots, but to the above-ground plant parts as well. The major compounds used are highly toxic to bees with LD50 values in the 0.02-0.03 ng/bee range. Given that corn is typically planted at a rate of 31,000 kernels/acre, it is essential that any potential routes for pollinator exposure be evaluated. We are monitoring for these neonicotinoid pesticides in samples of honey bees, honey bee pollen, soil, talc dust from seed planters, and dandelions from fields surrounding corn fields to try to determine possible exposure routes. All of the samples are being analyzed using the QuEChERs extraction protocol and LC/MS/MS.

Impact: Knowledge of routes of exposure of honey bees to pesticides is important if we hope to minimize the impact of pesticide use on the pollinators of our food crops.

Project 8: *Analyses of samples for Nootkatone*

Investigators: Terri Arsenault, Kirby Stafford and Anuja Bharadwaj (Dept. of Entomology)

Summary: The effectiveness of nootkatone, an essential oil of grapefruit and other plants, for control of the deer tick (*Ixodes scapularis*), the primary vector for the Lyme disease agent, is being investigated on lawns of cooperative homeowners. The reader can refer to the Records of the Year for reports of earlier findings. In 2010, a new nootkatone formulation, maillard soyscreen was compared to the lignin-based formulation by application at nine homes. The uniformity of the application was measured using filter paper assemblies collected immediately following application at seven of those locations. Analysis indicated that nootkatone was not distributed as expected, which was not the case in 2008 using the raw formulation and the same protocol. Factors that may have caused this result include nonhomogeneous tank mix, uneven spray technique, and/or inadequate sample numbers. Nevertheless, the filter paper samples collected over the course of one week continued to show rapid degradation of nootkatone in both formulations. As a better measure of long-term stability, soil and foliage samples were collected before application, immediately following application, and at varying times over a two month period. Unfortunately, samples collected at two locations showed residues of conventional insecticides, even though homeowners had voluntarily agreed not to apply insecticides to their lawns during the trial. Since tick counts are used to measure efficacy, this was a relevant finding. In contrast to the filter papers, the soil and foliage samples showed that nootkatone

persists at some level for several weeks after application, which is consistent with the finding of fewer ticks at nootkatone-treated sites.

Impact: The development and use of a persistent and effective natural product for deer tick control will reduce human exposure to both insecticides and to the Lyme disease vector.

PUBLIC OUTREACH

Telephone/internet inquiries: We receive about 500 calls from the public each year 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 CAES Department or State agency.

Station Bulletins and Fact Sheets: Station Bulletins are typically published annually by our Department. These bulletins are available in printed form and on the CAES web site (www.ct.gov/CAES). They are also available at libraries throughout Connecticut. Fact sheets are articles written for the general public regarding topics of timely and widespread interest, with examples focusing on issues such as wood preservatives, persistent organic pollutants, and removal of pesticide residues from produce. These are also available on our website and in printed form.

DEPARTMENT OF BIOCHEMISTRY AND GENETICS

Genetic Regulation of Leaf Development

Dr. Neil McHale assisted by Regan Huntley continued work on the genetic mechanisms governing growth and development in plants. Just as in animals, plants use mobile signal molecules known as hormones to regulate their pattern of growth. The most versatile of the plant hormones is indole-3-acetic acid (IAA) also known as auxin, the discovery of which dates back to the time of Charles Darwin. To this day, plant physiologists and geneticists are working to uncover the molecular pathways that allow this simple compound to regulate such a myriad of plant growth patterns, including initiation of leaves, flowers, roots and fruit. The answers emerging from these efforts will find a broad spectrum of applications in agriculture and at the same time reveal the molecular foundations of plant morphogenesis. Our work in auxin biology began with the isolation of a series of single gene mutations in the model plant Nicotiana sylvestris, which compromised or eliminated formation of the leaf blade. Among the most dramatic was a mutation where leaf blades are initiated but then fail to grow outward from the flank of the primordium. Studies with the mutated gene led to the cloning of its wild-type counterpart named LAM1. The DNA sequence of LAM1 indicated that it encoded a transcriptional regulator protein with striking similarity to WUSCHEL (WUS), a key organizer of shoot and root apical meristems. To determine whether these genes actually shared a common function, we constructed a transgene where WUS was placed under the regulatory control of the LAM1 promoter, and inserted it into the "bladeless" mutant lam1 plants. Full restoration of blade formation in these transgenic plants demonstrated that LAM1 and WUS are functionally equivalent genes, even though they normally operate in different locations. Extensive investigations dating back to 1996 on the function of WUS in meristems thus became a windfall of new insights on the function of LAM1 at blade initiation sites. Among the most significant was evidence showing that WUS is an organizer of cross signaling between the auxin and cytokinin pathways. To test this experimentally for LAM1, we generated double mutant lines where both LAM1 and WUS transgenes were combined with other mutations known to alter auxin, cytokinin and gibberellin (GA) signaling. Double mutant analysis has confirmed that LAM1 like WUS acts through integration of auxin and cytokinin response. The main focus going forward is to examine the role of GA signaling in blade formation, and construct additional transgenics addressing the functional significance of LAM1 expression long after the blade initiation phase. The hypothesis is that LAM1 integration of auxin and cytokinin signaling is as critical during blade expansion as it is during blade initiation.

Impact

Genes controlling patterns of plant development have been used extensively by plant breeders to produce crop plants tailored to specific environments. Alterations in growth habit and time to flowering are examples of developmental changes with direct applications in agriculture. Cloned genes and mutant strains from our program have influenced the direction of investigations in many other research laboratories. Dr. Jun-Yi Yang in the Plant Molecular Biology program at Rockefeller University is using one of our transgenic strains and our bladeless lam1 mutant has been a subject of work for several years in the Plant Genome program at the Noble Foundation (Ardmore, OK).

Protecting Honeybee hives from American Foulbrood Disease:
Dr. Douglas W. Dingman, assisted part-time by Regan Huntley, continued investigations on the bacterium *Paenibacillus larvae*: causative agent of the disease American foulbrood (AFB) in larvae of honey bees (*Apis mellifera*).

- A total of 282 apiaries have been visited, in collaboration with Mr. Ira Kettle (Connecticut state bee inspector), for conducting a multi-year survey of AFB prevalence in Connecticut.
- The level of AFB (sub-clinical and clinical infections) in Connecticut remains near 45% of the apiaries tested.
- Testing of *P. larvae* isolates for resistance to oxytetracycline-hydrochloride (i.e., Terramycin used by beekeepers to control AFB), via culturing and PCR techniques, has identified another apiary as containing Terramycin resistant *P. larvae*. At present, six different apiaries in Connecticut have been identified as containing antibiotic-resistant *P. larvae*.
- Genomic RFLP analysis of *P. larvae* isolates is continuing and the newly obtained antibiotic-resistant isolate will be examined to ascertain whether classification remains within the same genotypic RFLP grouping as all the other antibiotic-resistant isolates.
- Investigation of a sanitation protocol for combating AFB has been suspended for one year pending identification of beekeepers (with infected beehives) that wish to cooperate.
- A baseline sub-clinical infection profile for an apiary, over the course of a bee season, has been obtained and a second year analysis of another apiary is to be performed in the future. Baseline profiles will be useful for comparative analysis of sanitation efficiency.
- Database entry of all registered beekeepers in Connecticut for the years 2007-2009 has been completed with help from a student volunteer, Reese Blackburn. Survey results obtained for all the AFB isolates are being linked to this database for future GIS mapping analysis. Apiary registrations for 2010 and 2011 are being added to the database.
- Bacteriophage screening of *P. larvae* has identified several new bacteriophage. Isolation and sequencing of the bacteriophage will be done for further characterization.
- Initial investigations on presence of the microsporidia *Nosema apis* and *Nosema ceranae*, have been conducted to develop an assay procedure and to determine a course of investigation. A "rough" PCR diagnostic test has been developed for identification of *N. apis* and *N. ceranae* in samples of adult honeybees.
- Work with Mr. Mark Cooper (Weston, CT public health director) and Dr. Steven Jones (Univ. New Hampshire) relating to microbial source tracking awaits pending funding approval of a cooperatively-submitted implementation grant.

Impact
American foulbrood and nosemosis are devastating diseases of honey bees and cause significant economic losses to beekeepers and agriculture, worldwide. This investigation continues to show a high presence of AFB within Connecticut beehives and is beginning to demonstrate a high prevalence of nosemosis in Connecticut beehives as well. Beekeepers, being informed of this prevalence, are able to make informed decisions on control and treatment of diseased hives. Knowing baseline dynamics of these diseases will help provide insight into better methods of control. Understanding molecular characteristics of *P. larvae* will provide information on how

this bacterium interacts with honey bees and possibly result in new approaches to lower the impact of the disease.

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 characterize factors and ultimately genes that control the rate of photosynthesis. Photosynthetic fixation of CO_2 is the primary means for accumulation of dry matter by plants and improving its performance is widely considered to be a strategy for increasing crop yields. Considerable research in laboratories worldwide has established that the full potential of photosynthetic carbon fixation is seldom, if ever, realized in leaves even under optimal conditions. Instead, leaf internal regulatory processes that are incompletely understood depress photosynthetic efficiency especially when light availability is high. This is known to involve accumulation of H^+ ions and specific carotenoids leading to increased conversion of light energy to useless heat. A blending of genetic and physiological approaches to the study of photosynthetic regulation could lead to successful engineering of photosynthetic capacity in crop species.

Regulation by the LHCB7 gene. The target for regulated thermal dissipation of light energy is the light-harvesting pigment proteins of O_2-evolving Photosystem II (PSII). The PSII complex is ubiquitous in higher plants and algae and constitutes the starting point in the process of conversion of CO_2 to carbohydrate. A recently discovered component of the PSII antenna complex is a protein encoded by the nuclear *LHCB7* gene. We have studied photosynthesis in *Arabidopsis thaliana* plants that lack this gene. The consistently observed effect of loss of *LHCB7* is a shift in irradiance thresholds for regulated H^+-dependent thermal dissipation of absorbed energy to lower light levels. Many physiological traits are unaffected by loss of *LHCB7* such as growth, pigment composition, levels of other light-harvesting pigment proteins, and maximum photosynthetic efficiency (i.e. in the absence of excess light). Hence, the *LHCB7*-deficient phenotype is subtle. This is important because it indicates that no gross rearrangements of the photosynthetic apparatus have occurred as a result of loss of *LHCB7*. Instead, the *LHCB7* gene product appears to define a specific compartment of chloroplast membrane important in the H^+-dependent regulation of efficiency of conversion of light energy to chemical intermediates ATP and NADPH that directly drive the CO_2 fixation process.

The search for genes underlying C_4 photosynthesis. The higher photosynthetic capacities and improved water use efficiency of plants possessing the C_4 pathway of carbon fixation generally result in faster growth and higher economic yields. The key metabolic feature distinguishing C_4 such as maize from the majority of agricultural plants which possess the less efficient C_3 pathway is the occurrence of photorespiration in the latter. Photorespiration is an O_2-requiring process of release of CO_2 within the leaf that operates concurrently with photosynthesis in the light. Hence, photorespiration *opposes* net fixation of CO_2 into carbohydrate. Various anatomical and biochemical adaptations exist in C_4 plants that effectively abolish photorespiration in air. An ambitious goal is to engineer the complex process of gene expression culminating in C_4 photosynthesis into C_3 plants. This could involve hundreds of genes underlying an evolving network of gene expression during leaf development. Fortunately, advanced nucleic acid sequencing techniques are now available that permit investigators to

record snapshots of the global profile of gene expression in a normal leaf. We have laid the groundwork to monitor the effects of elevated levels of glycolic acid, the carbon substrate for photorespiration, on gene expression in maize leaves. This work will be conducted in collaboration with Drs. Thomas Brutnell (Cornell University) and Tim Nelson (Yale University) who have studied longitudinal patterns of gene expression in the expanding maize leaf.

Impact

The main impact of this work will be development of crop plants with higher photosynthetic capacity, which would be 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; Dr. Thomas Brutnell, Boyce Thompson Institute; and Dr. Tim Nelson (Yale University).

Plant Nucleobase Transporters

Dr. Neil Schultes assisted by Regan Huntley pursues studies on plant metabolism. Plants must synthesize all of the molecules needed for life from scratch. As a consequence, plants have an amazing and intricate capacity for primary and secondary metabolism – that is synthesis of metabolites (e.g. amino acids, proteins, DNA, starch, lipids, hormones etc.). Metabolites are in a constant state of flux in regards to concentration and distribution within plant cells and tissues. Understanding the rules governing this flux is the aim of biochemistry. Membrane bound transporters act as metabolite-specific gatekeepers that regulate traffic of metabolites between cellular compartments (chloroplasts, nuclei, vacuoles, mitochondria, peroxisomes and endoplasmic reticulum). As such, 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.

We concentrate on the movement of a particular group of molecules called nucleobases. Nucleobases are essential for plants being the building blocks of DNA and RNA, key intermediates in the synthesis of plant hormone cytokinin and secondary metabolites, such as caffine and main sources of nitrogen storage in seed endosperm. In plants, there are six different classes of transporters just for nucleobases. Our research defines the function for the nucleobase transporters in the nucleobase-ascorbate transporter (NAT), Azaguanine-like transporter (AZG) and nucleobase-cation symporter (NCS1) classes. The function of particular nucleobase transporters is determined in plants through mutational analysis and using a well defined microbe – brewers yeast – to produce individual nucleobase transporters and test transport characteristics. We use T-DNA "knockout" lines of the plant *Arabidopsis thaliana* for our mutational studies. In these lines, individual genes encoding for particular NAT, NCS1 or AZG transporters are defective. The ability of the plant to take up radio-labeled ^{3}H-guanine, ^{3}H-adenine or ^{3}H-uracil or grow on toxic nucleobase analogues is monitored. To assay the function of each individual nucleobase transporter, we clone the distinct Arabidopsis nucleobase genes into yeast, produce the corresponding transporter and assay both radio-labeled uptake and toxic analogue grow. We have determined the solute transport profile for the Arabidopsis NCS1 and AZG1 & 2

transporters. Currently, we are assaying the transport profiles for the Arabidopsis NAT 1-8 transporters by a similar manner.

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 nucleobase-ascorbate transporter genes in plants has an impact on a number of other research laboratories investigating similar research interests. One example is our collaboration with Dr. Mourad on uracil transporter-encoding genes in *Arabidopsis thaliana*.

DEPARTMENT OF ENTOMOLOGY

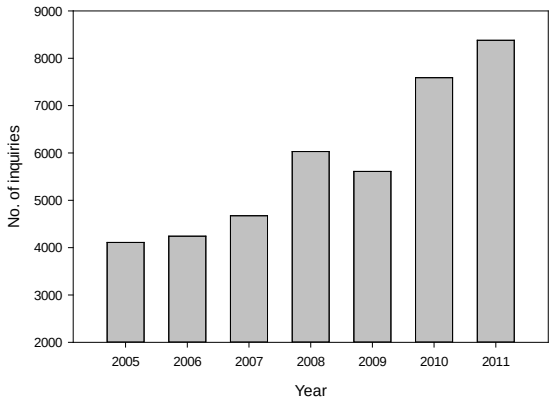
Staff members in the Department of Entomology are involved in a variety of service, research, pest surveillance, and regulatory activities. The primary service activities are provided through the Kenneth A. Welch Insect Inquiry Office. Staff in this office answer insect-related questions and identify 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, wood-boring insects, and honey bees and other bee pollinators. Our personnel 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. The Connecticut Green Industry (i.e., nursery, greenhouse, floriculture, sod, Christmas trees) is the largest agricultural business in Connecticut. The industry estimates that environmental horticulture generates $1.022 billion gross income supporting 48,000 full and part-time jobs in Connecticut. In conjunction with regulatory activities, Department scientists and technicians conduct a surveillance program in Connecticut for a variety of established pests and for exotic plant pests, some of regulatory concern, that represent a threat to our green industry, forests, and urban ornamental trees and shrubs. Surveillance for plant pests is performed in partnership with the United States Department of Agriculture (USDA) 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. In addition, we participated in a regional Forest Pest Survey and Outreach Program supported by the USDA. 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 for 2010 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 a 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 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, Norwalk-Wilton Tree Festival, 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** and **Rose Hiskes**, with the assistance of **Katherine Dugas** on Forest Health and CAPS**,** answered questions from the public. 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". The insect inquiry office is located on the top floor of the Jenkins Laboratory and receives thousands of visitors each year. However, in contrast to previous years when most inquiries were from visitors (around 60%), most of the inquiries this past year were from phone/cellphone calls (75% of total) to the office followed by visitors (17%), mail (5%), and e-mail (3%). The office served private citizens, pest control operators, the real estate industry, nurseries, land care businesses, arborists, health departments, other medical professionals, housing authorities, museums, municipalities, libraries, state government, and the news media.



Number of inquiries from FY 2004/2005 to FY 2010/2011.

Between July 1, 2010 and June 30, 2011 the insect inquiry office handled at least 8,380 recorded inquiries. There were 658 categories of inquiry including insects, arachnids, animals, use of pesticides, insect damage, general entomology, and horticultural issues. Of these 2,682 (32%) were related to man and medical issues, 251 undetermined/general inquiries (3%), 5,112 (61%) as natural resources, and 335 (4%) food related. Bed bug/bat bug inquiries remain the leading inquiry for the office with 1,088 (13%) of the identifications performed by the office. The bed bug webpage additionally had a high level of activity. Between July 1, 2010 and June 30, 2011, there were 13,466 viewings of bed bug material on the Station website. In order of numbers, the second highest query were ticks, followed by carpenter ants, hemlock woolly adelgid, white grubs, carpenter bees, Indian meal moths, carpet beetles, yellow jackets, squash vine borers, and cicada killers. Termite activity rose from 60 to 103 inquiries this past year.

Drs. Claire E. Rutledge and Gale E. Ridge with Ms. Rosie Eck.

The insect inquiry office encourages the education and training of students in science and Entomology. During the Oberlin College (Ohio) winter break of 2010-2011, Rosie Eck visited the office for three weeks and trained in biological science illustration with Dr. Ridge. She is the niece of Dr.

Claire Rutledge. Numerous student groups also visit the office during the year. The office continues to lead in public outreach with numerous State and New England wide presentations and training programs for the Emerald ash borer, Asian longhorn beetle, and bed bugs. The office serves private citizens, pest control professionals, the real estate industry, nurseries, land care businesses, arborists, health departments, other medical professionals and institutions, housing authorities, municipalities, state government and the media. CAES has also worked closely with the Yale Peabody Museum on a number of their exhibits.

Drs. Gale E. Ridge and Kirby Stafford at the Peabody Museum Bloodsuckers exhibit; Dr. Ridge contributed the bed bug colony and was featured in the information

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 2,593 ticks feeding on humans were submitted for identification in 2010, of which 2,302 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 2010, 1,246 (54.1%) were tested for the presence of *Borrelia burgdorferi*, the causal organism for Lyme disease, and 399 (32%) were found to carry this organism.

Sponsored Meetings and Conferences: On October 31, 2010, **Dr. Kimberly Stoner** co-hosted the 5th annual Community Farming Conference with Bill Duesing, Executive Director of the Connecticut Chapter of the Northeast Organic Farming Association. Forty-two people attended from community farms all over the state. Featured speakers included Jiff Martin of the American Farmland Trust, speaking on "Connecting with Farmland;" Diane Wright Hirsch of University of Connecticut Cooperative Extension, speaking on "Local is Not Equal to Safe: Why Even Small, Local Farms Need to Pay Attention to Food Safety." The rest of the speakers were from community farms, speaking from their own experience: Jon and Mary Gorham, of Massaro Community Farm, speaking about how to organize and good board and leadership; Jessica Cartagena, Amy Underwood, Chaurielle Robinson, and Debra Florez, teenagers and young adults from FRESH New London, speaking about engaging youth with the food system; and a panel of farm managers on community farms, including Daniel MacFee of the Yale Sustainable Food Project; Brenda Caldwell of Boulder Knoll Community Farm in Cheshire; and Anne Patrie, educational farmer from the Community Farm of Simsbury. The meeting concluded with a tour of Massaro Community Farm in Woodbridge on their annual Family Fun Day.

A Forest Health Workshop, organized annually by **Dr. Victoria Smith**, was held March 3, 2011 at the Station. It consists of a variety of presentations by Station Staff on various aspects of research and findings of concern to foresters in the Department of Environmental Protection, USDA-APHIS-PPQ, and the forest health community.

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. Many maintenance and improvements to the garden are done by farm manager **Richard Cecarelli** and his staff and members of the Spring Glen Garden Club. The garden is open to the public Monday-Friday 8:30 a.m.-4:00 p.m.; 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'.

Jeffrey Fengler observed 18 different butterfly species, 2 species of moth, 21 species of birds, 5 species of dragonflies, and 8 other insects or other animals around the garden on Plant Science Day August 4, 2010.

Butterflies, moths, birds and dragonflies observed on Plant Science Day, August 4, 2010.

Butterflies	*Birds*	*Dragonflies*
Cabbage White	Bluejay	Wandering Glider
Variegated Fritillary (MT)	Song Sparrow	12-spotted Skimmer
Clouded Sulphur	Mourning Dove	Widow Skimmer
Eastern Tiger Swallowtail	Barn Swallow	Eastern Pondhawk
Common Buckeye	Indigo Bunting	Blue Dasher
Common Sootywing	Red-winged Blackbird	
Dun Skipper	Turkey Vulture	*Other*
Question Mark	House Finch	Green Frog
Peck's Skipper	European Starling	Eastern Chipmunk
Silver-spotted Skipper	Tree Swallow	Bumblebee species
Tawny-spotted Skipper	American Goldfinch	European Honey Bee
Black Swallowtail	Rock Dove	Small Milkweed Bug
Spicebush Swallowtail	American Crow	Spotted Milkweed Beetle
Pipevine Swallowtail	Eastern Bluebird	Ambush Bug
(incl. eggs & larvae)	Northern Mockingbird	Carpenter Bee

Monarch (incl. eggs)	House Wren
Eastern Comma	Gray Catbird
Summer Azure	Chimney Swift
Red Admiral	Eastern Phoebe
	Northern Oriole
Moths	Brown Cowbird
Hummingbird Clearwing	
Ailanthus Webworm	

RESEARCH ACTIVITIES

Natural Products for Tick Control: **Dr. Kirby C. Stafford III** and postdoctoral scientist **Dr. Anuja Bharadwaj** began studies on the evaluation of natural products for tick control with a grant from the Centers for Disease Control and Prevention in 2008. Experiments continued through 2011 with the assistance of **Heidi Stuber** and summer assistant **Megan Haas**. Here, we report the results of field application of two formulations of nootkatone and a garlic-based product completed in 2010 and additional trials with garlic in 2011.

Nootkatone is a component of the essential oil from the heartwood of Alaska yellow cedar, and it is also available as a synthetic and an extract from grapefruit. 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 this project, developed extended duration formulations of nootkatone. The formulations selected for field evaluation against nymphs of blacklegged ticks, *Ixodes scapularis*, were lignin-encapsulated 25% nootkatone and 21% nootkatone Maillard soyscreen. The field trial with lignin-encapsulated 25% nootkatone, Maillard-encapsulated 21% nootkatone, and garlic-based product, Mosquito Barrier, was conducted at 5, 4 and 3 home sites in Salisbury, Canaan, and Cornwall on 9 and 11 June 2010. The garlic-based product, Mosquito Barrier, was also tested at 6 residential sites in Westport-Weston, CT. Filter paper disks caged in chicken wire mesh placed at the treatment sites were picked up periodically for the nootkatone residual analysis done in cooperation with the Department of Analytical Chemistry to estimate the approximate persistence of the compound the environment.

The repeat trial with the lignin formulation in 2010 provided 67% tick control for first two weeks, then declined to 33% for the third week post application. By contrast, in 2009, the lignin formulation provided 100% control for over 6 weeks. The Maillard-encapsulated nootkatone formulation was not found to be as effective as lignin formulation; as only 62% control was obtained for the first week after application, which dropped down to 26 and 27% for the next

second and third, respectively after the application. The residue analysis of filter papers samples for lignin and maillard formulations showed 98 and 92% loss respectively, within a week after application. A similar trend of nootkatone loss was observed in the previous year's trial. Nevertheless, nootkatone (1.5 ug/g leaf litter) was detectable in the leaf litter 70 days post application in 2009 and the residue analysis of 2010's soil and vegetation samples are in process. The single application of garlic in 2010 was effective in suppressing tick activity by 89% after first week of treatment and remained 89, and 100% for next two weeks and 67% by the end of fourth week posttreatment.

A field trial with the garlic-based product (Mosquito Barrier) was repeated in 2011 at 6 residential sites in Redding and Westport-Weston, CT. As the product label suggests reapplication every two weeks, two applications were made; first on June 15 and second on July 7. Initial tick samples after treatment found 67% reduction in tick activity with the garlic product. Chemical residual analysis and tick sampling are under progress and all the data will be compiled at the end of tick season.

Impact: Nootkatone and the garlic-based product were shown to reduce the abundance or activity of nymphal *I. scapularis*, the vector of the causal agents for Lyme disease, human anaplasmosis and human babesiosis. Work needs to continue to develop or improve the new extended-duration formulations of nootkatone so that formulation and persistence issues are addressed to improve efficacy. Natural products could provide an alternative to synthetic pesticides and an additional tool in an integrated tick management program to control *I. scapularis*.

Ticks and Tick-Associated Diseases: **Dr. Louis A. Magnarelli**, Dr. Steven J. Norris (University of Texas), and Dr. Erol Fikrig (Yale University), assisted by **Tia Blevins**, tested 102 cottontail rabbit (*Sylvilagus floridanus*) sera for antibodies to the causative agent of Lyme disease, *Borrelia burgdorferi.* The blood samples were collected from rabbits captured in New York, New York and Millbrook, New York in 1985 and 1986 and had been frozen at -60^{o} C. The sera were analyzed in a solid-phase enzyme-linked immunosorbent assay (ELISA) with whole-cell antigens or the following newly prepared recombinant antigens of *B. burgdorferi*: VlsE, protein (p) 35, and p37. Sixty-one (80%) sera contained antibodies to whole-cell *B. burgdorferi*, followed by results for the p35 (58%), VlsE (43%), and p37 (29%) antigens. High concentrations of antibodies (titers of 1:2,560 or greater) for 52 sera indicate robust immune responses. Results for the recombinant antigens also revealed high specificity (i.e., little or no cross-reactivity with different bacterial pathogens). The use of an ELISA containing one or more recombinant antigens of *B. burgdorferi* can be used in field studies to monitor the activity of this agent.

Impact: Cottontail rabbits are parasitized by several different tick species and are exposed to a variety of disease organisms, such as *B. burgdorferi*, *Rickettsia rickettsii* (the agent of Rocky Mountain spotted fever), *Babesia* species, and *Francisella tularensis* (the agent of tularemia).

Therefore, cottontail rabbits should be included in epidemiological studies, and an ELISA for Lyme disease is an appropriate laboratory method to use.

Pesticides in Pollen and Nectar of Treated Squash: There is great concern across the U.S. and around the world about annual heavy losses of honey bee colonies, the decrease in diversity of bumble bee species, 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, bumble bee, and pollinator decline. Systemic insecticides in the group called neonicotinoids have been a particular focus of concern for beekeepers in Connecticut and around the world. There is laboratory evidence that one widely used neonicotinoid insecticide, imidacloprid, makes honey bees more susceptible to a devastating new pathogen, *Nosema ceranae.* While there have been studies of pesticide residues in the pollen and nectar of crop plants treated as seeds, there are no studies in the literature of pesticide residues in pollen and nectar of crop plants treated by application of the insecticide to the seed furrow or by application of the insecticide through drip irrigation. **Dr. Kimberly Stoner** with **Dr. Brian Eitzer** in the Department of Analytical Chemistry studied the movement of two neonicotinoid insecticides, applied at labeled rates, as they would be used by farners, The levels found in nectar (10 ± 3 ppb for imidacloprid; 11 ± 6 ppb for thiamethoxam) were higher than any previously documented in nectar, and the concentrations in pollen (14 ± 8 ppb for imidacloprid; 12 ± 9 ppb for thiamethoxam) were at the high end of the previously documented range. These levels are in the range currently being studied for interactions with pathogens and other sublethal effects on honey bee colonies. Because squash is completely dependent on insect pollination in order to set fruit, these results are important to vegetable growers as well as beekeepers.

Impact: The role of chronic low-level exposure to pesticides is not well documented. This study will provide critical data on transport of several neonicotinoid insecticides applied at label rates in order to evaluate the exposure and role of pesticides on our pollinators.

Monitoring Abundance and Species Diversity of Wild Bees: In order to assess changes in diversity and abundance of wild bees and take action to protect them, we need to set up quantifiable, repeatable methods of monitoring the abundance and diversity of a wide range of wild bee species over the long term. **Dr. Kimberly Stoner**, with assistance from **Tracy Zarrillo** and **Morgan Lowry**, has adopted a method of trapping bees in bowls painted fluorescent yellow, fluorescent blue, or white, using either soapy water alone or soap mixed with propylene glycol from Sam Droege of the U.S. Geological Survey, who has used this method with many cooperators across the U.S. This method has the advantage of being sustainable over the long term, since it requires few materials and little labor in the field, and it yields a substantial number and diversity of bees. In preliminary studies in 2009 at

Dr. Kimberly Stoner sampling flowers at DeFrancesco Farm.

Boulder Knoll Farm, a town-owned farm in Cheshire, we collected 888 bees in 50 species, and in 2009 and early spring of 2010 at Lockwood Farm in Hamden, we collected 720 bees in 71 species. We have decided to set up long-term monitoring using a single standardized protocol at all four sites of the Connecticut Agricultural Experiment Station: the New Haven campus, Lockwood Farm, the Valley Laboratory in Windsor, and the Griswold Research Center, and also at the Stewart B. McKinney Wildlife Refuge Salt Meadow site in Westbrook.

Sampling Alternative Floral Resources on Vegetable Farms: One of the factors that determines the abundance and diversity of wild bees in an area and the suitability for managed honey bee colonies is the availability of flowering plants to provide nectar and pollen over the season of bee activity. **Dr. Kimberly Stoner**, with assistance from **Tracy Zarrillo**, **Morgan Lowry**, **Ellen Bulger**, and **Krystian Madrid**, has begun a project assessing "alternative" floral resources – flowering plants in addition to crops – such as cut flowers, herbs, flowering cover crops, and weeds, on ten Connecticut vegetable farms. They are recording time of flowering, area, flower density, taking 5-minute counts of bees, and then taking 5-minute net collections of bees for identification to species. This project is funded by the Natural Resources Conservation Service, which has funding to pay farmers to plant pollinator habitat, and therefore has an interest in what pollinator habitat already exists on Connecticut farms, and in what plants have the greatest abundance and diversity of native bees in our environment.

Surveys for Invasive Insects: In 2010, **Dr. Chris Maier**, assisted by **Tracy Zarrillo**, **Morgan Lowry**, and summer assistant s **Ellen Bulger** and **Kaitlyn O'Donnell**, continued to map the distribution of the lily leaf beetle (*Lilioceris lilii*), the viburnum leaf beetle (*Pyrrhalta viburni*), and the brown marmorated stink bug (*Halyomorpha halys*). All of these invasive, non-native insects feed upon native and cultivated host plants in both their immature and adult stages.

The lily leaf beetle infested lilies in many locations in all of the counties of Connecticut. It principally was a major pest of cultivated Asiatic lilies, but it also damaged the Canada lily (*Lilium canadense*) and the Turk's-cap lily (*L. superbum*), which are native species. These wild lilies soon may be imperiled if the lily leaf beetle remains abundant.

Dr. Maier and his assistants recorded the European viburnum leaf beetle in every Connecticut county except New London. They have developed a database of sites with and without the invasive beetle; thus, they will be able to track its spread over time. This beetle poses a very serious threat not only to several cultivated viburnum species, but also to two native viburnum species (*Viburnum dentatum* and *V. opulus*).

Adult of the brown marmorated stink bug, 5/8 inches in length. Photo by M. C. Thomas

During the past year, they detected the brown marmorated stink bug, an invasive species from eastern Asia, in many new towns in Connecticut. It was found in 36 towns and in all counties. Its increased distribution since its discovery in Connecticut in 2008 likely is due to its accidental transport from Mid-Atlantic States where it recently underwent an explosive increase in abundance. In late summer and early fall, adults of this agricultural pest often congregate in homes where they can become a nuisance. Dr. Maier and his staff are monitoring this potential pest to see if it causes injury in fruit orchards during 2011.

Impact: Invasive insects can damage crops and threaten native species. The brown marmorated stink bug has caused extensive crop losses in several Mid-Atlantic States and poses a threat to Connecticut growers. Even though populations in Connecticut still are relatively low, monitoring for this pest and developing better monitoring methods will assist our growers in reducing the future impact of this invasive stink bug.

Alternative Pollinators of Apple: Supported by a grant from the New England fruitgrowers, **Dr. Chris Maier** surveyed eight apple orchards in Connecticut and Rhode Island to determine if potential wild (non-honey bee) pollinators of apple in the genus *Osmia* occur naturally. By using trap-nests constructed of straws mounted in milk cartons, he reared four species of *Osmia* that are active when apples bloom. The most promising alternative pollinator, *O. cornifrons*, a foreign bee, nested at every site. The absence of the native blue orchard bee, *O. lignaria lignaria*, in trap-nests supports the hypothesis that *O. cornifrons* is replacing this native species and perhaps others that use similar nesting sites, usually abandoned beetle burrows in wood. Other species of *Osmia* in trap-nests were less common—*O. bucephala* and *O. georgica* at one site each and *O. pumila* at six sites. The potential value of these native *Osmia* species is being investigated.

Improved Use of Lindgren Funnels: **Dr. Chris Maier** and his assistants continued his USDA-funded experiments on how baited Lindgren funnels, traps that imitate the form and sometimes the odor of a tree trunk, might be modified to increase their efficiency in capturing adults of wood-boring insects and their natural enemies. In 2010, experiments were conducted in northwestern Connecticut and central Massachusetts to determine how the design of Lindgren funnels and the killing agent in their collection cups affected the number of targeted insects captured.

In a springtime experiment in coniferous forests at American Legion and Peoples State Forests, the number of captured beetles varied significantly among traps with different killing agents (vapona, soapy water, propylene glycol, and 70% ethyl alcohol). The mean catch of longhorned beetles (Cerambycidae) was greater in traps with 70% ethyl alcohol than in those with other killing agents. As in 2009, the total catch of the ribbed pine borer (*Rhagium inquisitor*) was highest in traps with 70% ethyl alcohol, whereas the mean catch of another cerambycid (*Asemum striatum*) associated with pine was statistically similar among treatments. Traps with ethyl alcohol also had the highest number of bark and predatory checkered beetles.

The use of alcohol in collection cups presumably increases the attractiveness of traps; thus, use of this killing agent may increase the catch of beetles, especially those that have low abundance.

In a late-season experiment in which the same four killing agents were compared, the number of beetles and wood-wasps caught did not differ among treatments. The number of longhorned beetles, however, was 2-7 times higher in traps with propylene glycol or 70% ethyl alcohol than in those with vapona or soapy water. The number of checkered beetles, longhorned beetles, and wood-wasps was extremely low during the trapping period in 2010. An identical experiment conducted in 2009 yielded similar results.

In an experiment run in a broad-leaved forest at American Legion State Forest, the design of lids (convex lid of 30-cm diameter, or flat lids of 30-, 45-, or 60-cm diameter) of Lindgren funnels with propylene glycol as the killing agent had minimal effects on the catch of beetles in summer. The mean number captured per trap of the four designs ranged from 6.4 to 8.7 longhorned beetles, 5.2 to 8.4 checkered beetles, and 189.2 to 215.8 bark beetles. Although the number of trapped beetles varied among treatments, the differences were not significant. Based on these findings from a broad-leaved forest, increasing lid size to reduce the amount of debris and water that collects in traps would not negatively impact the catch of insects.

In an experiment performed in an oak-pitch pine forest at Montague, Massachusetts, trap design once again did not affect the catch of checkered, longhorned, or bark beetles or that of wood-wasps. The longhorned beetle, *Xylotrechus sagittatus*, comprised 98.4% of the cerambycid catch in summer and early fall; but, statistically the number of this species also showed no relationship with trap design. Too few wood-wasps (total = 10) were captured to perform a meaningful analysis.

Longhorned Beetles of Connecticut: Over the last few years, **Dr. Chris Maier** and his assistants have captured longhorned beetles in traps, reared them from wood, and collected them on flowers and trees to ascertain their distribution, host range, and period of adult activity. They have determined that approximately 220 species of longhorned beetles could potentially reside in Connecticut. By compiling data from research and from museum collections, they have found 195 species (89% of the potential total) in the state. In 2010, they discovered three species (*Eupogonius subarmatus*, *Oplosia nubila*, and *Pogonocherus pencillatus*) not previously reported from Connecticut. To date, they have reared 79 species from dead wood collected in New England, and they have examined the period of adult activity of over 100 species. They are generating a database, which now has over 7,800 entries. Biological information in their database should assist in the development of management plans for borers that are or may become pests.

Future Outlook: 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.

Dr. Rutledge works with EAB in the U.S. Forest Service Quarantine Facility in Ansonia, CT

Agrilus species –The genus *Agrilus* (Coleoptera: Buprestidae) contains several species of economic importance, both native and invasive. **Dr. Claire E. Rutledge** is pursuing several lines of research with two members of this genus. The Bronze Birch Borer (BBB), *Agrilus anxious* Glory, a native insect, requires stressed, living trees to develop, and thus frequently attacks birches in landscape and nursery settings. The beetles cause considerable aesthetic and financial damage to homeowners and nurserymen in Connecticut. The Emerald Ash Borer (EAB), *A. planipennis* Fairmaire, an invasive pest, is a native of Asia that was discovered in Detroit MI in 2002 and has spread widely. While not yet detected in Connecticut, a large infestation in Saugerties, NY was found in 2010 approximately 25 miles from the CT border.

In collaboration with Dr. Melody Keena, US Forest Service, Dr. Rutledge is pursuing a multi-pronged approach to studying the reproductive behavior of BBB and EAB which encompasses mating behavior, mate choice, the kinetics of sperm transfer and storage, and the impact of mating frequency on fecundity. The results of this research are being used to improve laboratory rearing of EAB, as well as to understand the population dynamics of the species and how it compares to the native *Agrilus*.

Finally, surveys continue on the natural enemies of BBB and other species in the Buprestidae. To date, we have seen nematodes in the reproductive systems of two species, BBB and another native species, *Dicera lurida*. The nematodes were both sequenced for the small subunit rDNA and Cytochrome (COX) regions. Preliminary BLAST analysis of the ssrDNA in *D. lurida* shows closest relationships (95-96% range) to the tylenchoids *Deladenus siricidicola* from the Siricid woodwasp *Sirex noctilio* and *Howardula* sp. from a mycophagous *Drosophila* sp. Analysis of the COX region of the nematode in BBB also showed the closest relationship (91%) to *D. siricidicola*. The DNA analysis was carried out in cooperation with **Dr. Charles Vossbrinck** of the Department of Environmental Science at CAES.

Cerceris fumipennis: **Dr. Claire E. Rutledge** with the assistance of **Mioara Scott** has several studies on the buprestid hunter *Cerceris fumipennis* (Hymenoptera: Crabronidae) underway. 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. With funding from the US Forest Service, we are surveying colonies throughout CT.

Wasp Watcher Program: The wasp watcher program was begun in the spring of 2010. The program had several goals. The first was to increase our ability to monitor colonies of *C. fumipennis* for invasive buprestid beetles, in particular EAB. Secondly, we hoped to educate and involve citizens on the issues and science surrounding invasive species in general and wood boring insects in particular. In the summer of 2010, we had 23 watchers at 21 colonies. In the summer of 2011 many of the original watchers returned. We were also joined by volunteers at the White Memorial Conservation Center in Litchfield and the Bartlett Arboretum in Stamford. We concentrated on colonies with many nests, and 29 watchers monitored 21 colonies. The colonies were distributed throughout CT. No invasive buprestid beetles were found in 2010. We are still awaiting results from 2011.

Dr. Rutledge trains "wasp watchers" at White Memorial Foundation in Litchfield, CT.

Two lines of research in addition to the 'bio-surveillance' efforts were continued this past year. The first project is in collaboration with Philip Careless (Canada Food and Agriculture), Dr. Melissa Fierke SUNY and Colleen Teerling, Maine Forest Service. With funding from the Forest Service, we are collecting data to determine the degree-day requirements of *C. fumipennis*. This knowledge should help us to better use and manipulate *C. fumipennis* as a bio-surveillance tool. Captive wasp colonies can be used to provide 'surveillance services in areas where invasive buprestids are suspected in much the same way that honey bee colonies are used to provide pollination services in agriculture. The second regards the cues used by *C. fumipennis* to recognize their prey. This project is in collaboration with Dr. Peter Silk of the Canadian Forest Service and Philip Careless (Canada Food and Agriculture). We are hoping to identify the chemical signature of Buprestidae used by *C. fumipennis* to recognize their prey. Wasps will grasp, and attempt to paralyze buprestid beetles, but not beetles in other families. The attractive elements can be removed by washing the beetles with solvents, and then restored by applying the extract. So far, we have shown that the wasps accept washed beetles coated with an extract from several different species of Buprestidae, and reject washed beetles coated with non-buprestid beetle extracts. We are testing currently a synthesized *A. planipennis* contact sex pheromone for attractiveness to the wasp. This could provide an accessible source of 'buprestid smell' to dose non-buprestid beetles to make them acceptable to wasps being reared in colonies.

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**.

On March 9 and 10, 2011, approximately 60 personnel from The Connecticut Agricultural Experiment Station, in cooperation with the Connecticut Department of Environmental Protection, USDA-Forest Service, and USDA-APHIS-Plant Protection and Quarantine, participated in an Incident Command System (ICS) exercise, concerning a simulated detection of Emerald Ash Borer (EAB). The purpose of the exercise was to demonstrate and practice the ability of state and federal agencies to cooperate to address the detection of a potentially-devastating, federally regulated insect pest. The exercise was held at Ft. Trumbull in New London, with simulated finds of EAB at locations in the surrounding area. Experiment Station personnel participating in the exercise were: **Jeff Fengler**, and **Steve Sandrey** (Survey Team Leaders), **Peter Trenchard** (Regulatory Group Leader), **J. P. Barsky** (Safety Officer), **Tia Blevins** (Ground Support Unit Leader), **Carole Cheah**, **Diane Riddle**, and **Richard Cowles** (Survey Team Members), **Claire Rutledge** (Scientific Support), **Rose Hiskes** (Assistant Information Officer), and **Vicki Smith** (Agency Administrator). The exercise received coverage in the New London Day and on television Channel WFSB.

Nursery Inspection and Certification: Three-hundred eleven nurseries were certified to conduct intra- and interstate business. There were 719 nursery inspections during the growing season. Seven-thousand, nine-hundred and twenty five acres of nursery stock were examined.

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

Japanese Beetle Certification: We observed treatments of 2,890 plants at two nurseries and issued phytosanitary certificates to comply with states that quarantine nursery stock from Connecticut because of the Japanese beetle, *Popillia japonica*. Two nurseries met other requirements of the United States Japanese Beetle Harmonization Plan and shipped 1,954 plants to states that quarantine plants from Connecticut.

Japanese Beetle Certification to Canada: Eleven Connecticut nurseries, which met the inspection requirements of the US/Canada Japanese Beetle Harmonization Plan, shipped 102,274 plants to Canada in 2010.

Nursery Dealer Permits: Nursery dealer permits were issued to 168 firms. One-hundred forty five of these companies operate individual outlets. The remaining businesses have more than one outlet each. In total, there were 568 outlets.

Phytosanitary Certificates: Three-hundred and forty seven phytosanitary inspection certificates were issued covering the shipment of the following plant materials to destinations outside the United States:

Product	Number
Apples (Cartons)	9,060
Bulbs & Tubers (Dahlia & Gladiolas)(Bags)	258
American Chestnut (unrooted cuttings, bags)	10
Chinese tree peonies (plants)	64
Greenhouse plants	445
Nursery stock (containers - B & B)	101,685
Orchids (plants)	4,885
Perennials (bare root plants)	1,866
(plants)	100
(unrooted cuttings, bags)	10
Seeds (cartons & bags)	506
Tobacco (bales, boxes, bundles & cartons)	121,121
Tobacco (pounds)	10
Cotton seed meal (bags)	1,600
Walnut shells (bags and drums)	86

Special Inspections: Six inspections were made for 147 individual plants and bulbs to assist homeowners moving out of state. One-hundred twelve inspections were made to assist nurseries moving the following plants interstate:

Product	Number
Perennials (plants)	2,875
Nursery stock (containers)	686
(bare root plants)	1,954
Greenhouse plants	1,568
Orchids	284
Seed (Bags)	58

One tobacco grower had 130.5 acres inspected for the aerial application of pesticides. There was no Post-Entry Quarantine activity in CT in 2010.

Biotechnology Regulatory Services Inspection Activity: In cooperation with officers from the Wallingford USDA-APHIS-PPQ office, eleven inspections were conducted in 2010 at facilities or laboratories working with recombinant or regulated organisms.

Permits to Move Live Plants, Noxious Weeds, and Soil: In 2010, there were fifty four PPQ 526 Permits (Permit to move live plant pests, noxious weeds, and soil) approved in CT. There were five PPQ 330 Permits (permit to move soil) approved in CT.

FOREST HEALTH SURVEY

During the summer and autumn of 2009, 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. Plots containing a significant ash (*Fraxinus* sp.) component will be sites for trapping for Emerald Ash Borer (*Agrilus paniplennis*), an invasive insect that was detected in July 2010 in Saugerties, NY.

ENVIRONMENTAL CONDITIONS

Single rain events in March contributed to a high spring rainfall level for most of CT in 2010; even though most of the year was abnormally dry. Rainfall totals in inches are as follows:

Wind Damage: In March 2010, many areas of southeastern Fairfield County were affected by strong damaging winds. Mature trees in residential areas were toppled, resulting in landscape disturbance and structural damage. Via aerial survey, damage on 1,060.7 acres in Fairfield County were surveyed and mapped. Statewide, a total of 1,123.8 acres in Fairfield, Hartford, and Litchfield Counties were affected by this weather event.

Ice Damage: Several locations in Litchfield County were severely affected by ice storms in the winter of 2009-2010. All species of trees were affected, with breakage of major branches and trunks occurring. Damage was primarily at higher elevations, such as hilltops and ridges. In total, 58.3 acres were affected by ice.

Drought: Isolated pockets in Fairfield and Litchfield Counties were severely affected by dry conditions in spring and summer. In Fairfield County, 25.8 acres were impacted, and in Litchfield County, 27.6 acres were affected, for a total of 58.3 acres.

INSECT AND DISEASE SURVEYS

Gyspy Moth: For the first time in many years, there was no observable defoliation due to Gypsy Moth recorded in CT in 2010. During egg mass surveys in winter 2009-2010, very few viable egg masses were found. In November and December 2010, a gypsy moth egg mass survey was conducted in 80-95% favorable host sites on a 7-mile grid (102 sites) throughout Connecticut. No viable egg masses were found.

Hemlock Woolly Adelgid: This pest has been present in CT for many years, and continues to cause patchy damage and decline among the remaining population of hemlocks. In 2010, a total of 1,772.7 acres were affected by HWA and elongate hemlock scale. In fact, many areas of hemlock are healthy, especially in the northwest corner of the state; in many areas hemlocks are recovering due to wet summers and reduction in HWA populations, especially where biocontrol was implemented.

During 2010, we required all hemlock nursery stock that was being shipped out of Connecticut to be treated for Hemlock woolly adelgid. Three nurseries shipped hemlock trees out of state. Our plant inspectors observed treatments and issued phytosanitary certificates to cover 741 plants in these shipments.

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. In addition, insects submitted by arborists and homeowners as possible ALB have been examined. We conducted inspections of 6,509 trees in all counties of CT for presence or signs of ALB infestation. All surveys and identifications, thus far, have been negative. White spotted sawyer and western conifer seed bug are most frequently accused of being ALB.

Due to the recent detections of ALB in Worcester and Boston, Massachusetts, the Experiment Station has established a web site for fielding inquiries on ALB. The address is: CAES.StateEntomologist@ct.gov. The same address is also used for reporting possible Emerald ash borer.

This site can be used for general inquiries as well. We have fielded over many inquiries concerning ALB and EAB to this site to date. We have found it useful to ask that a digital photograph be included with the inquiry. Outreach efforts to educate stakeholders about these two invasive insects, signs of infestation, ALB and EAB look-alikes, and impacts of infestation continue. To assist with public education and early detection efforts for both ALB and EAB, the Station participated in a Forest Pest Survey and Outreach Project funded by USDA-APHIS-PPQ, which was overseen by **Rose Hiskes** with the assistance of **Katherine Dugas**. We held multiple training sessions, had displays at agricultural fairs and other venues, distributed information to garden centers and many other outlets, and presented talks to the Boy Scouts, garden clubs, schools, summer camps, and at public libraries.

Ramorum Leaf Blight: Ramorum Leaf Blight (aka Sudden Oak Death) is a serious plant disease that attacks many types of plants and trees common to Connecticut. It is currently known to occur in the Pacific Northwest on oaks, azaleas, big leaf maples, huckleberry, California bay laurel, camellia, myrtles, honeysuckle, Pacific madrone, Douglas fir, rhododendrons, and viburnum. It does not affect humans and is not a food safety concern. Sudden oak death is caused by a pathogen called *Phytophthora ramorum*. The pathogen is not a fungus or a bacterium, but a member of a unique group of organisms called Oomycetes. Oomycetes share some characteristics of fungi but are biologically different.

As part of the *P. ramorum* National Nursery Survey, we inspected 20 nurseries during 2010. During this survey so far, 40,000 plants have been inspected and 222 samples from symptomatic plants were submitted for lab analysis. All samples were cultured and tested by ELISA; DNA from ELISA-positive samples is tested by PCR and any PCR-positive samples would be sent to Beltsville for PCR confirmation. One hundred seventy-seven samples, about 80 %, were ELISA-positive, indicating the presence of *Phytophthora* sp. All samples from the nurseries were negative for *P. ramorum*. There was no trace-forward/trace-back activity involving *P. ramorum* in CT in 2010.

An aquatic survey was done in conjunction with the US Forest Service. The stream selected for survey surrounds a 400-acre production nursery that has been implicated in *P. ramorum* trace-back activity. One location upstream of the nursery and one location downstream were baited with rhododendron leaves during April through September 2010; the baiting period was

about 2 weeks each month, with a hiatus during June and July when the water temperature exceeded 20^{o} C. Leaf baits were submitted for testing to labs at the Pennsylvania Department of Agriculture and at Cornell University. While many leaf baits were positive for *Phytophthora* species, all leaf baits were negative for ***P. ramorum***.

Daylily Rust: Daylily rust, caused by *Puccinia hemerocallidis,* was found on daylilies in a southeastern U.S. nursery for the first time in the summer of 2000, and in 2001 and 2002 on daylilies owned by private citizens. It is now confirmed to occur in three counties. During 2010, we surveyed daylilies in nurseries and garden centers for signs of this rust. One hundred and two inspections were carried out; no signs of *Puccinia hemerocallidis* were found

Chrysantheumum White Rust: In 2010, we inspected 20,421 plants for CWR. One Master Gardener reported CWR in her personal garden; the plants had been planted over 10 years ago. The plants were dug up, bagged in plastic trash bags, and disposed of in the municipal waste stream. Inspection of properties within 400 meters revealed no nearby sources of inoculum.

Emerald Ash Borer: We found no emerald ash borers or any symptoms of them in our survey. However, we did find that overall the health of ash trees in the state is poor, with only 35% of trees examined classified as healthy by the observers. Thus, it seems likely that Connecticut's ash population will be highly vulnerable to the borer when it does arrive.

Locust leafminer: *Odontota dorsalis* is primarily a pest of black locust, *Robinia pseudoacacia*, but other trees, such as apple, beech, birch, cherry, elm, and oak are occasionally attacked. Outbreaks of Locust leafminer are generally more spectacular than destructive. During outbreaks, trees appear brown or gray, suggesting premature fall color. In 2010, 652.5 acres in Fairfield County and 65.7 acres in Litchfield County were affected by Locust leafminer, for a total of 718.2 acres.

Larch casebearer: Larch casebearer, *Coleophora laricella*, a native of Europe, was first reported in Massachusetts in 1886. Damage on larch is evident in spring and early summer. We recorded 25.2 acres in Litchfield County affected by this insect.

Butternut Research: Butternut populations are declining throughout the native range, and efforts to find trees resistant to the pathogens that kill them have been under way for some time. The Connecticut Agricultural Experiment Station has maintained a list of reported butternut trees in the state since 1994, and in the last two years we have been sampling the trees to determine what pathogens are present.

Two pure butternut trees have been identified in the state using a DNA test, and all the rest of the trees sampled have been Japanese walnuts or hybrids. The butternut canker pathogen, *Sirococcus clavigignenti-juglandacearum* has been found twice in CT, and one of the isolates contains a dsRNA virus. Inoculations of small butternut, Japanese walnut, and hybrid trees at Lockwood Farm will be done this winter to compare the virulence of these strains.

TRENDS IN FOREST INSECT PESTS

Below is a summary of the major forest pests/diseases in CT and acreage affected for the past seven years.

	2004	2005	2006	2007	2008	2009	2010
Gypsy moth	626	64,273	251,946	3,203.6	13,621.7	6,709.0	0
Forest Tent Caterpillar	trace	trace	15,583	1,037.7	2,430.0	1,900.4	0
Anthracnose	trace	trace	25,212	0	426	454.3	0
Orange Striped Oakworm	262	3,762	31,303	22,045.8	5,974.4	5,215.4	0

APIARY CERTIFICATION

Six hundred and seventy eight beekeepers registered 4,209 colonies in 2010. Our bee inspector opened and inspected 790 colonies. No clinical cases of American foulbrood were detected. *Nosema ceranae* was detected in many areas and is an ongoing problem. Chalkbrood was reported to be widespread. Varroa mite is generally distributed in beehives across the state. There were no positives for tracheal mites.

Pest/disease	Positives
Small Hive Beetle	42
American Foulbrood	5
Chalkbrood	51
Die-offs	31
Deformed wing Virus	31

Apiary inspector Ira Kettle with his observation hive answers questions about honey bees at the Griswold Open House, June 16, 2011.

DEPARTMENT OF ENVIRONMENTAL SCIENCES

Mosquito Trapping and Testing Program

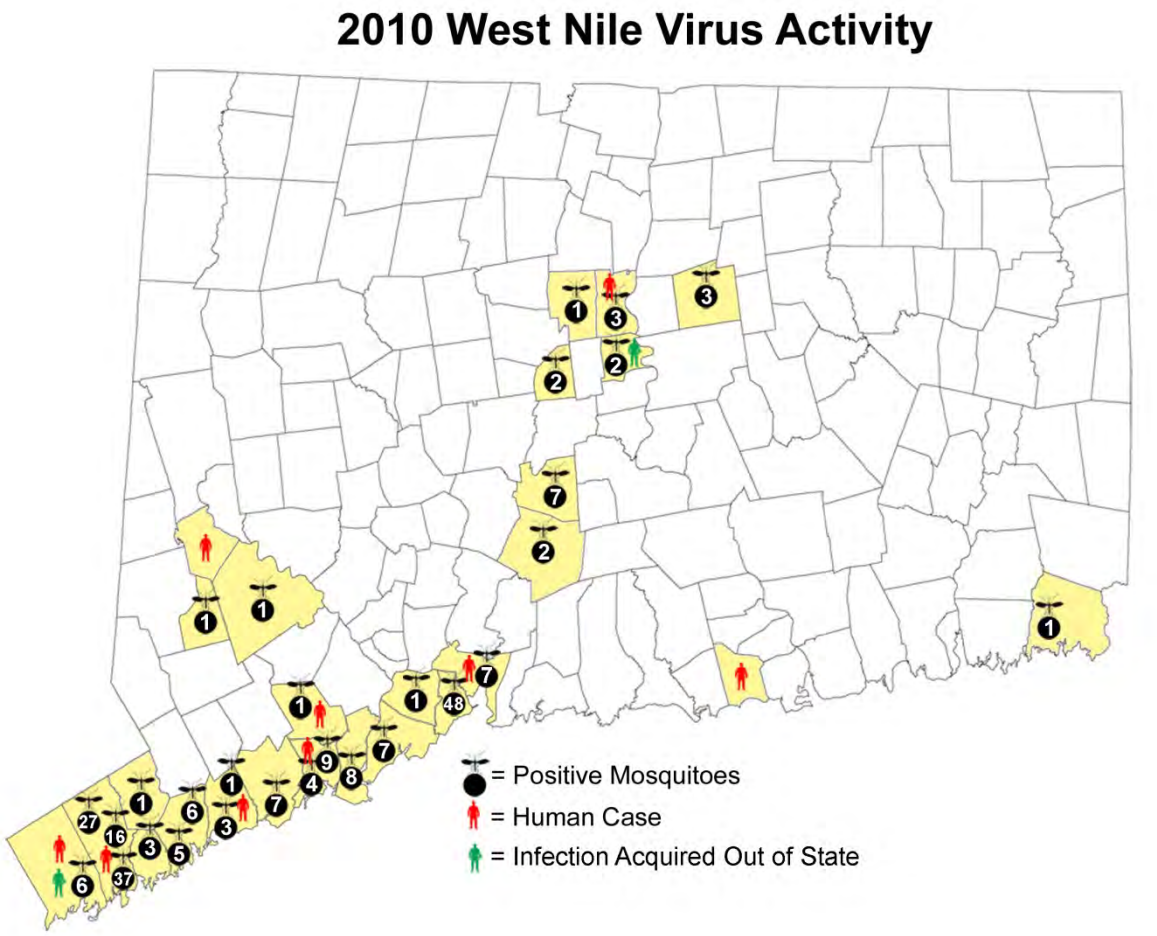
Mosquito surveillance for West Nile (WN) virus and Eastern Equine Encephalitis (EEE) virus is integral to the public health response to these mosquito-transmitted pathogens in Connecticut. The objectives of the surveillance program are to provide: 1) early evidence of local virus activity; 2) information 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.

In 2010, mosquito trapping was conducted from June 1 to October 21. 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 WN, 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 DPH for dissemination to other state agencies, local health departments, the media, and neighboring states.

For the 2010 season, a total of 115,725 mosquitoes (10,654 pools) representing 37 species were trapped and tested. A total of 220 isolations of WN virus were made from 9 mosquito species: *Culex pipiens* = 170, *Cx. restuans* = 25, *Cx. salinarius* = 15, *Ochlerotatus japonicus* = 4, *Aedes vexans* = 2, *Culiseta melanura* = 1, , *Ochlerotatus taeniorhychus* = 1, *Ochlerotatus triseriatus* = 1, and *Uranotaenia sapphirina* = 1 collected at 29 sites in 24 towns in 4 counties: Fairfield, (Bethel, Bridgeport, Darien, Fairfield, Greenwich, Monroe, New Canaan, Newtown,

Norwalk, Stamford, Stratford, Trumbull, Westport), Hartford (Hartford, Manchester, New Britain, West Hartford, Wethersfield), New Haven (Meriden, Milford, New Haven, Orange, Wallingford, West Haven), and New London, (Stonington) (Figure 1). The first positive mosquitoes were collected on June 14, and the last on October 7. As in prior years, the majority of WN virus activity was detected in densely populated urban and suburban regions in southwestern (Fairfield and New Haven counties) Connecticut. Nine locally acquired human cases of WN virus infection were reported to CTDPH from residents living in Bridgeport, Brookfield, Clinton, Greenwich, Hartford, New Haven, Stamford, Trumbull, and Westport. Two additional human cases that were acquired out of state were also reported.

Very little EEE virus activity was detected in 2010. A total of 4 isolations of EEE virus were



made from *Culiseta melanura* mosquitoes collected at one location in North Stonington from August 20 to September 30. There were no human or horse cases of EEE reported.

Other mosquito-borne viruses isolated included: Cache Valley (CV) = 6, Highlands J (HJ) = 1, and Jamestown Canyon (JC) = 22.

Mosquito species trapped and tested for arboviruses in Connecticut, 2010

Mosquito Species	# Mosquitoes	# Pools	Virus				
			CV	EEE	HJ	JC	WN
Aedes albopictus	2	2					
Aedes cinereus	4,639	543					
Aedes vexans	7,604	814	1				2
Anopheles barberi	1	1					
Anopheles crucians	1	1					
Anopheles punctipennis	1,980	508	3			1	
Anopheles quadrimaculatus	843	326	1				
Anopheles walkeri	1,719	151					
Coquillettidia perturbans	22,883	1,032				1	
Culex pipiens	22,187	1,475					170
Culex restuans	6,136	971					25
Culex salinarius	4,873	521					15
Culex territans	38	32					
Culiseta melanura	5,525	581		4	1	1	1
Culiseta minnesotae	325	24					
Culiseta morsitans	29	19					
Ochlerotatus abserratus	1,181	105				3	
Ochlerotatus atropalpus	1	1					
Ochlerotatus aurifer	645	78					

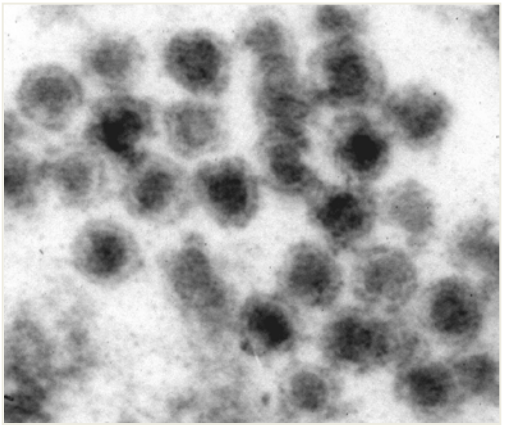
Ochlerotatus canadensis	11,995	547				4	
Ochlerotatus cantator	2,211	245				5	
Ochlerotatus communis	21	2					
Ochlerotatus excrucians	201	47				1	
Ochlerotatus japonicus	2,571	878					4
Ochlerotatus provocans	50	5					
Ochlerotatus sollicitans	470	46				1	
Ochlerotatus sticticus	128	20				1	
Ochlerotatus stimulans	1,280	169				1	
Ochlerotatus taeniorhynchus	6,991	220				3	1
Ochlerotatus thibaulti	3,226	188					
Ochlerotatus triseriatus	751	315					1
Ochlerotatus trivittatus	538	178	1				
Psorophora columbiae	1	1					
Psorophora ferox	648	121					
Psorophora howardii	3	3					
Uranotaenia sapphirina	4,028	484					
TOTAL	115,725	10,654	6	4	1	22	220

CV = Cache Valley, **HJ** = Highlands J, **JC** = Jamestown Canyon, **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 2010, 115,725 mosquitoes were tested for virus.

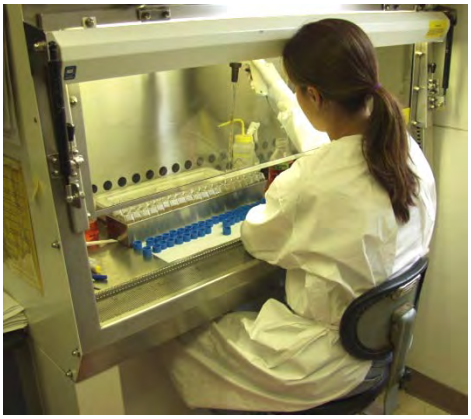
There were 220 isolations of WN virus 4 isolations of EEE. There were 9 locally acquired human cases in the state linked to WN virus infection. News releases included information on how residents could protect themselves from mosquito bites, such as the use of repellents. The information contained in 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 and Arbovirus Studies



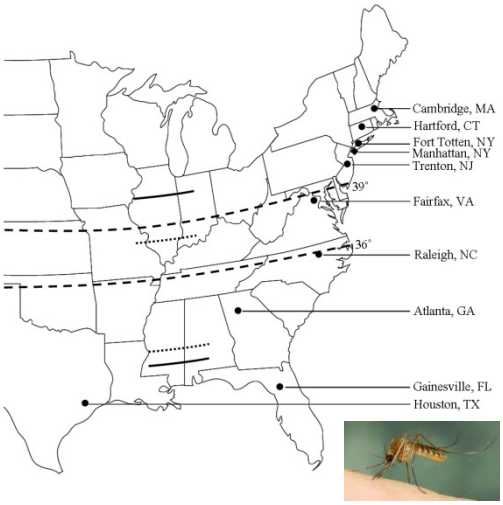
West Nile virus has become firmly established in northeastern United States, reemerging every summer since its introduction into North America in 1999. To determine whether WN virus overwinters locally or is reseeded annually, **Drs. Philip Armstrong, Charles Vossbrinck, Theodore Andreadis** and **John Anderson** examined the patterns of viral lineage persistence and replacement in Connecticut over 10 consecutive transmission seasons by phylogenetic analysis. In addition, they compared the full protein coding sequence among WN virus isolates to search for evidence of convergent and adaptive evolution. Viruses sampled from Connecticut segregated into a number of well-supported subclades by year of isolation with few clades persisting ≥2 years. Similar viral strains were dispersed in different locations across the state and divergent strains appeared within a single location during a single transmission season, implying widespread movement and rapid colonization of virus. Numerous amino acid substitutions arose in the population but only one change, V→A at position 159 of the envelope protein, became permanently fixed. Several instances of parallel evolution were identified in independent lineages, including one amino acid change in the NS4A protein that appears to be positively selected. Our results suggest that annual reemergence of WN virus is driven by both reintroduction and local-overwintering of virus. Despite ongoing diversification of WN virus, most amino acid variants occurred at low frequencies and were transient in the virus population.

Impact. These investigations will allow scientists to monitor and tract local regional changes in WN virus that may be associated with changes in virulence and/or transmission efficiency as it evolves over the years.

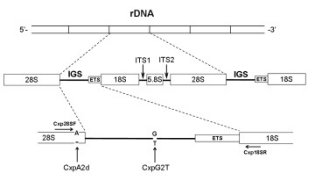


Mosquitoes transmit a number of distinct viruses including important human pathogens such as West Nile virus, dengue virus, and chickungunya virus. Many of these viruses have intensified in their endemic ranges and expanded to new territories, necessitating effective surveillance and control programs to respond to these threats. One strategy to monitor virus activity involves collecting large numbers of mosquitoes from endemic sites and testing them for viral infection. **Drs. Philip Armstrong, Theodore Andreadis, John Anderson and Shannon Finan, John Shepard** and **Michael Thomas** produced a web-based audio-visual report describing how to handle, process, and screen field-collected mosquitoes for infectious virus by Vero cell culture assay. Mosquitoes are sorted by trap location and species, and grouped into pools containing ≤50 individuals. Pooled specimens are homogenized in buffered saline using a mixer-mill and the aqueous phase is inoculated onto confluent Vero cell cultures. Cell cultures are monitored for cytopathic effect from days 3-7 post-inoculation and any viruses grown in cell culture are identified by the appropriate diagnostic assays. By utilizing this approach, they have isolated 9 different viruses from mosquitoes collected in Connecticut, and among these, 5 are known to cause human disease. Three of these viruses (West Nile virus, Potosi virus, and La Crosse virus) represent new records for North America or the New England region since 1999.

Impact. The ability to detect a wide diversity of viruses is critical to monitoring both established and newly emerging viruses in the mosquito population.



Mosquitoes in the *Culex pipiens* complex are important vectors of several disease-causing pathogens including West Nile virus. In North America, the complex consists of *Cx. pipiens pipiens* form pipiens, *Cx. pipiens pipiens* form molestus, *Cx. pipiens quinquefasciatus* and their hybrids that exhibit substantial diversity in physiology, behavior and geographic range. Hybridization among these mosquitoes is of concern because of potential implications for disease transmission. Currently, several morphological and molecular markers exist for differentiating members of the *Cx. pipiens* complex; however, these markers have specific limitations. **Dr. Shaoming Huang, Goudarz Molaei** and **Theodore**



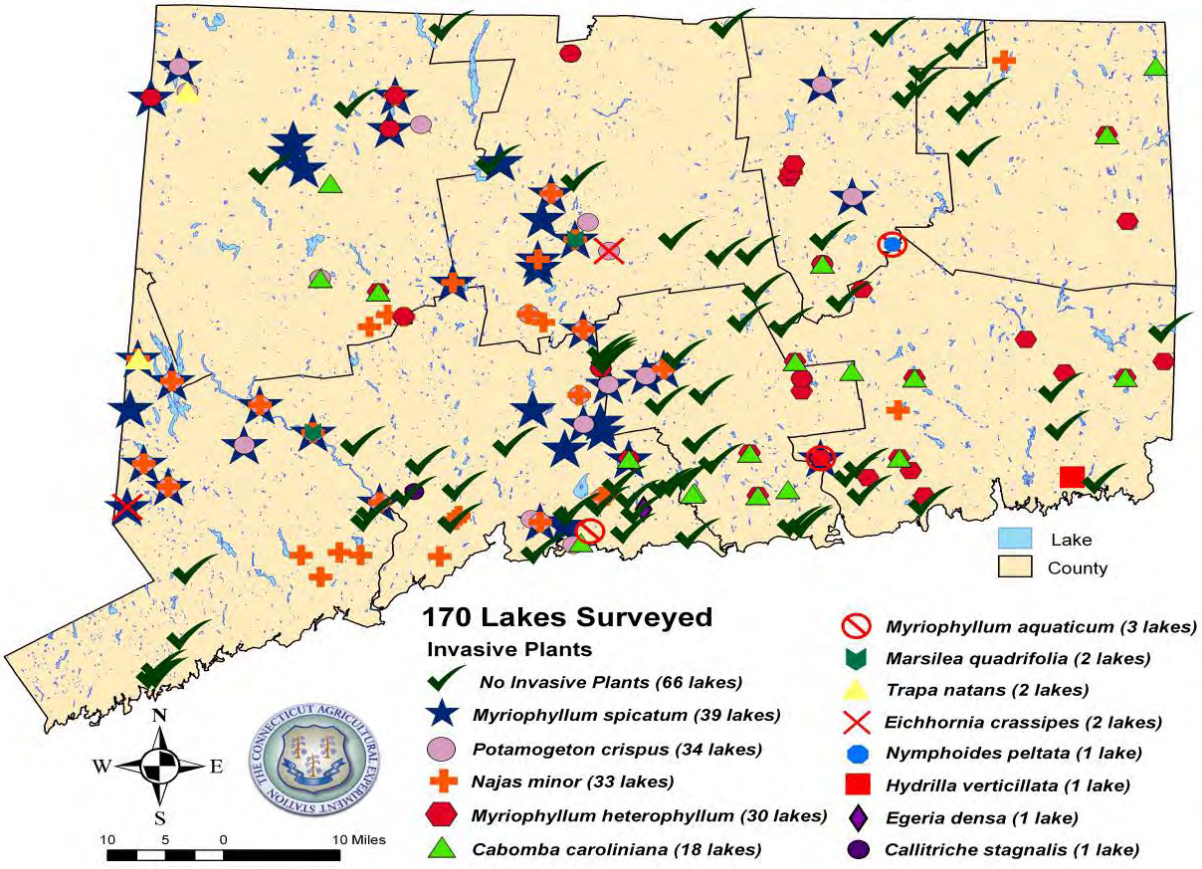
Andreadis developed two highly reliable ribosomal DNA-based single nucleotide polymorphism (SNP) markers, CxpG2T and CxpA2d for detecting *Cx. pipiens* complex mosquitoes containing *Cx. p. quinquefasciatus* alleles. Both CxpG2T and CxpA2d contain one allele that is present in all members of the *Cx. pipiens* complex and the other allele is specific to *Cx. p. quinquefasciatus*. Testing of field populations from the eastern United States demonstrated that these two SNP markers are capable of identifying a south-to-north gradient of *Cx. p. quinquefasciatus* and hybrids. The northern limit of detection of *Cx. p. quinquefasciatus* alleles in this study was in Fort Totten, NYC (40.79° N), whereas the southern boundary was determined between Atlanta, GA (33.81° N) and Gainesville, FL (29.64° N). CxpG2T and CxpA2d were more accurate than *ACE-2* marker, and may conceivably provide comparable resolution to microsatellite markers for detecting *Cx. p. quinquefasciatus* alleles.

The spread of exotic mosquito species into new environments can introduce shifts in mosquito populations and potentially alter public health risks to mosquito-borne diseases. The successful establishment of exotic species is believed to occur due to their competitive advantage over other cohabitating species. **Drs. Melissa Hardstone** and **Theodore Andreadis** hypothesized that the recently introduced exotic mosquito *Aedes japonicus japonicus* would be a more effective competitor than *Aedes atropalpus* and *Aedes triseriatus* and an equal competitor to *Culex pipiens* based on abundance data within used tire habitats. Impacts of competition were measured using the development rate and survival of larvae as well as adult wing size, sex ratio, and mortality. They found that intraspecific competition does not act strongly on *Ae. j. japonicus* nor the other three resident mosquito species. Interspecific competition was generally weak and driven mostly by species and density effects, rather than interspecific treatment effects. Interspecific competition was not present between *Ae. j. japonicus* and *Ae. atropalpus*, or *Cx. pipiens*, however, interspecific treatment effects negatively impacted *Ae. j. japonicus* and positively impacted *Ae. triseriatus*. Overall, our results show that larval competition between *Ae. j. japonicus* and the three resident species was weak when present. Consequently, interspecific competition which could influence the invasion pattern of *Ae. j. japonicus* may manifest only under extreme environmental conditions.

Invasive Aquatic Plant Program

Surveillance and Monitoring Program. **Greg Bugbee** and **Dr. Mark June-Wells** assisted by **Jordan Gibbons, Michal Cavadini and Brian Hart** are continuing to quantify the presence of invasive aquatic plants in Connecticut's lakes and ponds, determine their effects on native plant communities, establish baseline data to track their spread and provide information that is critical

for developing control strategies. During the 2010 field season, native and invasive aquatic vegetation was mapped in eight new and eleven previously surveyed water bodies. Complete aquatic vegetation surveys have now been completed on 170 Connecticut lakes and ponds. To begin to discern how invasive plants are affecting plant communities over time, four lakes originally surveyed in 2004 or 2005 were resurveyed In addition, Lake Candlewood, Connecticut's largest lake, was surveyed for the fourth consecutive year to determine the effects of alternate year deep and shallow winter drawdown on invasive *Myriophyllum spicatum* (Eurasian watermilfoil), *Najas minor* (minor naiad) and *Potamogeton crispus* (curly leaf pondweed). Lake Zoar (another large lake) was surveyed for the second time to track the long-term population dynamics of the same invasive species. Global positioning system (GPS) derived transects were established within each water body to quantitatively track changes in native and invasive aquatic species abundance and distribution over time. Water samples were collected from all lakes and ponds and analyzed for pH, temperature, dissolved oxygen, clarity,



alkalinity, conductivity and phosphorus. These data, along with watershed information, are being used to investigate the factors that influence the susceptibility of water bodies to certain invasive species. Dry specimens of all plant species in the CAES herbarium are archived for future reference and information is incorporated into the publicly accessible Connecticut Agricultural Experiment Station (CAES) 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 and some lakes contained as many as four invasive species. The most common invasive plants are *M. spicatum*, *M. heterophyllum*, *N. minor, P. crispus and Cabomba caroliniana* (fanwort). Less common plants are *Eichhornia crassipes* (water hyacinth), *Marsilea quadrifolia* (water shamrock) and *Hydrilla verticillata* (hydrilla). The survey of Fence Rock Lake in 2009 discovered Connecticut's first infestation of *Egeria densa* (Brazilian waterweed) and a resurvey in 2010 found it to successfully overwinter. Staff members at the CAES is working with the local lake association and the Connecticut Department of Energy and Environmental Protection (CT DEEP) to provide control options.

Resurveys suggest *C. caroliniana* has the capability to out compete even tenacious invasive plants such as *M. heterophyllum*. Cedar Lake, Chester, CT was surveyed in 2004 and again in 2010 (Figure 1). In 2004, the coverage of *M. heterophyllum* and *C. caroliniana* was nearly the same (2.6 and 2.5 ha respectively). In 2010, the area of *C. caroliniana* increased to 5.9 ha while *M. heterophyllum* decreased to 1.9 ha. This trend also was evident in our resurvey of Lake Quonnipaug, Guilford, CT and agrees with anecdotal evidence from lake managers that *C.*

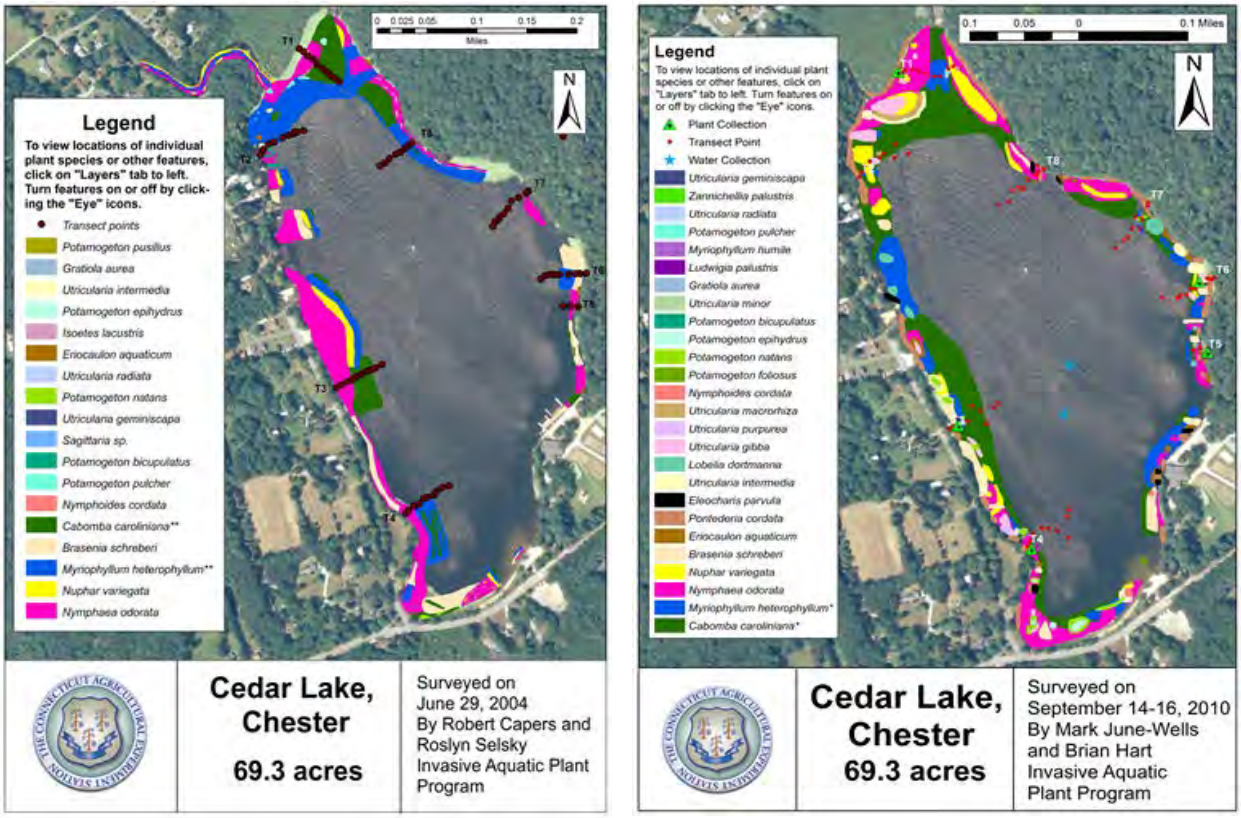


Figure 2. Comparison of aquatic plant communities in Cedar Lake between 2004 and 2010. *C. caroliniana* is dark green and *M. heterophyllum* is medium blue.

caroliniana is increasing statewide.

Investigations continue on using aerial imagery as a surveillance tool. In 2009, the United States Department of Agriculture National Agriculture Imagery Program provided good viewing of the Eurasian watermilfoil beds in Candlewood Lake. A comparison of 2010 imagery with 2009 identified four areas that appeared to have milfoil that were missed. These areas tended to be small humps in the center part of the lake where surveyors would expect it to be too deep to

Figure 2. Remote sensing imagery suggested area (arrow left) was *M. spicatum*. This was confirmed by our field survey and an invasive polygon was added to map (arrow right). The other polygons (right) were found without remote sensing but their visibility in the imagery is striking.

support milfoil (Figure 2). A revisit to the areas found all but one to be Eurasian milfoil. More sophisticated software will be used this in the future for analyzing the imagery.

These surveys provide one of the most complete aquatic plant and water chemistry databases available in any state. Using water chemistry and plant presence/absence data from 92 Connecticut lakes with invasive species, they developed risk assessment ranges for use by local resource managers and policy makers. Multivariate statistical approach elucidated strong correlations among our five most abundant non-native aquatic plant species and the lake water chemistry variables; alkalinity (buffering), conductivity (total ions), pH (hydrogen ion concentration), and phosphorus concentration (trophic level). Lakes were grouped by species presence. Two groups derived from the correlation technique (Principal Component Analysis) were: 1) Lakes with *C. caroliniana* and *M. heterophyllum* and 2) Lakes with *P. crispus, N.*

Species	Alk (mg/L)	Cond (us/cm)	pH	P-conc (ug/L)
Cabomba caroliniana	0.0-28.5	39.4-107.2	5.65-6.96	1.4-27.4
Myriophyllum heterophyllum				
Myriophyllum spicatum	17.5-77.0	107.6-232.3	6.31-8.07	0.000-85.5
Najas minor				
Potamogeton crispum				

minor, and *M. spicatum*. This allowed for a multivariate regression technique to compare whether these groups were significantly different in regards to water chemistry. Analysis detected highly significant differences among groups (see Table below). The *C. caroliniana* and *M. heterophyllum* group exhibited significant preferences for lakes with lower conductivity, alkalinity, and pH than the *P. crispus, N. minor,* and *M. spicatum* group. Finally, we found Discriminant Function Analysis was able to predict the presence of our five species with nearly 80 percent accuracy.

To prevent the spread of invasive species, Connecticut has enacted laws banning the sale and transport of invasive species. The States banned list contains 20 aquatic plants (Table 1). CAES Invasive Aquatic Plant Program (IAPP) evaluated aquarium retailer compliance with invasive aquatic plant mandates. In 2008 and 2010 seventy-five aquatic plant dealers were visited. All plant species that exhibited similar morphology to the 20 banned species were purchased and identified morphologically. Because many specimens could not be identified based on morphology, **Dr. Charles Vossbrinck** assisted by **Kittyapong Prapayotin Riveros** obtained genetic sequences for each specimen and compared them to known genetic sequences in the GENBANK NCBI database. It was found that 30% of the stores are selling banned aquatic species and that *Cabomba caroliniana* is the most common banned species being sold (Table 2). Moreover, the species *Egeria densa* (Brazilian waterweed) and species in the genus *Myriophyllum* were misidentified by the retailer more than 50% of the time. Noncompliance to State law appears to be primarily due to mislabeling, difficulties in identifying many aquatic plant species and ignorance of state statutes. CAES IAPP has begun educating retailers by offering workshops and distributing copies of the Invasive Aquatic Plant Identification Guide produced in 2010 as part of this program. This effort

#	SCIENTIFIC NAME	COMMON NAME
1	*Butomus umbellatus* L.	Flowering rush
2	***Cabomba caroliniana* Gray**	**Fanwort**
3	***Callitriche stagnalis* Scop.**	**Pond water-starwort**
4	***Egeria densa* Planch.**	**Brazilian water-weed, Anacharis, Egeria**
5	***Hydrilla verticillata* (L. f.) Royle**	**Hydrilla**
6	*Iris pseudacorus* L.	Yellow iris, Yellow flag iris
7	*Lythrum salicaria* L.	Purple loosestrife
8	***Marsilea quadrifolia* L.**	**European waterclover, Water shamrock**
9	*Myosotis scorpioides* L.	Forget-me-not, Water scorpion-grass
10	***Myriophyllum aquaticum* (Vell.) Verdc.**	**Parrotfeather**
11	***Myriophyllum heterophyllum* Michx.**	**Variable-leaf watermilfoil**
12	***Myriophyllum spicatum* L.**	**Eurasian watermilfoil**
13	***Najas minor* All.**	**Brittle water-nymph, Minor naiad**
14	*Nelumbo lutea* (Willd.) Pers.	American water lotus
15	***Nymphoides peltata* (S.G. Gmel.) Kuntze**	**Yellow floating heart**
16	***Potamogeton crispus* L.**	**Curly leaf pondweed, Crispy-leaved pondweed**
17	*Rorippa microphylla* (Rchb.) H.Hyl.	Onerow yellowcress
18	*Rorippa nasturtium-aquaticum* L. Hayek	Watercress
19	*Salvinia molesta* D.S. Mitch.	Giant salvinia
20	***Trapa natans* L.**	**Water chestnut**

has provided valuable information to the CT DEEP who is charged with inspecting aquarium retailers and enforcing the laws regarding the sale of the banned plants.

Table 1. Invasive aquatic species banned under Connecticut State Statutes (Sec.22a-381d). Invasive species found in Connecticut lakes and ponds in bold

Year	Stores (n)	Stores Selling Banned Plants (n)	Stores Selling Banned Plants (%)	Stores Selling *Cabomba caroliniana* (%)	Stores Selling *Egeria densa* (%)
2008	28	8	28	14	14
2010	47	14	29	23	11

Table 2. Connecticut pet stores selling banned invasive aquatic macrophytes in 2008 and 2010

Control efforts. The goal of this objective is 1) to investigate novel means of chemical control that minimizes herbicide usage and protect native vegetation and 2) find biological organisms that will provide long-term suppression of invasive species particularly Eurasian watermilfoil.

Herbicides: Novel methods of chemical control with herbicides can rapidly remove invasive plants and begin to restore native plant communities to aquatic ecosystems.

1. *Bashan Lake, East Haddam, CT.* CAES is in the 12th year of research involving the use of spot applications of the herbicide 2, 4-D to control *M. heterophyllum* in Bashan Lake. We have largely restored the lake to preinfestation conditions; however, regrowth requires yearly surveys and modest retreatments. For a sixth consecutive year, we have shown the effectiveness of late summer herbicide applications thus limiting the exposure of those who use the lake to the herbicide. We have integrated underwater video equipment with GPS and geographic information system (GIS) technology to precisely locate and treat the patches of *M. heterophyllum*.

2. *Crystal Lake, Middletown, CT.* Crystal Lake has extensive growth of *Potamogeton crispus* and *Myriophyllum spicatum*. Chemical control efforts have been hampered due to the presence of the threatened plant species *Potamogeton vaseyi*. Limnobarriers were used to isolate the beds of *P. vaseyi* and treated the lake in late April with diquat dibromide to remove the invasive plants. After several weeks, the unwanted vegetation was controlled. 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 *P. crispus* to pretreatment levels but virtually no re-growth of the *M. spicatum*. This near complete elimination of *M. spicatum* by the April diquat treatment may be a new tool for controlling this plant but further study is needed. In 2008, a survey for *Potamogeton vaseyi* by CT DEP found that the plant was growing well; however, none was located in 2009. Eight species of native plants were found the year after treatment compared to only four the year prior to treatment.

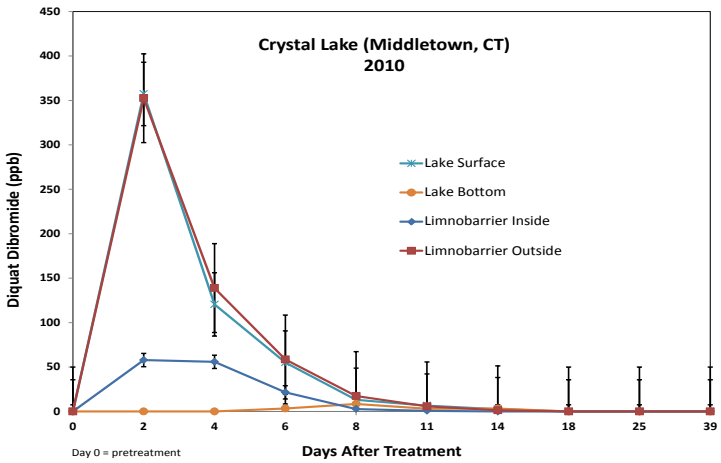


Figure 3. Degradation of diquat dibromide after spring treatment for Potamageton crispus.

This resurgence in native species suggests that the early season application of diquat, and associated reduction in invasive species pressure, may be beneficial to the plant community. Longer term control of the curly leaf pondweed probably requires reducing its bank of reproductive structures in the sediment called turions. Consecutive early season diquat applications were made in 2009 and 2010 to test theory. Again, limnobarriers were installed and plant populations were monitored. In 2010, in collaboration with the CAES Department of Analytical Chemistry, we monitored the movement and degradation of the diquat herbicide. We tested the water inside the limnobarriers, just outside the limnobarriers and in the central parts of the lake (surface and bottom), for diquat dibromide for 39 days to monitor its dissipation (Figure 3). The limnobarriers provided substantial reduction in diquat concentrations with levels reaching only near 50 ppb inside compared to 350 ppb outside. Interestingly, the diquat never reached the lake bottom (the herbicide was injected at a depth of 0.5 meters and mixed by the boat propeller) and this may protect native plants that are just starting their new season growth.

Biological control. The CAES IAPP biological control program has now been in progress for four years. This year's efforts followed two lines of investigation.

Grannis Lake- East Haven, CT. This was the seventh year of study at Grannis Lake, which has the problematic populations of *M. spicatum*, *P. crispus* and *N. minor*. After many years of unsuccessful attempts to control the invasive species with herbicides a plant eating fish called grass carp (*Ctenopharyngodon idella*) was introduced. A total of 200 sterile (triploid) fish averaging 25 cm (10 inch) in length were introduced into the 20 acre lake in September of 2007. Over 200 georeferenced sites in the lake were monitored for the effects of the grass carp on both native and invasive plant species. After no decrease in vegetation in 2008 and 2009, our survey in May 2010 finally showed the fish were reducing the abundance (mass per point) of the invasive species (Figure 4). The frequency of occurrence has not yet been reduced and suggests that the fish are consuming the suspended vegetation without any appreciable reduction in basal plant parts. With continued feeding the frequency of occurrence should begin to decline. Grannis Lake will be restocked in 2011 or 2012, in conformance with CT DEEP guidelines. *Candlewood Lake, Brookfield, New Fairfield, New Milford, Sherman, CT.* The CAES IAPP has continued research on the interactions between Eurasian watermilfoil and the milfoil weevil (*Euhrychiopsis lecontei*). This insect has controlled Eurasian watermilfoil in other states and is native to most lakes with Eurasian watermilfoil in CT. Unfortunately, weevil populations in CT are rarely high enough to cause a significant reduction in milfoil. They are currently conducting two long-term investigations on augmenting milfoil weevil populations to determine if control of Eurasian watermilfoil will result. The first project is in Candlewood Lake. Although Candlewood Lake contains over 350 acres of Eurasian watermilfoil, our surveillance found the weevil to be nearly nonexistent. This offered an excellent opportunity to determine if weevil augmentation can increase the long-term population. CAES in collaboration with Western Connecticut State University (WSCU), the Candlewood Lake Authority and EnviroScience, Inc. introduced 10,000 weevils into three sites in 2008. In 2009, the weevil population in the sites changed little from pretreatment densities. In 2010, an additional 5000 weevils were stocked into an old site and

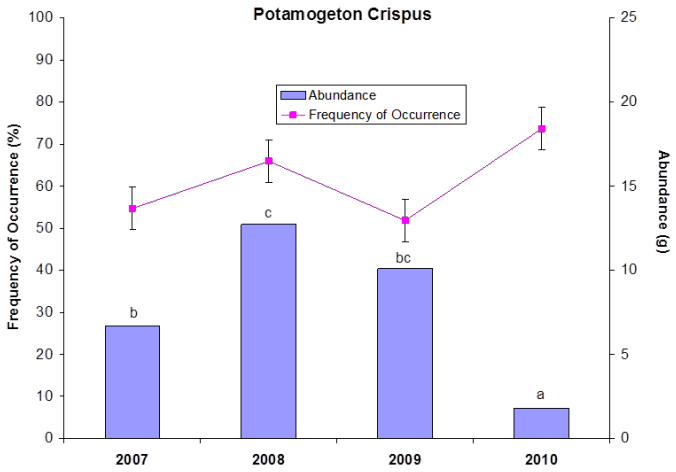
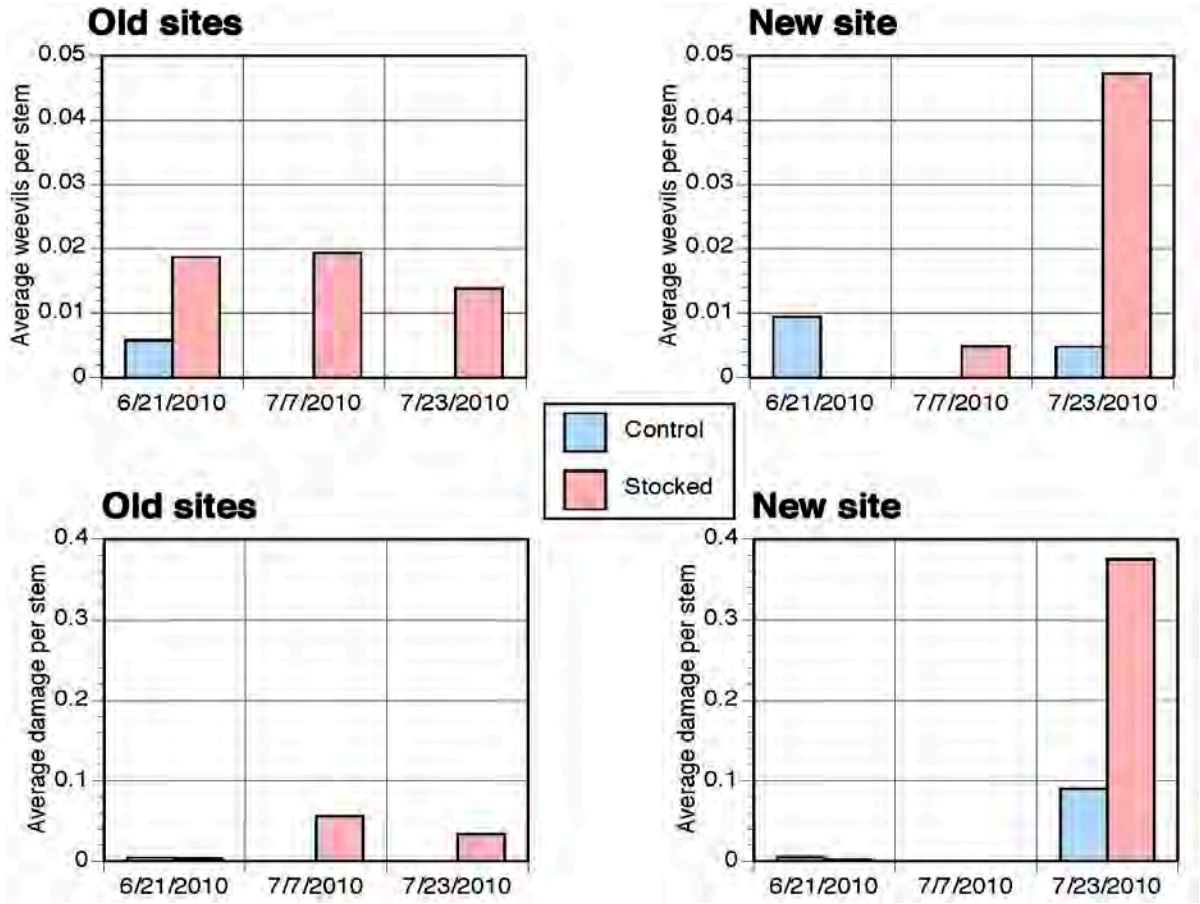


Figure 4. The yearly effects of grass carp herbivory on the frequency of occurrence and the abundance of *Potamogeton crispus* in Grannis Lake, East Haven, CT.

11,000 weevils were stocked into a new site. Weevils and damage were monitored in old and new sites in 2010 and small increases were noted when compared to control sites (Figure 5).

Figure 5. The effects of milfoil weevil augmentation on weevil abundance and stem damage in Candlewood Lake (courtesy of Mitch Wagner, WSCU)

The second milfoil weevil investigation site is located at Indian Lake, in Sharon, CT. The Indian Lake Association initiated a weevil stocking program in 2008. We monitored milfoil and weevil populations prior to augmentation and are currently following populations in a manner similar to that of Candlewood Lake. Unlike Candlewood Lake, Indian Lake already had an abundant weevil population prior to augmentation. Our preliminary data show that average weevil



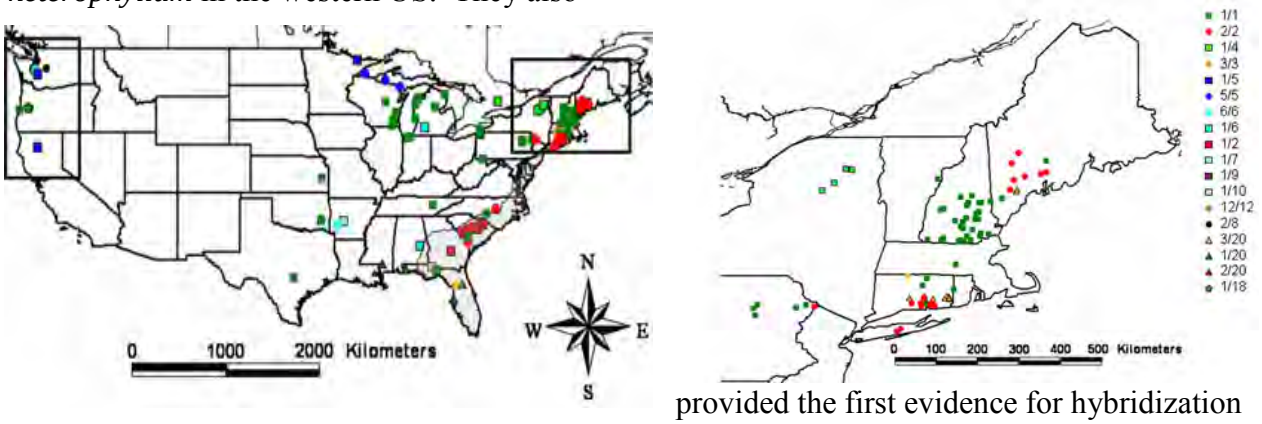
populations in the augmented areas were similar (1.25 weevils/stem) to the non-augmented areas.

Molecular identification and population genetics. The goal of this objective is three fold; 1) to develop a molecular-based system for plant identification, 2) to utilize microsatellite markers for distinguishing among populations of the milfoil weevil and 3) to determine whether genetic differences in variable milfoil are present and if differences affect invasiveness.

Dr. Charles Vossbrinck assisted by **Kittyapong Prapayotin Riveros** has developed a database of plant DNA sequences for molecular identification of the aquatic invasive and native species. They have positively identified and sequenced at least one gene from 56 different aquatic plant species and have sequenced all three genes (small ribosomal subunit, internal transcribed spacer

ribosomal DNA, atpB-rbcL spacer region) from 41 species. One hundred thirty sequences have been submitted to GenBank (http://www.ncbi.nlm.nih.gov/Genbank/index.html) where they are available to researchers worldwide. Novel methods using cesium chloride/ethidium bromide density gradients and ultracentrifugation have been developed to effectively isolate and purify DNA bands. The database and molecular sequencing technology was used to identify and distinguish species of banned plants being sold in Connecticut aquarium retailers.

Genetic variation is increasingly recognized as an important factor influencing the establishment and spread of introduced species, and depends on both the introduction history and partitioning of genetic variation within and among potential source populations. **Dr. Charles Vossbrinck** collaborated with Dr. Ryan Thum at Grand Valley State University in Michigan and examined patterns of genetic variation in native and introduced populations of variable leaf watermilfoil, *Myriophyllum heterophyllum*, using chloroplast (trnL-F) and ribosomal (ITS) DNA sequences, as well as amplified fragment length polymorphisms (AFLPs). They identified a strong phylogeographic break distinguishing populations located on the Atlantic Coastal Plain (ACP) versus other (‘‘Continental’’) portions of the native range. Within these distinct biogeographic regions, they also found genetic variation to be strongly partitioned among populations as analysis of molecular variance (AMOVA) partitioned 91 and 75% of cpDNA and ITS diversity among populations, respectively. They demonstrated that the introduced ranges of variable leaf watermilfoil (northeastern and western US) result from multiple independent introductions from a variety of source populations, including lineages from both the ACP and Continental portions of the native range. In addition, they used molecular markers to demonstrate that variable leaf watermilfoil is genetically distinct from three closely related species that it is morphologically similar to. In particular, they demonstrated that *M. heterophyllum* is clearly distinct from a morphologically similar native species in the western US, *M. hippuroides*, whose distinctiveness from *M. heterophyllum* has been questioned, and therefore confirm the introduction of *M. heterophyllum* in the western US. They also



provided the first evidence for hybridization between these two species. Finally, their molecular markers identified previously unrecognized genetic variation in these four species, and therefore demonstrate the need for further taxonomic investigation.

Fig. 4 Geographic distribution of *M. heterophyllum* ITS genotypes in native and introduced ranges (boxed areas) in the US and northeastern states. Approximate location of the Atlantic Coastal Plain is indicated by light shading. Squares are ITS genotypes that were heterogeneous with the most common ITS allele (1); triangles indicate *M. heterophyllum* 9 *M. laxum* hybrids, all of which carried the *M. laxum* allele (20) in combination with a *M. heterophyllum* allele (indicated by color); *M. heterophyllum* 9 *M. hippuroides* hybrid is indicated with a pentagon.

Outreach. We strive to disseminate all information from our program to the public in a timely fashion and educate stakeholders in the identification, prevention and management of invasive aquatic species. Given the magnitude of invasion by non-native aquatic plants, we are making significant efforts to engage citizens, lake associations, and other stakeholders. 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 via our website (http://www.ct.gov/caes/IAPP). Included are all publications in downloadable formats, as well as the digitized interactive maps of all surveyed lakes and our complete herbarium. 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), the Northeast Arc User Group (NEARC) and students groups such as the Connecticut Envirothon.

Parasite Research

Microsporidia are a group of obligate intracellular eukaryotic parasites with small genomes. They infect animals from a wide variety of phyla, including humans. Two manganese superoxide dismutase (MnSOD) genes, designated NbMnSOD1 and NbMnSOD2, were found by **Dr. Charles Vossbrinck** and colleagues from China to be organized in a tandem array within the *Nosema bombycis* genome. The genes, both 678 bp in length, were found to be more similar to each other than they are to homologous genes of other Microsporidia, suggesting that the tandem duplication occurred subsequent to the development of this lineage. Reverse transcript PCR shows that mRNA for both genes is present in the spores. Analysis of the primary structure, hydrophobic cluster analysis, target signal analysis, and phylogenetic analysis all indicate that NbMn- SOD1 is dimeric and targeted to the cytosol. NbMnSOD2 seems to have changed more rapidly and is under less evolutionary constraint than NbMnSOD1 suggesting that NbMnSOD2

may function under different conditions or in different tissues of its host rather than simply resulting in an increase in expression. A phylogenetic analysis of MnSOD sequences from eukaryotes, Archaea, and bacteria shows the microsporidial MnSODs to be grouped with the bacteria suggesting a possible horizontal gene transfer.

Environmental Chemistry

Sorbic acid as a quantitative probe for the formation, scavenging and steady-state concentrations of the triplet-excited state of organic compounds. **Dr. Joseph Pignatello** in collaboration with William Mitch, Yale University.

Sorbic acid (*trans,trans*-hexadienoic acid) was developed as a probe for the quantification of the formation rate, overall solution scavenging rate and steady-state concentrations of triplet-excited states of organic compounds. The method was validated against literature data for the quenching rate constant of triplet benzophenone by tyrosine obtained by laser flash photolysis and by Stern-Volmer plots of phosphorescence quenching. In contrast to these methods, the probe method does not require knowledge of the optical properties of triplets to monitor their quenching. Moreover, the probe method permits simultaneous quantification of triplet formation, quenching and steady-state concentrations during illumination of complex chromophore mixtures, such as natural organic matter (NOM), with polychromatic light >315 nm. Application of the method to de-aerated Suwannee River NOM illuminated with polychromatic light (315-430 nm) yielded a triplet quantum yield of 0.074, and a self-quenching reaction rate constant between excited triplet SRNOM and ground-state SRNOM of 4.34×10^4 L mg-C^{-1} s^{-1}.

Effect of Biochar Amendments on Mycorrhizal Associations and Fusarium Crown and Root Rot of Asparagus in Replant Soils. **Dr. Joseph Pignatello** in collaboration with **Dr. Wade Elmer** Plant Pathology and Ecology.

Pyrolyzed biomass waste, commonly called biochar, has attracted interest as a soil amendment. A commercial prototype biochar produced by fast pyrolysis of hardwood dust was examined in soils to determine if it could reduce the damaging effect of allelopathy on arbuscular mycorrhizal (AM) root colonization and on Fusarium crown and root rot of asparagus. In greenhouse studies, biochar added at 1.5 and 3.0% (wt/wt) to asparagus field soil caused proportional increases in root weights and linear reductions in the percentage of root lesions caused by *Fusarium oxysporum* f. sp. *asparagi* and *F. proliferatum* compared with a control. Concomitant with these effects was a 100% increase in root colonization by AM fungi at the 3.0% rate. Addition of aromatic acids (cinnamic, coumaric, and ferulic) that are known allelopathic agents affecting asparagus reduced AM colonization, but the deleterious effects were not observed following the application of biochar at the higher rate. When dried, ground, asparagus root and crown tissues infested with *Fusarium* spp. were added to soilless potting mix at 0, 1, or 5 g/liter of potting mix and then planted with asparagus, there was a decrease in asparagus root weight and increase in disease at 1 g/liter of potting mix but results were inconsistent at the higher residue rate.

However, when biochar was added at 35 g/liter of potting mix (roughly 10%, vol/vol), these adverse effects on root weight and disease were equal to the nontreated controls. A small demonstration was conducted in field microplots. Those plots amended with biochar (3.5% [wt/wt] soil) produced asparagus plants with more AM colonization in the first year of growth but, in the subsequent year, biochar-treated plants were reduced in size, possibly due to greater than average precipitation and the ability of biochar to retain moisture that, in turn, may have created conditions conducive to root rot. These studies provide evidence that biochar may be useful in overcoming the deleterious effects of allelopathic residues in replant soils on asparagus.

Preparation and Characterization of Humic Acid Cross-linked with Organic Bridging Groups. **Dr. Joseph Pignatello** in collaboration with Gabriele E. Schaumann, Sören Thiele-Bruhn, and Jingdong Mao.

Cross-linking of humic substances with organic bridging groups is hypothesized to contribute to the humification of soil organic matter. Model cross-linked humic substances were prepared by cross-linking Amherst soil humic acid by a diepoxide and a polycarboxylic acid in the solid state, applying procedures established for cross-linking of polymers and textile fabrics. Products of the cross-linking reactions were analyzed by FTIR and ^{13}C CPMAS NMR. Physicochemical properties of the products were determined by solubility experiments and thermal analysis. The incorporation of the cross-linker into the matrix of the humic acid by covalent linkages was confirmed by both the disappearance of bands of the reactive functional groups of the cross-linker in the FTIR spectrum and the increase of signals related to the incorporation of the cross-linker into the matrix of the humic acid in the FTIR and ^{13}C-CPMAS-NMR spectra. The formation of covalent ester and ether linkages by the cross-linking reaction was indicated. Water solubilities at pH 6.2 of the cross-linked samples as determined by UV/Vis spectrometry were reduced compared to controls. Fewer water molecule bridges were formed in the cross-linked samples, which was attributed to a lower number of available functional groups and increased distances between humic acid strands caused by the cross-linking molecules. Reduced reactivities of humic acid strands in the cross-linked samples further indicated successful cross-linking. The reactions investigated in this study can be regarded as models for reactions occurring in natural soils to test the significance of cross-linking reactions in the humification process of soil organic matter.

Speciation of Ionizable Compounds Sorbed on Charcoal Black Carbon: The examples of Aromatic Carboxylic Acids and the Antibiotic, Sulfamethazine. **Dr. Joseph Pignatello** in collaboration with Jinzhi Ni, Baoshan Xing, Mercè Granados, Jose Beltran, and Jordan Peccia.

Charcoal is a form of black carbon from the pyrolysis of biomass. It is a ubiquitous component of soils as a result of natural or deliberate fires, and a number of researchers have suggesting

adding manufactured charcoal ("biochar") to soil to improve soil fertility. Charcoal and black carbon materials in general are typically powerful adsorbents of hydrophobic compounds. Adsorption of ionizable compounds by charcoal black carbon is poorly understood mechanistically, however. Sulfamethazine [SMT; 4-amino-*N*-(4,6-dimethylpyrimidin-2-yl) benzenesulfonamide] is one of the most heavily used antibiotics in animal agriculture. Adsorption of SMT (pK_{a1} 2.28, pK_{a2} 7.42) on a charcoal was determined as a function of concentration, pH, inorganic ions, and organic ions and molecules. SMT displayed unconventional adsorption behavior. Despite its hydrophilic nature ($\log K_{OW} = 0.27$), the distribution ratio *K*d at pH 5, where SMT^0 prevails, was as high as 10^6 L/kg, up to 10^4 times greater than K_{OC}. The *K*d decreases at high and low pH, but not commensurate with the decline in K_{OW} of the ionized forms. At pH 1, where SMT^+ is predominant and the surface is positive, a major driving force is π-π electron donor-acceptor interaction of the protonated aniline ring with the π-electron rich graphene surface, referred to as π^+-π EDA, rather than ordinary electrostatic cation exchange. In the alkaline region, where SMT^- prevails and the surface is negative, adsorption is accompanied by near-stoichiometric proton exchange with water, leading to the release of OH^- and formation of an exceptionally strong H-bond between SMT^0 and a surface carboxylate or phenolate, classified as a negative charge-assisted H-bond, (-)CAHB. At pH 5, SMT^0 adsorption is accompanied by partial proton release and is competitive with trimethylphenylammonium ion, signifying contributions from SMT^+ and/or the zwitterion, $SMT^\pm$, which take advantage of π^+-π EDA interaction and coulombic attraction to deprotonated surface groups. In essence, both pK_{a1} and pK_{a2} increase, and $SMT^\pm$ is stabilized, in the adsorbed relative to the solution state. Allelochemicals are natural compounds exuded by plant roots to act on other plant species, usually for its own benefit. Many allelopathic agents are aromatic carboxylic acids or phenolic acids, which typically have acid dissociation constants (pK_a) between 4 and 5, and therefore can exist in the neutral or anion forms in soil depending on pH. We examined the adsorption of the allelochemicals, cinnamic acid and coumaric acid, to different charcoals (biochars) as part of a study on bioavailability of natural signaling chemicals in soil. Adsorption isotherms in pH 7 buffer, where the AAs are >99% dissociated, are highly nonlinear, give distribution ratios as high as $10^{4.8}$ L/kg, and are insensitive to Ca^{2+} or Mg^{2+}. In unbuffered media adsorption becomes progressively suppressed with loading and is accompanied by release of OH^- with a stoichiometry approaching 1 at low concentrations, declining to about 0.4 – 0.5 as the pH rises. Adsorption of cinnamate on graphite as a model for charcoal was roughly comparable on a surface area basis, but released negligible OH^-. A novel scheme is proposed that explains the pH dependence of adsorption and OH^- stoichiometry and the graphite results. In a key step, AA^- undergoes proton exchange with water. To overcome the unfavorable proton exchange free energy, AA engages in a hydrogen bond recognized to be of unusual strength with a surface carboxylate or phenolate group, $[RCO_2\cdots H\cdots O\text{-surf}]^-$, having a comparable pK_a. The same is possible for AA^-, but results in increased surface charge. The proton exchange pathway appears open to other weak acid adsorbates, including humic substances, on carbonaceous materials.

Probing sorption selectivity of neutral organic compounds to organic matter solids through the use of nitroxyl paramagnetic NMR relaxation probes. **Dr. Joseph Pignatello** in collaboration with Jingdong Mao and Mark A. Chappell.

Soil organic matter is composed of lipid, carbohydrate-like, protein-like, lignin-like and black carbon-like functional units. A number of researchers have proposed that environmental contaminants show preferential sorption in soil organic matter depending on the similarity of their structure to the functional unit. For example, an aromatic compound may preferentially interact with the lignin-like or black carbon-like units because such units are rich in aromatic functional groups. However, incorrect approaches were used to test this hypothesis and the results have been conflicting. The main objective of this study was to probe at the molecular level the question of whether or not there are preferred sites of sorption of organic compounds to SOM. A novel approach was employed, which involved the use of Solid State Nuclear Magnetic Resonance (NMR) techniques and nuclear paramagnetic relaxation probes as sorbates. It takes advantage of the spectral changes caused by the highly efficient relaxation afforded by these relaxation probes near the site of sorption. As a result, line-broadening and reduction of spin-lattice relaxation rate are expected. Stable organic nitroxyl free radical relaxation probes of different polarities namely, HTEMPO (1-oxyl-2,2,6,6-tetramethyl-4-hydroxypiperidine) and TEMPO (2,2,6,6-tetramethylpiperidine-1-oxyl) were used as models for organic compounds. A high organic soil Pahokee Peat and a high organic soft coal Beulah Zap lignite were used as sorbents. In addition, a polystyrene- poly(vinylmethylether), PS-PVME, polymer blend was synthesized and used as an example of an intimate blend of aromatic and aliphatic microdomains. Sorption kinetics revealed that pseudo-equilibrium was reached within ~4-5 days for all sorbate-sorbent combination. Sorption isotherms were then constructed with an equilibration time of at least 6 days, and with concentrations spanning at least two orders of magnitude. The isotherms were corrected with respect to probe recovery in order to account for the physisorbed molecules only. After equilibration, samples were freeze dried and analyzed using ^{13}C Cross Polarization/Total Sideband Suppression (CP/TOSS) Solid State NMR and T2 filter. Peak suppression in terms of percent peak area or peak intensity reduction for TEMPO and HTEMPO in Pahokee Peat and Beulah Zap reveals little to no selectivity with the different SOM functional groups based on ^{13}C chemical shift. Electron paramagnetic resonance as well as partition coefficients of TEMPO and HTEMPO between water and different organic compounds (i.e., n-octanol, anisole, toluene, hexadecane, cellulose) was also determined in order to help explain this phenomenon. In conclusion, there is little to no selectivity of probes to SOM on the basis of functional group chemistry. This contradicts previous findings on preferential sorption, which were based on functional group correlations with sorption coefficients, i.e., macroscopic data. Furthermore, there seems to be no preference to the small amount of black carbon present in these SOM samples represented by aromatic region centered at 128 ppm. Thus, the implication of these results is that site selectivity may be due to factors other than functional group composition. This work demonstrates for the first time the use of molecular probes to study sorption specificity.

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, **Greg Bugbee** tested 6,100 samples and answered 1,862 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.

DEPARTMENT OF FORESTRY AND HORTICULTURE

Connecticut's landscape is a quilt of forests, farms, towns, and cities. Scientists in the Department of Forestry and Horticulture are studying the factors that influence both forest and farm productivity, including novel specialty crops, grapes, and the effect of the growing deer population on natural and managed landscapes.

NEW CROPS PROGRAM

Investigation of new crops is essential to provide new opportunities for farmers during a time of changing agriculture in Connecticut. Today, about 11,000 acres on 733 farms in Connecticut are devoted to vegetable production with a cash value of 30.2 million dollars. This compares to 19.1 million dollars from 582 farms in 2002. Seventy-nine percent of these farms are less than 100 acres in size; sixty-three percent are less than 50 acres in size. With numerous small farms, there is a need for growers to find a diversity of high value niche crops. In addition, small farm sizes in Connecticut have resulted in marketing shifts from wholesale contracts with local supermarkets to direct retail sales. Approximately 313 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 20% of these farms offer pick-your-own fruit and vegetables to reduce the cost of harvest labor with savings 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 at these markets. According to the Connecticut Department of Agriculture, there were 115 farmers' markets in 2010, attended by over 400 farmers compared to 87 markets in 2007, a 32% increase.

As the popularity of farmers' markets in Connecticut have surged, so too has the need for growers to find a diversity of high value niche crops. Consumers used to a wide variety of fruits and vegetables in large supermarkets are seeking a greater diversity of ethnic and specialty crops at farmers' markets and roadside stands. A recent survey of vegetable growers by The Connecticut Agricultural Experiment Station showed that over 70 vegetable crops are currently being grown in Connecticut. 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. Results are also communicated to growers at meetings and farm visits. 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.

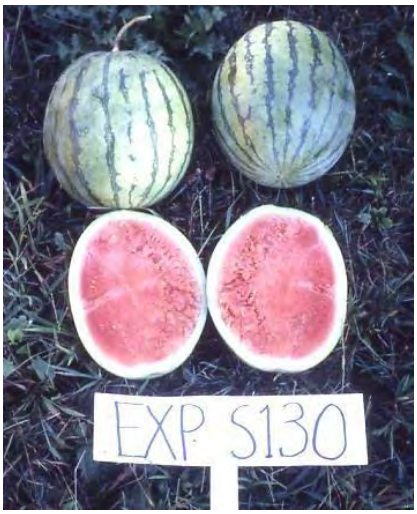
Pak Choi Trials: From 2000 to 2006, the Asian population in Connecticut grew 42%. This and other ethnic groups wish to continue consumption of vegetables that are customarily in their diets, thereby giving farmers opportunities for production of crops with a ready market. Ethnic vegetables also appeal to high-end buyers for whom ethnic vegetables are not every day fare, but who enjoy gourmet produce and culinary variety. Many farmers wish to diversify their operations by growing ethnic vegetables, but there is little information on the culture of these vegetables in Connecticut. It is important that cultural techniques for these vegetables be adapted to Connecticut's soils and climate. In 2010, **Dr. Abigail Maynard** evaluated 12 different varieties of pak choi on yield and quality at Windsor and Lockwood Farm. The average yield at Windsor (sandy terrace soil) was 20.2 T/A compared to 16.7 T/A at Lockwood Farm (loamy upland soil).

IMPACT: In spring, Joi Choi (27.8 T/A) and Canton Long (17.6 T/A) had the greatest yields. At a retail price of $0.99/lb, there is a potential crop value of $55,044/acre. Many cultivars (All

Seasons, Canton Short, Dwarf Green Petiole, Green Boy, Mei Qing Choi, Summer Boy, and Summer Flavor) bolted at both sites in the spring and were unmarketable. A farmer growing these cultivars in the spring would have had a crop failure resulting in no income. Most Connecticut farmers are now growing the cultivar Joi Choi. In fall, Win Win Choi (20.3 T/A) and Joi Choi (17.2 T/A) had the greatest yields with a potential crop value of $40,194/acre. The long-term benefits include additional revenue for farmers and providing a product that has growing consumer demand. Thirty-five percent of Connecticut's vegetable growers answering our survey are currently growing pak choi.

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 2010, **Dr. Maynard** evaluated 8 vegetable amaranth cultivars at Windsor and Lockwood Farm.

IMPACT: All Red (3.5 lbs/plant), Red Stripe Leaf (3.4 lbs/plant), Green Round Leaf (3.2 lbs/plant), and Green Pointed Leaf (3.2 lbs/plant) averaged the greatest yields. At a retail price of $0.99/lb, there is a potential crop value of $33,541/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. A grower in Bloomfield now supplies a local school system with his crop of vegetable amaranth.



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 a 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 2010, **Dr. Maynard** evaluated for yield and quality seven cultivars of personal sized seedless watermelon at Windsor and Lockwood Farm. Unlike larger watermelons, personal-sized watermelons are sold by the melon, not by the pound. Therefore, estimated yields were measured in number of personal sized fruit per acre. Bravo (16,498 fruit/acre and Mielhart (14,236 fruit/acre) averaged the greatest yields at both sites. Bravo (11.6) averaged the highest Brix values (sugar content).

IMPACT: Twenty-four percent of vegetable growers responding to our survey grow personal-sized watermelons. By growing the cultivar Bravo instead of the standard cultivar Vanessa, a grower can produce over 10,100 more personal-sized watermelons per acre. At $4.99 retail price/fruit, the grower would potentially gross almost $50,400 more per acre by growing Bravo instead Vanessa. If the oversized (>7 lbs) pumpkins are sold for $0.49/lb, the grower can potentially gross over $103,600/acre by growing Bravo compared to $45,000/A by growing Vanessa. The long-term benefits of growing personal-sized watermelon 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.

Sweet Potato Trials: A 1998 Connecticut Department of Agriculture survey showed that sweet potato is one of the most popular specialty vegetables. Sweet potatoes are called yam in the south, but both are identical species. North Carolina and Louisiana are the leading producers in the United States, 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 2010, **Dr. Maynard** evaluated several cultivars that have short maturities (90 days) at Windsor and Lockwood Farm.

IMPACT: Beauregard and Covington averaged the greatest yields (3.3 lbs/plant) with both O'Henry and Jewels averaging 3.0 lbs/plant. At a retail price of $0.79/lb, there is a potential crop value of $37,854/acre. Beauregard is the most popular cultivar grown in Connecticut with forty-one percent of the surveyed vegetable growers including sweet potatoes at their farms. The long-term benefits of growing sweet potatoes 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.

Edamame Trials: Edamame are specialty varieties of soybeans that are harvested in the green stage. The word "edamame" means "beans on branches" and it grows in clusters on bushy branches. Edamame is consumed as a snack, a vegetable dish, used in soups or processed into sweets. As a snack, the pods are lightly boiled in salted water, and then the seeds are squeezed directly from the pods into the mouth with the fingers. Outside East Asia, edamame is most often found in Japanese restaurants and some Chinese restaurants, but it has also found popularity elsewhere as a health food. In 2010, **Dr. Maynard** evaluated ten cultivars of edamame for yield and quality at Windsor and Lockwood Farm.

IMPACT: The cultivar Sunrise had the greatest yield (0.71 lbs pods/plant). At a retail price of $2.49/lb, there is potential crop value of over $38,500/acre. By growing the cultivar Sunrise instead of the cultivar Beer Friend, the grower can potentially produce almost 12,000 more pounds per acre or gross almost $9,000 more per acre. The long-term benefits include additional revenue for farmers, especially those who attend farmers markets in urban areas. Five percent of the Connecticut vegetable farmers responding to our survey are now growing edamame.

Specialty Pumpkin Trials: The predominant market for pumpkins is for jack-o'-lantern types (12 - 20 lbs). However, small pumpkins are often needed for operations specializing in school tours where each child receives a pumpkin to take home. Smooth pumpkins are preferred for painting or coloring. Specialty pumpkins come in a wide range of colors and color combinations including white, pale green, tan, burnt orange, and yellow. Shape also varies from the ideal round, to squatty with a flattened or concave top, to oval, to tall and elongated. In 2010, **Dr. Maynard** evaluated the yield and quality of 12 varieties of specialty pumpkins at Windsor and Lockwood Farm.

IMPACT: Moonshine (12.2 fruit/plant), Gooligan (8.7 fruit/plant), Hooligan (8.0 fruit/plant), and Apprentis (6.8 fruit/plant) had the greatest yields. At a retail price of $1.00/pumpkin, there is a potential crop value of $35,429/acre. Sixty-eight percent of Connecticut vegetable farmers responding to our survey are now including some of these cultivars in addition to growing Jack-

O-Lanterns. The long-term benefits of growing specialty pumpkins include an additional product and revenue for growers who attend farmers markets or have their own roadside stands.

Specialty Eggplant Trials: Eggplants are a botanically diverse group that can be divided into two types based on fruit shape and color. The first, more traditional type, is the teardrop-shaped, large-fruited eggplant. Fruit of these eggplants are typically oval or long, and tapered in shape with a black, purplish-black, or purple skin color, often with a green calyx. The second type is collectively referred to as the "specialty" eggplants, some of which are referred to as "Asian" eggplants. Asian eggplants generally have a purple calyx. Fruit shapes of specialty eggplants vary, but are often long and smooth, ball- or bell-shaped. In 2010, **Dr. Maynard** evaluated 10 varieties of specialty eggplants on yield and quality at Windsor and Lockwood Farm.

IMPACT: Hansel (18 lbs/plant), Ichiban (13 lbs/plant), and Fairy Tale (13 lbs/plant) had the greatest yields. At a retail price of $1.49/lb, there is a potential crop value of $97,357/acre. The cost of producing ethnic eggplant varieties at the UMass Research Farm was estimated to be $6,000/acre. Based on this information, the total net receipts for Hansel grown at the UMass Research Farm would have exceeded $90,000/acre. The long-term benefits of growing specialty eggplant 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 with leaf collection programs in the fall are turning to farmers to dispose of their leaves. However, not all farmers have extra land to set aside for a standard composting operation. Instead, they layer undecomposed leaves on their fields and simply plow them under. This is called sheet composting. Nitrogen deficiency can be a problem in these soils because microorganisms involved in leaf decomposition use nitrogen more efficiently than plants. There is some question whether the differences in the rates of decomposition between oak and maple leaves would lead to differences in plant response when these leaves are used in a sheet composting operation. This is also a situation that confronts many home gardeners who have a predominance of oaks in their backyards.

To help answer this question, **Dr. 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 1994-2009 and incorporated into the soil by rototilling. Last year, lettuce, eggplant, and onions 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 2010, lettuce yields from plots amended with oak or maple leaves were slightly greater (1.2 lbs/head) compared to yields from

the unamended control plots (1.0 lbs/head). The greatest eggplant yields were from the unamended control plots (11.6 lbs/plant) followed by plots amended with oak leaves (10.8 lbs/plant) and maple leaves (10.6 lbs/plant). The greatest onion yields were from the plots amended with oak leaves (9.0 lbs/10 ft row) followed by the control plots (8.7 lbs/10 ft row) and plots amended with maple leaves (6.2 lbs/10 ft row).

IMPACT: Many Connecticut homeowners are now disposing 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.

VITICULTURE

Winegrape growers and Farm Wineries in Connecticut face many challenges. Farm Wineries are required to grow a minimum of 25% of the fruit used in their total output, but are having trouble meeting this standard. Consecutive very cold winters in 2003 and 2004, as well as in 2009 and 2011 resulted in significant plant loss on less cold hardy cultivars. These losses drove up prices for Connecticut grown fruit. Little information has been available to growers regarding cultural information for growing more cold hardy and disease resistant cultivars in the state. Growers of 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 productivity via better management practices in existing vineyards and improved cultivar selection in newly planted vineyards. Innovative practices need to be tested in Connecticut to assess their viticultural and economic appropriateness.

Winegrapes: Studies initiated by **Dr. William R. Nail** from 2004-2011 are helping determine profitable cultural practices for growing high quality winegrapes 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 over 30 wineries with a Farm Winery license, with two or three more scheduled to open each year 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.

Effects of graft union height: Freeze damage to grafted grapevines frequently occurs at the graft union, which is typically very close (one to two inches) to the ground. Crown gall, caused by *Agrobactium vitis*, is a devastating and often lethal disease of grapevines, and frequently occurs on severely 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. Temperature data loggers have been installed at both graft union heights to monitor differences in temperature at the graft unions. Vines have been evaluated for bud fruitfulness, winter freeze damage, and crown gall incidence and severity beginning in 2008. Yield and fruit quality were evaluated beginning in 2009.

In the absence of snow cover, daily minimum temperatures averaged 0.5 to1.5 ºC higher at the higher graft union level. While no significant differences in crown gall incidence or severity have been observed in the experimental vineyards, the high grafted vines have been more economical to manage, as their single straight trunks are less susceptible to inadvertent tractor and herbicide damage. High grafted vines had a high potential to yield high quality fruit during their second year after transplanting, while low grafted vines would traditionally have had no yield. This potential yield of fruit, estimated at $2,000 per ton, would offset the increased cost production of the high grafted vines.

IMPACT: Vines with crown gall typically require replacement. High-grafted vines may result in significant reduction in such losses, which would be approximately $2,150 per acre plus labor for each 10% of vine mortality.

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. Vines grafted to 101-14 had 32% less mortality caused by winter freeze damage than those grafted to 3309C following their first winter. Crown gall in subsequent years has been slightly higher in 3309C vines. There were no significant differences in productivity or fruit quality between rootstocks without crown gall through the 2010 growing season.

IMPACT: 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

Training and pruning effects on vine performance of hybrid cultivars: Grapevines in most older vineyards in Connecticut were 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. Many recently released hybrid cultivars that are rapidly finding favor 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 commercial 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 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 in future years.

The data collected to date suggest that the vertically divided Scott Henry system was most productive in the first year of full production, while the horizontally divided Geneva Double Curtain was the most productive in the second and third years. However, divided canopies require more intensive management than single canopies. Data were collected beginning in 2010 to determine the relative cost of maintaining these different training systems.

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 Connecticut. This will assist growers in determining if the increased yields per linear unit of row will justify the additional labor and supply costs of divided canopy systems.

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 less skilled labor and lends itself to mechanization. A planting of the hybrid cultivars Cayuga White and St. Croix, both trained to four different training systems, was established in 2005. Beginning in 2011, vines on six-foot spacing were pruned to either cane or cordon (spur) pruning to compare the relative efficiencies of these pruning methods. Yield and fruit quality parameters will be determined beginning in the 2011 harvest season, and will continue for at least three more years.

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. Over the course of a previous experiment on hybrid grapevines, there were no differences in yield, fruit quality, or any measured vegetative parameters measured between cane and cordon pruned vines. Therefore, cordon pruning can reduce pruning costs by approximately 30% for growers.

Cultivar and clonal evaluation: Beginning in 2004, **Dr. Nail** evaluated previously established experimental plots at Lockwood Farm and a private grower's vineyard in Shelton. The results of these trials have been published in station bulletins. New cultivar trials were established at Lockwood Farm and the Valley Laboratory in spring, 2008, in conjunction with the national project "NE-1020: Multistate Evaluation of Winegrape Cultivars and Clones". This project involves over 50 scientists from over 30 states, allowing for evaluation of regional comparisons of vegetative and fruit qualities. The planting at Lockwood Farm is the third largest planting in the Eastern United States. Both plantings contain established cultivars with documented characteristics, as well as unreleased and untested cultivars whose performance in Connecticut are unknown. Data collection on these vines began with pruning data in spring 2010, and will continue for several years. Experimental wines will be made from selected cultivars at the Enology laboratory at the New York Agricultural Experiment Station at Geneva and evaluated for wine chemistry and sensory qualities beginning in 2011.

IMPACT: The NE-1020 plots will provide Connecticut growers with valuable information on the suitability of new cultivars if and when they are released. Viticultural and fruit quality characteristics are important when a new cultivar is introduced into a region. The results of these

trials will allow growers to make informed decisions as to the selection of appropriate new cultivars and their cultural requirements.

Rootstock effects on red Bordeaux winegrapes: The effects of the rootstocks C.3309 and SO4 on vegetative and fruit quality parameters were evaluated on the red Bordeaux cultivars Cabernet Franc, Cabernet Sauvignon, and Merlot from 2004-2010 at a commercial vineyard in Shelton, CT.

IMPACT: Vines grafted to SO4 had higher yields in 2004 and 2007 due to more clusters per vine, and had slightly better fruit quality in 2005 and 2006. There were no subsequent differences between the two rootstocks, suggesting that, except for slightly increased yield and possible fruit quality early in the life of a vine, the differences between the two rootstocks were negligible.

The value of the forest to Connecticut is much more than the timber and other forest products. First and foremost, forests protect watersheds, aquifers and groundwater supplies that provide the bulk of our clean drinking water. Trees can also provide air pollution control, acting as giant filters to remove dust, particulates, and some airborne chemicals. In addition, trees cool our environment in the summer by recycling water and reflecting sunlight. Forests contribute to the character of Connecticut add to our enjoyment throughout the year.

CROP-TREE MANAGEMENT

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 2003, **Dr. Jeffrey Ward** began a study to determine if crop tree management would increase growth of large, mature oak sawtimber (> 18 inches diameter) without a loss in bole quality and stand growth rates in cooperation with CT DEEP-Division of Forestry, Metropolitan District Commission, and Torrington Water Company. The four oak management study areas were in Hartland, Hamden, West Hartford, and Winchester. Each study area had three 0.62-acre treatment plots: B-level thinning (traditional forest thinning), crop tree, and unmanaged. Each plot was located within a 3- to 5-acre area with similar treatment. The mature red oak sawtimber stands had no prior management and were 80 to 112 years old; upper canopy oaks averaged 17.2 inches in diameter at breast height. All trees larger than 4 inches were permanently numbered and measured annually for 5 years. Basal area was reduced from 138 ft^2/acre prior to harvest to 77 and 72 ft^2/acre on the B-level and crop tree management plots, respectively. For all size classes combined, basal area growth over the next 5 years was greatest in the crop tree plots, followed by B-level thinning, and finally unmanaged controls. Concurrently, sawtimber basal area growth did not differ among treatments and averaged 1.3 ft^2/acre/year, suggesting management can maintain stand volume growth rates. Relative to 5-yr diameter growth of upper canopy oaks on unmanaged plots (0.9 inches), diameter growth increased by 29 percent on B-level thinning and 54 percent on crop tree management plots to 1.1 and 1.3 inches, respectively. Diameter growth increase was related to degree of crown release. Completely released trees grew more than partially released trees, which in turn grew more than trees that were not released.

IMPACT: Crop-tree release provides a management tool to develop stands with a balanced age structure in public forests and for private forest owners for whom high forest cover and non-commodities attributes are important considerations. Connecticut Department of Environmental Protection, Forestry Division incorporated this research in the 96 acres of TSI treatment during 2009-2010.

Ninety percent of 120 attendees to a crop tree management webinar who collectively manage 1.3 million acres reported a moderate or significant knowledge change. Sixty-five of the attendees indicated that they will increase or implement components of crop tree management on stands within over 630,000 acres from Maine to Montana and from Mississippi to Maryland. In addition, they will take the following actions [annotated list]: “promote oak tree crop tree release, increase acreage under crop tree management (agency personnel); include Jeff's research in my silviculture class, emphasize crop tree management more in workshops (educators); apply crop tree release to more acres, modify recommendations I make to landowners, release on 4 sides in crop tree release (foresters); implement the crop tree concept on my acreages, actively manage my black birch, more aggressive (e.g. 4 sided) crop tree release (woodland owners).”

FOREST DYNAMICS

Disturbances to different canopy strata can have both short (<10 years) and long term (>20 years) effects on stand composition and structure. Most research has focused on short-term responses to disturbances, including forest management, as there are few published studies spanning more than a decade on the hardwood forest dynamics. Studying the trajectory of species composition and stand structure for periods longer than a decade is important because predictions based on short-term observations may, or may not, be accurate.

The Old-Series plots, established in 1926-27, provided a unique opportunity to document the effect of how different types of disturbance influence forest composition. Originally established to study the relationship between species and soil characteristics; these plots have chronicled slow, inexorable natural dynamics of Connecticut's second-growth forests.

During the summer of 2007 **Dr. Ward** completed the eighth inventory of The Old-Series plots. The four plots were located in stands typical of Connecticut's forests, i.e., stands which originated around the turn of the century, partly on land abandoned from agriculture and partly on land repeatedly cut for timber or fuelwood. The location, species, diameter, and crown classes of all woody stems > 0.5 inches dbh (diameter at 4.5 feet) were recorded on 13 acres of strip transects. Transects were measured at 10-yr intervals between 1927 and 2007, except for 1947, and includes records of 35,953 stems.

The objective of this research was to compare the effects of three distinct disturbance regimes (wildfire, repeated multi-year defoliations, and single-year defoliations) on forest composition and regeneration. Disturbances included a wildfire in 1932, single-year defoliations (1964, 1972, 1981), and multi-year defoliation episodes (1961-1963, 1971-1972, 1981). Wildfire reduced basal area by 46 percent. During the first defoliation period, oak basal area mortality averaged 36 (multi-year) and 12 percent (single-year). In 2007, oak density (stems per acre) on burned transects in 2007 was twice that observed on unburned transects, 90 and 42; while maple density was higher on transects that had had only single-year defoliations (190) compared with multi-year defoliation (119). In contrast, birch density was lower on transects with single-year defoliations (97) compared to multi-year defoliation (198). Oak ingrowth was highest following wildfire, 244 stems per acre per decade (SA_{10}), and was negligible during subsequent decades, 6 SA_{10}. Transects with multi-year defoliations averaged 80 birch SA10 compared with 44 maple SA_{10} between 1967-1997. During that same period, maple ingrowth averaged 35 SA_{10} and birch

ingrowth 14 SA_{10} following single-year defoliations. Disturbance type has a long-term impact on forest composition.

Our observations indicate that maintaining oak will require active management, such as prescribed burning, mowing, or herbicide to allow development of oak regeneration competitive with maple, beech, and birch prior to a disturbance that removes the upper canopy. Partial cutting and other disturbance similar to multi-year defoliation episodes benefit non-oak species and should be minimalized in stands where management objectives include maintaining an oak component. Until there is change towards more active management and less partial cutting, oak will continue to decline and these forests will become increasingly dominated by more mesophytic species.

As with the shift from chestnut to oak forests in the early 1900's, the emergence of a forest dominated by mesophytic hardwoods will alter the economic, ecological, and esthetic values of the forest. The consequences of these changes will last well into the 21st century. Historically, oak has been more economically valuable than maple and birch for its higher price, lower cull rates, and higher per acre volume growth. The shift from oak will also affect many wildlife and insect populations - discriminating against those species dependent on oak and favoring those species associated with maple and birch. Changes in esthetic values are important because of increased public utilization of the forested landscape for both home sites and recreation. The leaves and flowers of maple and birch are more colorful than oak. However, faster growing oaks and pines are more likely to have the "big tree" characteristics that the public associates with mature forests.

POTENTIAL IMPACT: The quality and variety of forest resources available to future generations depend on the dynamics of forest composition. The Connecticut Agricultural Experiment Station, in cooperation with CT DEP-Division of Forestry and local non-profit organizations, is examining forest dynamics in four unmanaged forests. This research will allow managers of forest preserves to make more precise predictions of compositional change. Findings from the research on natural change have been disseminated via thirteen media interviews and over talks and field tours.

JAPANESE BARBERRY CONTROL

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.

Japanese barberry is listed as invasive in 20 states and 4 Canadian provinces and is associated with enhanced population densities of blacklegged ticks that can transmit the causal agent of Lyme disease. **Drs. Jeffrey Ward and Scott Williams** continued their studies of alternative methods to control Japanese barberry, which began 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. The barberry control study now includes 149 plots at 28 study areas that has examined 55 treatment/timing options. This year we will highlight two studies: one that examined treating barberry with directed heating using propane torches and another that examined barberry control during the dormant season with herbicides.

Propane study: In 2008, we began a study to examine effectiveness of directed heating using 400,000 BTU backpack propane torches to control Japanese barberry infestations at study areas in Redding and North Branford. This was a collaborative study with the Propane Education and Research Council, South Central Connecticut Regional Water Authority, Aquarion Water Company, The Nature Conservancy, and CT-DEP, Division of Forestry. Each study area had eight 0.62 acre plots. Treatment combinations included a pre-leafout or post-leafout initial treatment with propane torches to reduce the size of established clumps and an early (late June), mid (early July), or late (late July) follow-up treatment to kill sprouts that developed from surviving root crowns. All treatment combinations were equally effective and reduced barberry abundance (a surrogate for cover) from 31% prior to treatment to only 0.5% the following autumn, i.e., a 98% reduction. All treatment combinations were also equally effective in reducing the size of surviving barberry to an average of only 4 inches compared with 29 inches for untreated clumps. Estimated labor costs using propane torches for both initial and follow-up treatment was 1.0 hour/acre for every 1% pretreatment abundance; e.g., 10 hours for a 1-acre stand with 10% abundance. Because timing of initial treatments (pre-leafout vs. post-leafout) and follow-up treatment (early, mid, late) were equally effective in reducing Japanese barberry abundance and height of surviving stems, initial treatments can be completed from March-June and follow-up treatments can be completed from June-August in southern New England. For habitat restoration projects on properties where herbicide use is restricted, directed heating with propane torches provides a non-chemical alternative that can effectively control invasive Japanese barberry

Dormant season treatments: In 2008, we began a study in Mansfield to examine the efficacy of treating barberry infestations during the dormant season (Oct-Mar). Our earlier research has shown that effective barberry control can be accomplished from late spring through early autumn by a variety of chemical methods. This was a collaborative study with the Town of Mansfield and USDA-NRCS. Dormant season techniques included basal spray (triclopyr in oil) and clearing saw cutting with a 'wetblade' application of triclopyr. Dormant season techniques were compared with a glyphosate foliar spray during the growing season (Sept). Foliar application resulted in a greater reduction of barberry cover than basal spray and wetblade treatments during

the dormant season, 94, 84, and 74 percent reductions, respectively. Treatment effectiveness did not differ among months for either of the dormant season techniques. Labor costs did not differ among techniques - averaging 0.13 hours/acre/percent cover; i.e., 3.9 hours for a 1-acre stand with 30% barberry abundance. There was a large difference among treatments in amount of herbicide applied: 0.6, 1.4, and 2.8 ounces/acre/percent cover for wetblade clearing saw, foliar spray, and basal spray applications, respectively. While not as effective as foliar spraying, wetblade clearing saw and basal spray applications provide an opportunity to control barberry during the dormant season. Additionally, the wetblade clearing saw technique can reduce the amount of applied herbicide.

IMPACT: To improve drinking water quality and reduce the risk of exposure to Lyme disease, water companies in Connecticut (Aquarion), Rhode Island (Providence Water), and Massachusetts (MDC) initiated or expanded their invasive control management efforts during the past year on nearly 150 acres. CT-DEEP, Forestry has expanded their efforts to control invasives by treating 6.5 acres in 2011. Land trusts that have continued or initiated barberry control include Aspetuck, Guilford, Haddam, Joshua, Lyme, and Salem.

Over 96% of 128 attendees to a barberry control webinar who collectively managed 2.2 million acres reported a moderate or significant knowledge change. In addition, they will take the following actions [annotated list]: educate public, promote more invasive species control (agency personnel); discuss issue in management seminars, share information with landowners (educators); start barberry eradication program for several clients, work at reducing more exotics, modify approach and techniques used to manage exotic (foresters); step up barberry control, kill all barberry on 40 acres, burn barberry as opposed to mechanically pulling it out, press adjoining neighbors to control their invasives (woodland owners).

THE LINK BETWEEN INVASIVES AND LYME DISEASE

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 blacklegged tick (*Ixodes scapularis*) and white-footed mouse (*Peromyscus leucopus*) survival. To determine mouse and larval tick abundances at six replicate sites, **Dr. Williams** has been trapping mice since 2007 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 permanent draglines within each

treatment area, retained, and were tested for the presence of *Borrelia burgdorferi*, the causal agent of Lyme disease in humans and pets.

To date, there have been 1,225 captured white-footed mice. 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 (6.3 larvae/mouse). Adult tick densities in dense barberry (125/acre) were higher than in both controlled barberry (64/acre) and no barberry (21/acre) areas. Ticks sampled from full barberry infestations and controlled barberry areas had similar infection prevalence with *B. burgdorferi*, 52 and 53% respectively. Adult tick infection prevalence with *B. burgdorferi* varied widely between treatments and study areas, but was lowest in areas where barberry was absent and generally lower where barberry was controlled. This in concert with the overall reduction in the adult tick cohort in areas where barberry was controlled resulted in 113 *B. burgdorferi*-infected ticks/acre in dense barberry, 49/acre where barberry was controlled, and 12/acre where barberry was absent.

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 terms effects of controlling Japanese barberry.

Impact: This research is not only of interest from an ecological perspective, but also serves to scientifically document the potential negative impacts an invasive plant can have on human health. This research has been featured on gardening websites and multiple forest land managers have used it to strengthen their argument for the increased need to control invasive plants. Results from this research will lead to improved interest in the control of invasives, and ultimately, a reduction in the number of ticks capable of causing Lyme disease in humans and domesticated animals.

Various entities within the towns of Redding, Weston, Easton, Guilford, Greenwich, Hampton, Mansfield, and Coventry and in the states of Massachusetts, Rhode Island, and New York have used these results in part to justify equipment purchase and initiate or reinvigorate invasive plant control programs. Additionally, numerous towns in Connecticut as well as the states of Delaware

and Maryland and the Province of British Columbia have used our research linking deer and invasive plants to scientifically justify their respective deer management programs.

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. We hypothesized that dense Japanese barberry infestations may retain humidity, resulting in increased abundances of blacklegged ticks, which require stable and humid conditions to survive. Therefore, temperature/relative humidity sensors were deployed from June-December 2008, 2009, 2010, again in 2011 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.

Sensor data analysis from 2008-2010 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. Additionally, 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 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 2011 and ticks and mice will continue to be sampled.

Impact: This research investigates the causal mechanism behind the increased abundances of blacklegged ticks found in Japanese barberry

infestations. By understanding this relationship, land managers can better target problem areas where Japanese barberry is most prevalent, which will ultimately lead to a reduction in the number of ticks capable of causing Lyme disease in humans and domesticated animals.

DEER DAMAGE STUDIES

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 spring of 2006, 2007, 2008, 2009, 2010, and 2011. Late summer sampling was conducted in 2005, 2006, 2007, 2008, 2009, and 2010 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 2011. Results from this study will reveal plant species composition and growth rates in the absence of browsing deer.

Impact: Overabundant herds of white-tailed deer negatively affect forest regeneration by repeated browsing. This in turn will negatively affect the future of the timber industry and other wildlife populations in Connecticut. The Nature Conservancy in Connecticut uses these data to scientifically justify and document the results of their deer management program by educating their constituency on the negative impacts of overabundant white-tailed deer on the very forest flora and fauna they are charged with protecting. The Nature Conservancy also uses these data as a benchmark with which to monitor and compare noticeable browse damage on other properties which may require deer reduction.

Deer Repellent Trial on Hosta: A deer repellent trial conducted on Japanese yews (*Taxus cuspidata* 'Densiformis') by **Drs. Ward** and **Williams** in 2007 revealed that some commercially available deer repellents were more effective than others. In general, repellents that were applied more

frequently performed better. However, because more product is used during such an application schedule, efforts can get expensive for homeowners. In 2011, **Dr. Williams** launched a deer repellent study on *Hosta* (*Hosta hosta* 'Francee') that initially was intended to investigate the effectiveness of repellent formulations that could be made relatively inexpensively in a homeowners kitchen. However, two Connecticut-based commercial deer repellent manufacturers sponsored research efforts to test their products as well. As a result, **Dr. Williams** is testing 10 different commercially available products and 6 homemade formulations, a physical fence, and no protection each on 12 *Hosta* at two locations (432 *Hosta* total). Results should be available at the end of the 2011 growing season.

Impact: Browse damage from overabundant herds of white-tailed deer cause the Connecticut nursery and landscape industry $1.5-$2 million in direct damages to plants prior to sale at nurseries and garden centers as well as $1 million in lost sales to homeowners discouraged by repeated deer damage annually. Effective repellents can cost homeowners up to $7.00/plant/growing season. If a homemade repellent formulation was 75% effective, it would save homeowners nearly $700/100 plants treated and could limit nursery loses by $1.1-$1.5 million and could improve sales by $750,000 annually.

Rehabilitated Fawn Survival and Behavior: Working collaboratively with Mr. Michael Gregonis of the Connecticut Department of Energy and Environmental Protection, **Dr. Williams** is researching survival and dispersal of pen-raised white-tailed deer fawns. Every year, a number of fawns are removed from the wild by well-intentioned, but misinformed members of the public and are raised by licensed wildlife rehabilitators. In the past, fawns were released back into the wild and their fate was unknown. Last year, Mr. Gregonis and **Dr. Williams** radio-collared 19 fawns at three locations. Thirteen fawns were subjected to a hard release, in which fawns were transported to state forests and released. The remaining 6 fawns were subjected to a soft release, in which the pen door was opened and some food and water were provided. After 36 days, all 13 hard release fawns had died from various causes. After 85 days, all soft release fawns were dead. A similar study will occur in fall 2011. It is likely that the majority of fawns entered into this program are not orphaned at all, rather plucked from the wild while waiting for the doe to return.

Impact: Pen-raising wild white-tailed deer fawns by hand domesticates them. Releasing them into the wild as domesticated stock incurs a survival rate of zero. This research will be used to inform members of the Connecticut public to leave fawns in the wild as removing them will likely result in death.

DEPARTMENT OF PLANT PATHOLOGY AND ECOLOGY

The mission of the Department of Plant Pathology and Ecology 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. Our diverse basic and applied research programs seek a better understanding of the biology and ecology of plant pathogens and interactions between plants, pathogens, and the environment. Our services focus on the diagnosis of plant health problems for all Connecticut residents, including homeowners, plant care professionals, and commercial growers. The Department also 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.

RESEARCH ACTIVITIES

Bacterial spot of stone fruits

Dr. Robert E. Marra's project on bacterial spot of stone fruits is focused on the development of a biological control method against bacterial spot, caused by the bacterium, *Xanthomonas arboricola* pv. *pruni* (Xap), one of the prominent diseases in southern New England, particularly of peach and nectarine. The strategy being tested is whether we can use a bacteriophage, a natural viral enemy of the pathogen, to protect plants from infection and reduce the severity of the disease. We demonstrated last year that all of 43 phage strains isolated from peach orchards in Connecticut, New York, and Massachusetts are genetically identical. This absence of phage diversity may pose problems for long-term sustainability as a biocontrol, as the bacterium can become resistant fairly rapidly.

Nonetheless, we have been attempting to perform inoculations with the Xap bacteria on greenhouse peach trees (variety O'-Henry, highly susceptible) in pots. This year, we experimented with a "detached branch" assay, in which branches from the potted O'-Henry peaches were excised and immediately placed in water in flasks, then sustained in the growth chamber, inside humidity tents, under a regime of 27C and 12/12 hours day/night. Using 3-5 such flasks for one treatment, and another 3-5 flasks as negative controls, we attempted inoculations of the branchlets with suspensions of the Xap bacteria. We have had intermittent success with this assay, but cannot reliably produce symptoms.

In spring 2010, three orchards of 49 peach trees, variety, Sweet Dream, were planted at the Station's three research farms, Lockwood, Windsor, and Griswold. This variety is considered desirable in southern New England, but is too susceptible to Xap to be economically feasible. The trees were pruned in spring 2011 using an open center training technique, and any dead trees were replaced. Once they become established, these trees will be used for field tests on control of Xap.

Bacterial Spot continues to be a significant economic problem for peach growers in Connecticut, which results in losses in quality and quantity of fruit. Multiple sprays are applied for control of this

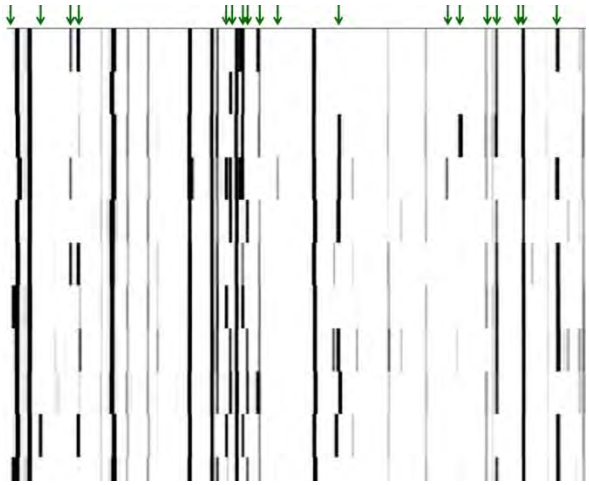
disease every year, which are costly and potentially phytotoxic to the trees. Research to develop biological control using a naturally occurring bacteriophage would qualify as organic disease control, making it a very desirable option for orchardists and lead to increased profits for Connecticut growers.

Genetic variation and dispersal dynamics in* Fusarium palustre*, associated with Sudden Vegetation Dieback in salt marshes of eastern United States

In order to elucidate patterns of dispersal of the newly described *Spartina* pathogen associated with wetland dieback, *Fusarium palustre*, **Dr. Robert E. Marra** initiated a genetic analysis of a collection of 90 isolates ranging from Louisiana to Maine (collection of **Dr. Wade H. Elmer**). Using Amplified Fragment Length Polymorphisms (AFLP), Dr. Marra has discovered an unexpected amount of genetic variability.

This procedure exploits the Polymerase Chain Reaction (PCR) in scanning the entire genome for polymorphic restriction-enzyme sites; i.e., those that may be present in some isolates but absent in others, manifesting as the presence or absence of a DNA fragment. The DNA fragments generated by the PCR are fluorescently labeled, then separated, based on size, using equipment at Yale University's DNA Facility. Data are then analyzed with software developed for this purpose.

The figure below presents AFLP data for one set of selective primers used on a subset of 12 isolates ranging in origin from Louisiana to Maine. This figure represents only a portion of the entire AFLP profile extending from 75bp to 500bp. Polymorphic fragments are indicated by the green arrows; monomorphic fragments serve an important function in "anchoring" the data. While not pictured here, it is important to note that fragment patterns are identical among replications on the same isolates, confirming the reproducibility and robustness of the assay. Polymorphic markers identified using subsets of isolates such as these will be used to analyze genetic variation within and among sites, and to test hypotheses on the dispersal dynamics of this important pathogen.



Fusarium palustre AFLP loci (polymorphic fragments indicated by green arrows).

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

Dr. Robert E. Marra's research on Perennial Canker (also known as Neonectria canker) continues to focus 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, principally the mating structure and the ecology of spore dispersal, and its interactions with its hosts, particularly black birch (*Betula lenta*). DNA from cultures obtained from infected bark and wood from various parts of Connecticut and the eastern United States 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.

This research utilizes a set of 13 microsatellite markers that were shown in earlier work to be highly polymorphic within and among sites in Connecticut and Massachusetts. The microsatellite markers are now being used to study a metapopulation consisting of two noncontiguous research sites in West Rock Ridge State Park. 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.

The data acquisition phase of this research is nearly complete, and the analysis has just begun. The results confirm an earlier hypothesis that *N. ditissima* has a mixed mating system, albeit one in which selfing, not outcrossing, is the predominant mating mode. A predominance of selfing was unexpected, given that our previous work showed that there is a high degree of genetic variability among cankers (each maternal canker has a unique 13-locus genotype), from which one would reasonably hypothesize that the population exhibits a high degree of outcrossing. Our previous analysis of the maternal cankers resulted in an inability to reject a null hypothesis of random mating; the current analysis refutes this. This seeming contradiction suggests that dispersal dynamics of this fungus are complex, and require further study.

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 mating system will shed light on the fungus' dispersal patterns, a critical precedent to the development of a biocontrol program.

Biochar, earthworms, and disease suppression

Dr. Wade H. Elmer has shown that biochar, a fine-grained, charcoal-like product, will suppress Fusarium crown and root rot of asparagus when added to soil. He conducted a series of greenhouse studies that demonstrated that when biochar was incorporated in soil naturally infested with the pathogenic *Fusarium* spp., it resulted in increased asparagus plant weights and suppressed disease. The effect was linearly proportional to the biochar rate. When toxic allelochemicals were added to the soil, colonization by mycorrhizae was reduced, but the effect was reversed when biochar was added. Biochar may suppress disease by absorbing toxins in the soil, increasing mycorrhizal colonization in the roots and

allowing the densities of fluorescent pseudomonads to proliferate in the rhizosphere. These beneficial microbes help to suppress disease.

Since biochars can vary depending on the feed stock, temperature, speed of pyrolysis, and age, **Dr. Elmer** initiated another series of experiments comparing different types of biochar for their effect on asparagus growth. CQuest®, Agrichar® (Best Energies, Inc., Madison, WI), Soil Reef® (EcoTechnologies Group, LLC, Berwyn, PA), and Pure Black, and three different biochars (Encendia Inc., New Haven, CT), were compared in greenhouse experiments for their effect on Fusarium crown and root rot of asparagus. All biochar behaved similarly and reduced colonization and the number of root lesions.

Dr. Elmer's previous research demonstrated that vegetables grew better and had less root diseases when the soils were augmented with adult earthworms. Based on these data, he proposed that earthworms might be used to provide delivery of beneficial products, like biochar, to the lower soil horizons, particularly in perennial plantings, where root systems cannot be easily manipulated after planting. Experimental field plots of asparagus were established in 2010 at Lockwood Farm, the Valley Laboratory, and the Griswold Research Center, and designed to examine the individual and combined effects of earthworms and biochar. Earthworms were reapplied to all plots in 2011. Although yield will not be taken until 2012, Dr. Elmer has observed that the vigor of asparagus fern growth is enhanced when biochar and earthworms were combined.

Additional plots were established at Lockwood Farm in June 2011 to examine the combined effects of earthworms and biochar on another host pathogen system, Verticillium wilt of eggplant. The experiment is in progress, but Dr. Elmer has observed that plants are generally larger in plots treated with earthworms and biochar than in control plots.

Earthworm being applied to asparagus soil (left) and asparagus plot after biochar was applied (right).

A toddler watches as Peter Thiel applies earthworms to an asparagus plot at the Griswold Research Farm (left); the toddler proudly shows his earthworm (right).

Dr. Elmer also conducted experiments to determine whether or not earthworms discriminated against the different types of biochar. Earthworms were placed in bins and fed eight different sources of biochar. Results demonstrated that the oldest, most weathered biochar was the most palatable to the earthworms and the CQuest biochar was the least palatable.

Growth in an asparagus plot without earthworms or biochar (left) compared to growth in an asparagus plot treated with earthworms and biochar (right).

Impact. These studies may provide evidence that earthworm activity can redistribute surface biochar applications to improve soil health and suppress soilborne diseases of annual and perennial crops, and may provide environmentally-friendly and sustainable suppression of foliar pathogens. It also highlights the many factors affecting the successful implementation of this technology.

Suppressing Pythium root rot with partial soil saturation and silicon nutrition in a flooded floor greenhouse

Use of ebb & flow recycled watering systems is increasing in Connecticut greenhouses to conserve water and fertilizer and to minimize run-off into the environment. However, a major disadvantage of recycled watering is the potential for disease outbreaks and the development of fungicide-resistant pathogens. A joint project with **Drs. Wade H. Elmer, Martin P. N. Gent**, **Rich McAvoy** (University of Connecticut), and **Joe Geremia** (Geremia Greenhouse, Yalesville, CT) previously found that disease was significantly reduced when plants received partial saturation as compared to standard saturation in a flooded floor greenhouse. In 2010, additional experiments were initiated to determine if combining silicon nutrition, which had previously been demonstrated to influence resistance to disease, with partial saturation could increase resistance to Pythium root rot of poinsettias. Our first year of data showed that applying silicon reduced Pythium root rot in the standard (wetter) irrigation treatment, but did not affect disease in plants in the partial saturation treatment. Experiments with zinnias are planned for fall 2011.

Impact: Partial saturation, combined with nutrition, offers great value to growers who use ebb & flow irrigation systems. These findings should encourage growers to adopt partial saturation and new fertilization regimes when using ebb & flow irrigation in order to reduce damage from disease once *Pythium* inoculum is present.

Sudden Vegetation Dieback

Sudden Vegetation Dieback (SVD) continues to occur along Connecticut's shoreline and most new sites appear to be proximal to established SVD sites. Results from a three-year survey (2007-2009) led **Dr. Elmer** to conclude that the incidence of *Fusarium* spp. colonizing *Spartina* plants was greater in sites where SVD had occurred. Although most isolates of a newly described species, *F. palustre,* were virulent, there is little evidence that Fusarium alone could cause SVD. Laboratory studies have shown that *F. palustre* is more tolerant to salinity than morphologically similar species that occur on corn, indicating that *F. palustre* may have co-evolved with salt marsh plants and adapted to saline environments.

Grazing pressure by the purple marsh crab, *Sesarma reticulatum,* may be affecting recovery from SVD sites. Using pitfall traps, we found that crab densities were not statistically significant from sites where plants were recovering from SVD. We hypothesized that another stressor may be enhancing the palatability or attractiveness of *Spartina* plants to the marsh crabs.

Sudden Vegetation Dieback along a tidal creek in Madison, CT.

The purple marsh crab (*Sesarma reticulatum*).

To determine if these crabs were more attracted to stressed *Spartina* plants than healthy ones, we reared adult crabs in captivity and gave them a choice of a stressed or non-stressed plant. Plants were stressed by imposing drought and inoculating with *F. palustre*. Crabs subsequently fed on stressed, diseased plants more than on healthy plants. Greenhouse experiments were then designed to examine drought-stressed, flood-stressed, and healthy (control) plants that were either inoculated with *F. palustre* or left uninoculated. In each bin, five crabs were allowed to choose between one or two plants. Crabs preferred, in declining order, drought-stressed (either inoculated or uninoculated), inoculated plants with no drought stress, uninoculated plants with no drought stress, or flooded plants (either inoculated or uninoculated).

These findings suggest that a temporary drought and/or infection by *Fusarium* may predispose *Spartina* plants to be more palatable to the crabs. *In situ* experiments are currently in place to study if crabs in naturally-occurring SVD sites prefer drought stress and/or inoculated plants to healthy plants.

***Impact*:** This research is providing insights into the critical factors associated with marsh grass recovery in SVD sites and will lay the framework for understanding the relevant contribution of herbivores and plant pathogens to an ecosystem-based approach for restoration and management.

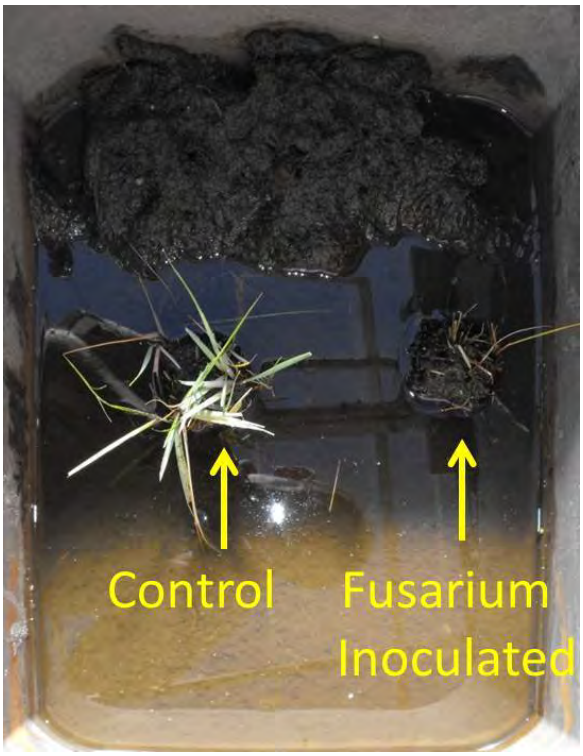


Photo of an experiment in which purple marsh crabs (not visible) were given a choice of feeding on a healthy plant (control) or a plant inoculated with *Fusarium palustre.* Crabs clearly preferred feeding on inoculated plants.

Integrated Pest Management for winegrapes in New England

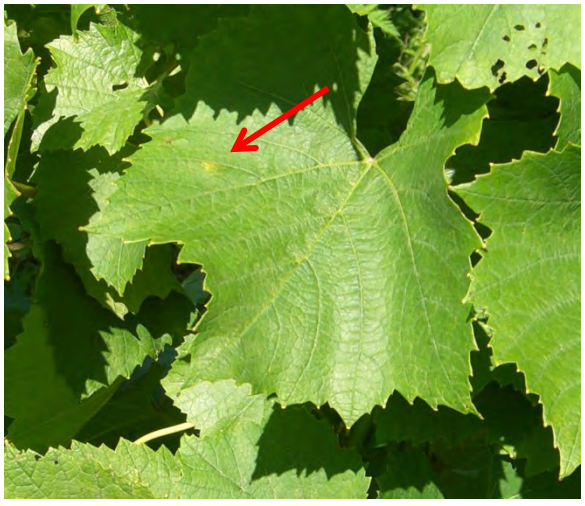
Dr. Francis J. Ferrandino is continuing his work on diseases of winegrapes. This involves both an extension and a research component and is being accomplished through a collaboration of scientists and technicians at CAES, UMASS, UCONN, and URI. Between December 2008 and April 2009, 7 cell phone-based, 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. Dr. Ferrandino also communicates information about his research with diseases of grapevines to winegrape growers. These events provide much-needed feedback so that Dr. Ferrandino can adjust his research program to more efficiently address the growers' needs. He also regularly scouts experimental vineyards and makes frequent site visits to commercial vineyards in order to train growers to detect the first signs of disease. This information is passed on to growers, who are then better able to spot the onset of disease.

Impact: Disease-risk information alerts the growers to possible disease problems to look for in the vineyard. Using information about local weather events and inoculum levels to predict conditions that are

favorable for infections, winegrape growers are able to eliminate unneeded fungicide applications, while maintaining the economic value of the crop. The short-term benefits of eliminating one fungicide application can save a winegrape grower approximately $55.00 per acre (~$40.00 in cost of fungicide + ~$3.00 in cost of fuel + ~$12.00 in cost of labor per acre). When these savings are multiplied over the season, they factor into substantial saving for the winegrape grower. The long-term benefits associated with fewer fungicide applications include minimizing the potential for fungicide resistance to develop in the powdery mildew fungus, more responsible environmental stewardship, and protecting the health of both the vineyard worker and the consumer.

Dr. Ferrandino changes a battery for a weather station deployed within a Chardonnay vineyard located in Newport, RI.

Dr. Ferrandino gives presentations about his research to winegrape growers in CT, MA, and RI.



Early symptoms of downy mildew on grapevine are subtle yellow spots on the upper surface of the leaf (arrow).

When the leaf is turned over, however, white sporulating areas are clearly visible (arrow).

Mathematical models of plant disease epidemics

Dr. Francis J. Ferrandino is continuing his theoretical investigations on the relation between the form of mathematical models describing plant disease development in time and plant disease spread in space. This work involves detailed investigations of the connections between sporulation progress curves and the temporal development of the resultant plant disease epidemic, as well as how the shape of the inoculum dispersal distribution affects the resultant spatial distribution of plant disease. The confirmation of theoretical models depends on detailed temporal and spatial sampling of plant disease. Dr. Ferrandino is continuing his spatio-temporal assays of grape powdery mildew and other pathogens in vineyards, powdery mildew in ornamental and vegetable crops, as well as detailed examination of the spread of foliar blights in tomato, pepper, eggplant, muskmelon, and pumpkin plantings.

Impact: Mathematical models of plant disease with parameters, which are directly determined using field data, are essential in evaluating the efficacy and economic and environmental sustainability of IPM programs.

Environmentally-friendly control of powdery mildew on landscape plants and general fruit and foliar pathogens on vegetable crops.

Dr. Francis J. Ferrandino is extending 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) to common vegetable crops planted in the home garden (tomato, pepper, eggplant, muskmelon, and pumpkin). All foliar and fruit pathogens are being monitored on the vegetable plants. The alternatives to conventional chemical controls include sprays of cow's milk, compost tea, horticultural oil, and potassium bicarbonate products. The results from 2008 and 2009 suggest that stylet oil offered the best protection for lilac--it delayed the time when 50% of the lilac leaves were infested by three weeks. In 2010, powdery mildew was observed on monarda, phlox, and lilac by 22 July; however, disease levels were too low to evaluate the efficacy of the various sprays. In 2010, milk-based sprays were shown to reduce the incidence of anthracnose on plum tomato fruit and the severity of powdery mildew on muskmelon. This year, so far, disease levels are too low to evaluate the efficacy of the various sprays.

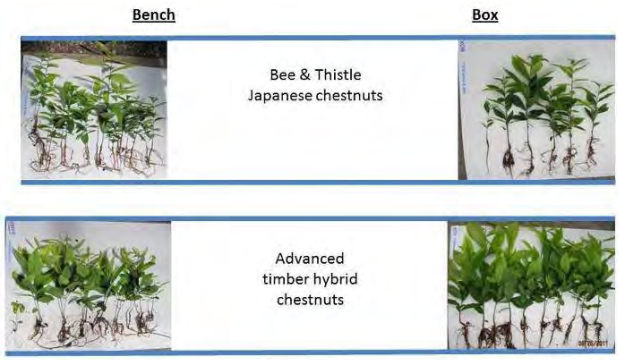
Spray trials on muskmelon at Lockwood Farm (30 August 2010). The best powdery mildew control was obtained with milk-based sprays (blue) and conventional chemical fungicide (black).

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

Chestnut breeding for orchard and timber trees

Dr. Sandra L. Anagnostakis is working with Dr. Scott Schlarbaum at the University of Tennessee to compare chestnut tree growth and survival after starting seeds under two systems. Over 8,000 seeds were collected from eleven chestnut trees, including 1,125 that were the results of hand pollination. These were divided between the Univ. of Tennessee nursery beds and a Root Production Method® planting at the Forrest Keeling Nursery in Elsberry, MO. The resulting trees will be planted in "comparison plots" in three Connecticut locations (northwest, central, and southeast), two in Pennsylvania, and one at West Point in New York. A preliminary experiment in the CAES greenhouse showed that air-pruning the roots (growing with an open screen bottom) produced trees with much healthier root systems. The trees will be examined yearly for three years, and growth and disease resistance recorded. Precocity in nut production will also be noted.

This project will further progress toward restoration of American chestnut as a usable timber tree in North American forests and will support the utilization of chestnut as a specialty nut crop for the American marketplace.



Chestnut seedlings produced in a greenhouse bench with a solid bottom (left) and in a box with an open screen bottom exposed to the air (right).

CAES chestnuts being sorted for planting at the Forrest Keeling Nursery in Elsberry, Missouri, in January. Dr. Scott Schlarbaum is standing at the back, left.

CAES chestnuts in the hoop house at the Forrest Keeling Nursery in June 2011.

CAES chestnuts in the Univ. of Tennessee's nursery bed.

Butternut Canker Research

Trees in Connecticut reported to be butternuts (*Juglans cinerea*) have been examined by **Dr. Sandra L. Anagnostakis** over the past few years in a search for butternut canker disease caused by *Ophiognomonia clavigignenti-juglandacearum* (formerly *Sirococcus clavigignenti-juglandacearum*). So far, 180 trees have been visited and only five true butternuts found (four in one location). At Lockwood Farm, we have planted 150 seedling butternuts, Japanese walnuts, and hybrids for our tests of virulence, and the inoculation done last winter showed that some of the Japanese walnuts were just as susceptible to this pathogen as the butternuts. This suggests that planting random hybrids between the two species is not the solution to restoring butternuts to the forest.

A multi-state project on this disease problem has involved scientists in Pennsylvania, Iowa, Vermont, Indiana, and Connecticut on a State and Private Forestry grant. Stem samples from 26 trees in Pennsylvania and 26 trees in Iowa were sent to us under quarantine, and tested in the lab for their resistance to *O. clavigignenti-juglandacearum.* We found that there were significant differences between them, with the Iowa stems being much more susceptible to pathogen growth than the Pennsylvania stems. Some of the stems received had obvious cankers, and isolations revealed one *Melanconis juglandis* and one *O. clavigignenti-juglandacearum* on the stems from PA, and one *Melanconis juglandis* and five *O. clavigignenti-juglandacearum* on the stems from Iowa.

The goals of the project are to further progress toward restoration of butternut as a usable timber tree in North American forests and to support the utilization of butternuts as a specialty nut crop for the American marketplace.

Stems from three Pennsylvania butternut trees inoculated in the CAES lab with five strains of *Ophiognomonia clavigignenti-juglandacearum*, showing differences in the growth of the pathogen on different source stems.

Ramorum Blight/Phytophthora ramorum

Dr. Marra has been working with **Dr. Douglas** in supervising the implementation of USDA-mandated assays for detection of *P. ramorum* on nursery material shipped from California, Oregon, and Washington. Nursery surveys, trace forwards, and trace backs are conducted in cooperation with **Dr. Victoria L. Smith** and state inspectors. The screening process begins with a serological test called ELISA (enzyme-linked immunosorbent assay), which detects all *Phytophthora* species. The assays are performed by summer research assistants under the supervision of Drs. Marra and Douglas. If a sample tests positive by ELISA, Dr. Marra extracts DNA from it and then analyzes for *P. ramorum*–specific nucleotide sequences using two real-time PCR assays.

The Molecular Plant Disease Diagnostic Laboratory was given Provisional Approval Status as part of the National Plant Protection Laboratory Accreditation Program (NPPLAP) for *P. ramorum* by APHIS-PPQ and, in March of 2011, **Drs. Marra and Li** were certified in the 2011 Proficiency Testing Program for two real-time PCR assays.

***Impact*:** *P. ramorum* is a pathogen of 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 Connecticut's significant horticulture industry, which at over $1 billion in annual production ranks Connecticut among the ten largest in the country and contributes to more than half of the total agriculture in the state. Nurseries found to have plants infected with *P. ramorum* are effectively quarantined until rigorously demonstrated to be clear of the pathogen, a process that can take several months. Therefore, Ramorum Blight, independent of its impact on our forests and landscapes, can have a significant impact on the state's economy. Many of the most susceptible hosts—eastern red oak,

northern white oak, rhododendron, lilac, mountain laurel, and viburnum, to name a few—are significant parts of the nursery industry as well as Connecticut forests and landscapes. Given that the eastern United States, including Connecticut, is considered at high risk for *P. ramorum*, based on host distribution and climate, concern over the possible release of the pathogen into the environment is warranted. Through the Molecular Plant Diagnostics Laboratory (MPDL), Dr. Marra's goal is to accelerate and refine our ability to identify *P. ramorum* in infected plants from the nursery, garden center, forest, and landscape, greatly increasing our chances of averting a Ramorum Blight epidemic. Additionally, the molecular diagnostic techniques being used and under development in the MPDL will continue to enhance the disease diagnostics services provided to Connecticut's stakeholders.

Noteworthy diseases

Noteworthy plant health problems:

Environmental stress associated with weather extremes contributed to significant health problems on woody ornamental trees and shrubs in the landscape, on forest trees, and on herbaceous plants. **Dr. Sharon M. Douglas** reported that drought and heat were of primary concern in summer 2010. By the end of the growing season, Growing Degree Days (GDD) for 2010 were approximately 3 weeks ahead of the 30-year average; in contrast, precipitation was well below the 30-year average. Records were set with several heat waves during July as temperatures reached well over 90ºF, and these conditions were complicated by drying surface winds. Heat and drought stress resulted in symptoms on many woody ornamentals including drought-sensitive species such as dogwood, maple, ash, and hemlock, as well as species that are normally considered drought-tolerant such as pine, juniper, and *Prunus*. New transplants were particularly hard-hit, but established trees and shrubs were also affected. Symptoms began to appear by mid to late summer. These included marginal scorch, tip and branch dieback, premature leaf and needle drop, and, in extreme cases, plant death. In many cases, damage from drought was exacerbated by poor planting practices, soil and site conditions, and poor cultural care. Drought also appeared to affect leaf drop, as evidenced by two extremes: many woody ornamentals defoliated prematurely and dropped both green and brown leaves (particularly white ash), whereas others (crabapple and Japanese maple) held onto their leaves well beyond the "normal" drop period. Herbaceous ornamentals were also affected as were fruits and vegetables. Plantings without irrigation showed reduced size and quality. Where irrigation was used, many ponds were pumped dry.

The second weather extreme occurred in the winter of 2010-2011. Records were set for snowfall and the impact of this harsh weather was evident in most ornamental plantings. The extent and severity of the injuries observed this year were greater than usual since most of the woody ornamentals were substantially weakened by drought stress from the previous summer. Winter injury and desiccation were evident on many broadleaved and needled evergreens, particularly hemlock and rhododendron, although juniper, pine, and mountain laurel were also affected. Symptoms varied from leaf/needle discoloration and drop to tip dieback and branch death. Physical cracking and damage from the weight of accumulated snow and ice was also evident throughout the state, especially on arborvitae and juniper.

Damage from de-icing salts and vole activity were significant secondary effects of the harsh winter and began to show up in early spring. De-icing salts injured plants in two ways: through direct contact of foliage with salt solutions in the "spray zone" along roadways and through the

accumulation of salts in the soil and subsequent uptake of these salts by plant roots. Conifers are very sensitive to de-icing salts and hemlocks, pines, and junipers planted along roadways began to exhibit symptoms once growth resumed in early spring. Among these symptoms were needle bronzing and browning, needle drop, and tip and branch dieback. Symptoms on salt-sensitive deciduous trees near roadways were also diagnosed on many species including sugar maple, beech, and crabapple. The extended snow cover also provided conditions favorable for vole activity, primarily the meadow vole. Once the snow began to melt in spring, the after-effects of this pest were evident in lawns and landscapes. This pest caused damage in orchards, Christmas tree plantations, forests, landscapes, and nurseries by girdling seedlings, ornamentals, and mature trees. Damage occurred as the voles fed and gnawed on stems close to the ground. When this gnawing completely girdles the stem, the plant dies. As a consequence, symptoms can vary from sudden, "unexplained" dying to a general, slow decline. Voles were also pests during the growing season as they consumed a variety of annual flowers, flower bulbs, and vegetables.

Disease survey

Dr. Yonghao Li, Dr. Sharon M. Douglas, and **Ms. Mary K. Inman** diagnosed a wide range of plant health problems for homeowners, commercial growers, plant care professionals, and government and cooperative extension personnel during the past year. Fungal, bacterial, and abiotic diseases were prevalent on many trees, shrubs, flowers, lawn grasses, fruits, and vegetables. Diseases caused by viruses and nematodes were also identified on some hosts.

Weather, including dry conditions in summer 2010, record-breaking snowfall in winter 2010-2011, and cool and rainy weather conditions in early spring 2011, all contributed to plant health issues.

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

A wide range of diseases was identified on perennials and annual flowers this season. Common diseases and hosts were downy mildew on alyssum, coleus; Botrytis blight on cranesbill, Oriental lily, peony, phlox, sedum, and tulip; bacterial leaf spot on geranium, impatiens, and poinsettia; powdery mildew on chelone, goldenrod, and peony; rust on chrysanthemum (brown rust), goldenrod, and violet. The virus diseases on herbaceous plants were hosta infected with tobacco rattle virus and hosta X virus, and begonia infected with impatiens necrotic spot virus. Some other fungal diseases were Heterosporium leaf spot on columbine and iris; Ascochyta leaf spot on actaea; Fusarium wilt on chrysanthemum; anthracnose and Southern blight on hosta; Didymellina leaf spot on hosta; Southern blight, Septoria leaf spot and Southern blight on rudbeckia; Cercospora leaf spot on statice; Septoria leaf spot and smut on trillium.

Botrytis blight of tulip

Botrytis blight of lily

Brown rot and fungal leaf spot were the most prevalent diseases on cherry trees because of the wet, cool weather conditions in spring 2011. Other common diseases that were identified on broadleaf woody ornamentals were anthracnose on maple, oak, beech, dogwood, tuliptree, and ash; rust on amelanchier, crabapple, and hawthorn; powdery mildew on dogwood, hackberry, ninebark, maple, oak, magnolia, rose, and lilac; Botryosphaeria canker disease on dogwood, lilac, rhododendron, mountain laurel, cherry, rose, crabapple, and holly; wetwood on maple and horsechestnut; Armillaria root rot on holly, boxwood, and rhododendron; bacterial leaf spot on forsythia, cherry, maple, hydrangea, philadelphus, and willow. Fungal leaf spot diseases that were identified on woody ornamentals were Entomosporium leaf spot of amelanchier, Septoria leaf spot of birch, scab and frogeye leaf spot of crabapple, spot anthracnose of dogwood, Entomosporium leaf spot of hawthorn, Cercospora leaf spot of hydrangea, Phyllosticta leaf spot of maple, fungal leaf spot of honeylocust, fungal leaf spot of inkberry, Cercospora leaf spot of privet, Cercospora leaf spot of leucothoe, black spot of rose, Cercospora leaf spot of mountain laurel, Tubakia leaf spot of oak, Phyllosticta leaf spot of hickory, and Macrophoma leaf spot of lilac.

Some other diseases were ash with ash yellows and Phytophthora canker, azalea with leaf gall, beech with Phytophthora bleeding canker, boxwood with Volutella blight, cherry with black knot, dogwood with slime flux, elm with black spot and Dutch elm disease, filbert with eastern filbert blight, forsythia with Fusarium wilt, lilac with Pseudomonas blight and Phytophthora canker; maple with Diplodia blight, Cryptosporiopsis wood rot, Phomopsis blight, and Verticillium wilt; mimosa with Fusarium wilt, pachysandra with Volutella blight, pieris with Phomopsis canker, redbud with Verticillium wilt, rhododendron with Phytophthora root rot and Phomopsis canker, and wisteria with wood rot.

Downy mildew of rose

Phyllosticta leaf spot of maple

On conifer species, canker, dieback, and needlecasts were prevalent diseases in this season. The hosts and diseases included arborvitae with Botryosphaeria canker, Phomopsis dieback, and Pestalotiopsis dieback; cypress with Botryosphaeria canker; Douglas-fir with Rhizosphaera needlecast, Rhabdocline needlecast, and Swiss needlecast; fir with rust; juniper with Phomopsis tip blight, rust, and Cercospora tip blight; pine with Canavirgella needlecast, Ploioderma needlecast, Diplodia blight, and Armillaria root rot; spruce with Rhizosphaera needlecast, Sirococcus blight, Cytospora canker, Diplodia blight, and repeating spruce needle rust.

Diplodia blight of Douglas-fir

Rhizosphaera needlecast of spruce

Vegetables:

Among the vegetable diseases that were identified were Septoria leaf spot, early blight, bacterial leaf spot, Phoma leaf spot, anthracnose, powdery mildew, bacterial wilt, gray leaf mold, blossom-end rot, leaf roll,

catface, and tobacco mosaic virus on tomato. Some other common vegetables and their diseases were basil with bacterial leaf spot, bean with Cercospora leaf spot and Rhizoctonia blight, cabbage with bacterial black rot, carrot with powdery mildew, collard greens with powdery mildew,; cauliflower with bacterial black rot and bacterial leaf spot; cucumber with downy mildew, bacterial soft rot, and anthracnose; eggplant with Verticillium wilt; garlic with rust, bacterial soft rot, and Penicillium soft rot; pepper with Xanthomonas leaf spot, damping-off, and Phytophthora blight; potato with scab, and squash with powdery mildew and Fusarium fruit rot.

Penicillium bulb rot of garlic

Septoria leaf spot of tomato

Tree and Small Fruit:

Common tree and small fruit species and diseases were apple with scab, powdery mildew, frogeye spot, fire blight, rust, and bitter pit; peach with scab, X-disease, brown rot, Phomopsis canker, and leaf curl; blueberry with Botrytis blight, Phomopsis blight, Fusicoccum canker, rust, and bacterial leaf spot; pear with fungal leaf spot; plum with brown rot and black knot; apricot with black knot, brown rot, fungal leaf spot, and bacterial leaf spot; and grape with black rot.

Turf:

The unusually hot, humid, dry summer of 2010 caused significant drought stress and dieback of many lawns throughout the state. Damage began in June and continued into early September, as cool-season turfgrasses went beyond their normal summer dormancy to dead. As a consequence of these stressful conditions of prolonged heat and high humidity, many weed and disease problems plagued lawns and golf greens. Common infectious diseases that were identified on lawn grasses were summer patch, red thread, yellow patch, Rhizoctonia brown patch, Pythium blight, rust, powdery mildew, Curvularia blight, Leptosphaerulina leaf blight, and anthracnose.

Weeds:

Poison ivy remained a key plant of public concern. Identification and control of true, running bamboos and Japanese knotweed continued to be significant problems for many Connecticut landowners. Predominant weed problems in turf were crabgrass, annual blue grass, wild violet, chickweed, clover, and wild garlic. Some other weeds that were identified for Connecticut residents were bentgrass, bindweed, bittersweet, bitter nightshade, ground ivy, mugwort, nutsedge, phragmites, pigweed, purslane, spurge, and star-of-Bethlehem.

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.

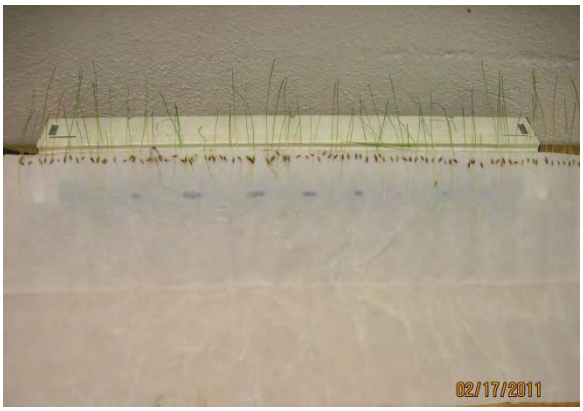
SERVICE ACTIVITIES

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.

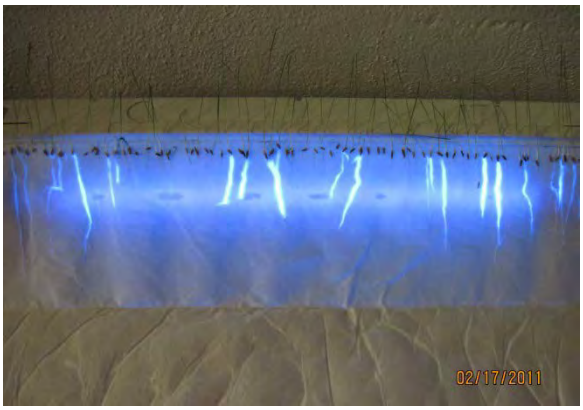
Seed Testing: In cooperation with the Connecticut Department of Agriculture, Bureau of Regulation and Inspection

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 2011, 320 vegetable, 8 lawn, and 10 crop seed samples 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). Vegetable seeds are tested for germination, and of the 320 vegetable seed samples tested, 21 failed label claims for germination. Failures were not retested because of insufficient amounts of seed. None of the vegetable samples contained noxious weed contaminants in 2011. Lawn seeds are tested for both germination and purity. One component of purity analysis involves conducting a fluorescence test on all samples of ryegrass to determine the percentage of perennial ryegrass (*Lolium perenne*) and annual ryegrass (*L. multiflorum*). This test is necessary because the seeds of annual and perennial rye are too similar to be sorted. Roots of

the annual ryegrass fluoresce as white lines when placed under an ultraviolet light, in contrast to lack of fluorescence in the roots of perennial ryegrass.



Germinating annual and perennial ryegrass seeds.



Fluorescing roots of annual ryegrass under ultraviolet light.

Of the 8 lawn seed samples tested, 6 met label claims for both purity and germination. One sample failed purity analysis because it contained less ryegrass and more fine fescue than stated on the label, despite meeting the level of total pure seed on the label. One sample passed label claims for germination, but failed its claim for purity. No lawn samples contained noxious weed seeds. Of the 10 crop seed samples tested, 8 samples met label claims for purity and germination and 2 samples failed both purity and germination. Several noxious weeds were identified in 2 samples, including chess, corn cockle, and brome grass. A *Station Technical Bulletin* 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 is to minimize 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. Li** and **Ms. Inman** examined 43 samples from the Connecticut Department of Consumer Protection at the request of the Department of Analytical Chemistry of the Experiment Station.

***Samples for 2011 National Nursery Survey and Trace-Forward and Trace-Back Surveys for* Phytophthora ramorum**

Connecticut continued to participate in a national survey of nurseries to assess the presence of the Ramorum Blight (Sudden Oak Death) pathogen, *Phytophthora ramorum*, in our state for 2011. The objective is to survey nurseries at risk of harboring or distributing *P. ramorum*-infected plants. **Drs. Douglas** and **Marra** supervise the USDA-mandated assays for testing. During the past year, **Dr. Victoria L. Smith** (Deputy State Entomologist) supervised the collection of 236 samples by CAES nursery inspectors. After the ELISA pre-screen for all *Phytophthora* species, 83% of the samples tested positive. This represented the highest number of *Phytophthora*-species positive samples we have encountered after many years of conducting national surveys. DNA was extracted from ELISA-positive samples and tested for *P. ramorum*. At the time of this publication, no samples tested positive for *P. ramorum* in the 2011 nursery survey.

In June 2011, there was, unfortunately, a positive find of *Phytophthora ramorum,* the causal agent of Ramorum Blight (or Sudden Oak Death) in a residential property in Connecticut. This was detected through the Station's participation in a "trace-forward" survey initiated by the USDA-APHIS-PPQ on plants sent by mail to private residences throughout the U.S., including Connecticut. Plants were from a nursery in Oregon that had tested positive for *P. ramorum*. Samples were collected by **Dr. Victoria Smith** and nursery inspectors, and brought to the lab for testing by **Drs. Douglas** and **Marra**. Samples from *Rhododendron* sp. 'Pronum' tested positive for *P. ramorum* using real-time PCR and by culture. The residential property was in New Haven County. Follow-up surveys of host material and soil on the property are in progress.

Symptoms of *P. ramorum*-infected *Rhododendron* sp.'Pronum.'

Citizen Inquiries

Plant Disease Information Office

Drs. Li and Douglas, assisted by **Department Scientists** and **Ms. Inman**, answered 4652 inquiries about plant health from Connecticut citizens. Although the majority of inquiries were on ornamentals, trees, and shrubs (61%), other categories, such as food crops (21%) and turfgrasses (5%), were also well represented. The number of inquiries on turfgrass represents a 2% increase from the previous year, possibly due to stress from the heat and drought of the 2010 growing season. A moderate

percentage of inquiries fell into the miscellaneous category (13%), which included identification of plants and poison ivy control and identification. Although the majority of inquiries were from Connecticut homeowners (69%), there were many inquiries from commercial growers and plant care professionals (24%). Inquiries from cooperative extension, health, news, and agricultural personnel (7%) remained consistent with previous years. A further breakdown of inquiries showed that 42% of the samples came in by phone, 10% came in by mail, 5% came as email, and 43% were brought in person. The number of physical samples handled by the PDIO (53%) continued to exceed the number of phone calls (42%)—this is a trend that has been observed for the past 3 years. Six hundred thirty-eight letters and 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 246 questions, tested 147 samples, and made 18 site visits. **Dr. Elmer** made 14 site visits, answered 13 questions, and tested 17 samples. **Dr. Ferrandino** made 16 site visits, tested 35 samples, and answered 25 questions, and **Dr. Marra** tested 1 sample and answered 2 questions from stakeholders.

Impact: During the period covered by this report, over **5788** 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 ORGANIZED BY THE DEPARTMENT OF PLANT PATHOLOGY AND ECOLOGY

Meetings and Workshops

Dr. Sharon M. Douglas organized and hosted the 2011 Annual Meeting of the Northeast Plant Diagnostic Network (NEPDN), from 23-25 February 2011, in Jones Auditorium, with assistance from **Ms. Mary Inman** and **Dr. Yonghao Li**. Twenty-six plant disease diagnosticians, from West Virginia to Maine, were greeted by Dr. Louis A. Magnarelli, Director. Attendees discussed topics of interest, which included surge capacities of diagnostic laboratories, significant diseases of the region, lab accreditation,

and state reports on unusual or significant diseases. Dr. Douglas organized a tour of CAES, during which the group heard about the variety of research programs at the Station, visited the USDA Forest Service Quarantine Facility in Ansonia, and Geremia Greenhouses in Wallingford.

Dr. Wade H. Elmer organized a special Lunch Club Seminar about "Salt marsh change and biotic responses" by Dr. Roman Zajac, The University of New Haven (11 March 2011)

Dr. Wade H. Elmer co-sponsored two Bedding Plant Meetings with **Ms. Leanne Pundt** and **Dr. Richard McAvoy** of the University of Connecticut. Topics covered included: Update on Managing Insects and Mites on Spring Crops, Update on Nutrition, Chemical Growth Regulators, and other Production Tips, Update on Emerging Diseases, Nutrition and New Fungicides for Spring Crops, and Update on Pesticide Safety. On 8 February 2010, the meeting was held at the Tolland Cooperative Extension Center in Vernon, CT and on 22 February 2010 the meeting was held at the University of Connecticut, Torrington campus, in Torrington, CT.

Lockwood Lectures

Dr. Francis J. Ferrandino organized a Lockwood Lecture by Dr. Odile Carisse, plant pathologist, Agriculture and Agri-Food Canada, Horticulture Research and Development Centre, Quebec, Canada. The title of the lecture was *Molecular tracking of airborne inoculum: impact on grape disease management* (25 October 2010).

Dr. Sandra L Anagnostakis organized a Lockwood Lecture by Dr. Jeanne Romero-Severson, Associate Professor, Department of Biological Sciences, University of Notre Dame, Notre Dame, Indiana. The title of the lecture was *Seeing the Forest and the Trees* (6 May 2011).

Conference Organizing

Dr. Robert E. Marra served on a Steering Committee for the *Connecticut Conference on Natural Resources* from 2005 to present. The Conference was held this year on Monday, 7 March 2011, at the University of Connecticut, Storrs. The conference was attended by 243 people, including seven scientists from CAES who presented seven talks and one poster.

VALLEY LABORATORY

Scientists at the Valley Laboratory conduct multidisciplinary research on insects, diseases, soil nutrition, mycology, integrated pest management and weeds of concern to commercial agriculture and homeowners in Connecticut. The Valley Laboratory, located in Windsor Connecticut, 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 research unit has greatly expanded to reflect the diverse agriculture present in the State. In addition to research, 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 56 experimental plots at the Windsor farm during the past year. Five Windsor-based scientists had 28 of these plots; six New Haven-based scientists and a University of Connecticut graduate student were using 16 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 research 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.

Hemlock Woolly Adelgid Research

Eastern hemlock, *Tsuga canadensis,* is an important native conifer climax species which provides essential wildlife habitat and cover, especially in winter. 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 national strategy for reducing the impact and spread of HWA in our eastern forests. *Sasajiscymnus tsugae* (Coleoptera:Coccinellidae), originating from Honshu, Japan and *Laricobius nigrinus* (Coleoptera:Derodontidae) , originating from the Pacific Northwest are the primary biological control agents released for HWA management. Projects 1-3 are conducted by **Dr. Carole Cheah** and funded by the USDA Forest Service and project 4 is funded by USDA APHIS PPQ.

1) Project: Development of artificial diets for predators of hemlock woolly adelgid

Dr. Carole Cheah maintains an experimental *S. tsugae* colony with lines originating from the first imported shipments from Osaka, Japan in 1994 and 1995 and a more recent line from Kobe, Japan, obtained in 2006. Current laboratory studies, in collaboration with Dr. Allen Cohen of North Carolina State University, Insect Rearing Program, are aimed at the development of an artificial diet and/or supplement to augment and improve the mass-rearing and production of adelgid predators for biological control. Currently all mass rearing of predators requires healthy HWA-infested foliage. Supplies can be unpredictable and of variable quality and affected by drought, winter extremes and accessible collection areas. Artificial egg diets developed by Dr. Cohen have resulted in equal or superior results to existing diets used for emergency feeds for HWA adult predators, when abundant, high quality live adelgids are not available.

S. tsugae feeding on Cohen diet

L. nigrinus feeding on Cohen diet (photos by Cheah)

Impact: For large scale mass rearing of HWA predators, artificial diets should result in significant economic savings in production, and enhanced survival of adult predators during holding periods prior to release. The optimal formulations are being provided to 5 federally supported rearing programs and insectaries in 5 states rearing predator species for hemlock woolly adelgid biological control.

2) Evaluation of Herbivore Induced Plant Volatiles as Possible Attractants for Predators of Hemlock Woolly Adelgid

Plants under herbivore attack have been shown to produce volatiles that in turn attract natural enemy predator and parasitoid species of the herbivores in question. Many coccinellids exhibit positive olfactory responses to odors of their prey and/or host plant systems. *S. tsugae* is a highly dispersive species with excellent flight capabilities but this has obscured results from recovery sampling techniques which are mostly concentrated in the extreme lower canopy. Olfaction capabilities of *S. tsugae* have been questioned previously but did not investigate optimal environmental and physiological conditions for testing and validating insect responses to odor sources, such as preconditioning treatments of test subjects, reproductive states of individual test insects, appropriate airflow rates, humidity, ambient temperature, light intensity and balance. In this project, **Dr. Carole Cheah** investigated these factors in addition to the influence of biotic factors such as the insect's age and physiological state and level of foraging experience on the potential response to natural plant odors and synthetic test chemicals. Both *S. tsugae* and *L. nigrinus* were tested in a custom-designed 2-way air-flow olfactometer for odor detection and discriminating response to HWA-infested, non-infested eastern hemlock and artificial volatiles, with the objective of identifying volatiles for potential use in predator monitoring or trapping systems. Five synthetic volatiles known be attractive to other predatory species were tested. *Sasajiscymnus tsugae* demonstrated significant odor perception of eastern hemlock (infested or not) seedlings over blanks. The responsiveness and detection of HWA-infested hemlock odors was also found to be influenced by the reproductive state of the individual. Older, reproductive females and males of *S. tsugae* were able to significantly discriminate between non-infested and infested hemlock seedling odors. Reproductive *S. tsugae* females were also significantly attracted to methyl salicylate odors. Neither insectary-reared nor wild-collected *L. nigrinus* were attracted to HWA-infested seedlings. The percentage of responsive *L. nigrinus* adults was also much lower than for *S. tsugae*. *L. nigrinus*, laboratory reared or wild-collected from Seattle, did not respond to methyl salicylate.

Impact: Methyl salicylate -based attractants appear to be suitable for further development into a field monitoring system for the HWA biocontrol predator *S. tsugae*. This could result in significant improvement in techniques for field sampling and detection of predator establishment for biological control of HWA.

3) Quality and Process Control for production of HWA predators

Several laboratories (university, state, federal, and private businesses) mass rear predators of HWA. Often these predator releases have failed to provide the expected levels of HWA control and mortality of predators produced has been high during the rearing process. It is not known if these failures

are because of 1) inadequate numbers of predators being released, 2) problems in release techniques, 3) the quality of the predators themselves or 4) questionable quality of the adelgid prey used for rearing. The QC system consists of several tiers of observation and decision-making: 1) behavioral, 2) biomass and linear measurements, 3) biochemical assessments, and 4) internal morphology. This project is led by Dr. Allen Cohen of North Carolina State University in collaboration with **Dr. Carole Cheah** and has developed unique product quality control assessment techniques as a basis for improvement of production and process control for mass-rearing of HWA predators.

Impact: Important parameters which influence the production quality of predators such as protein content of predators and prey, free-radical scavenging capacity in predators and prey, lipid content, storage carbohydrate content, predator biomass, and predators' internal condition have been defined. These parameters are currently being tested and integrated into a Quality Control system which will enable early detection and correction of production and quality problems with the objective of optimizing the efficiency of predator production and biological control of HWA.

4) Project: Establishment of a HWA predator field insectary

A field insectary at the Lockwood Farm was established by **Dr. Carole Cheah**, with the help of Lockwood Farm staff, with plantings of HWA-tolerant species of western, mountain and northern and southern Japanese hemlocks in May 2009. The objective is to develop a novel procedure for eventually field-rearing *S. tsugae* acclimated to the northeast climate for biological control releases. This second full year of planting has yielded valuable data on the adaptation and survival of each species during highly variable Connecticut winters and summers. After the harsh and snowy winter of 2011, northern Japanese hemlock, *Tsuga diversifolia*, again proved to be the most hardy and adaptive of the 4 species to the Connecticut climate. No top-kill of foliage was recorded for *T. diversifolia* exposed above the snowline, while both western and mountain hemlocks had high levels of defoliation and tip dieback. Southern Japanese hemlock seedlings, planted as much smaller plugs, was totally protected by snow cover and survived well. *Tsuga diversifolia* has also produced the most vigorous new growth in 2011 and is the most adapted and established of the 4 species. Attempts to infest *T. diversifolia* with HWA were made in March, May and June 2011.

Hemlock field insectary at Lockwood Farm

Tsuga diversifolia, northern Japanese hemlock

(photos by Cheah)

Impact: Northern Japanese hemlock would be a suitable landscape/garden alternative to the threatened native eastern hemlock which is susceptible to HWA, and should be of commercial interest to specialty nurseries.

MILE-A-MINUTE WEED 1) Diet development for biological controls of invasive weeds

Mile-a-minute weed, *Polygonum perfoliatum,* (MAM) originates from Asia, was first discovered in the eastern U.S. in the 1930s and is classified as a noxious invasive weed in Connecticut. It currently infests 9 eastern states and was first recorded in Connecticut in 1997. In Connecticut, 19 towns are currently infested. This rapidly growing prickly and prolific vine is annual in its northern range but quickly forms dense thickets which displace native vegetation and reduces plant diversity. An introduced weevil, *Rhinoncomimus latipes* (Coleoptera: Curculionidae), imported from central China, has been successfully reared and released for biological control of this invasive species in the Mid-Atlantic and southern New England states. However, weevil rearing is dependent on intensive 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. Carole Cheah** is collaborating with Dr. Allen Cohen, North Carolina State University, on the development of an artificial diet for *R. latipes* in cooperation with the Phillip Alampi Beneficial Insect Laboratory (PABIL), New Jersey Department of Agriculture, Trenton, NJ, with funding support from the USDA Forest Service. In 2010-2011, adult *R. latipes* was attracted to feed robustly on a breakthrough artificial diet developed by Dr. Cohen. In experiments, Dr. Cheah recorded survival of >80% over three weeks on diet alone. At the end of the experimental period, survival was 66% after 37 days on diet alone and weevils were able to feed and oviposit normally on return to MAM foliage. In 2011, this diet was used by Dr. Cheah to maintain 5,000 weevils prior to release for up to a week with negligible mortality in the absence of MAM. This project is funded by the USDA Forest Service FHTET program.


Adult *R. latipes* feeding on Cohen artificial diet (photo by Cheah)

Impact: A suitable artificial diet for *R. latipes* would enhance mass rearing for the expanding biological control program of mile-a-minute weed which is currently based on live plant cultures.

2) Implementation of Biological Control of Mile-a-Minute Weed in Connecticut

This project is funded by USDA Forest Service and USDA APHIS PPQ in cooperation with the University of Delaware and NJDA Phillip Alampi Beneficial Insect Laboratory. **Dr. Carole Cheah**, in collaboration with **Dr. Todd Mervosh** of the Valley Laboratory and Donna Ellis from the University of Connecticut, released 5,000 *R. latipes* in Connecticut in June 2011, with releases in 2 new towns: Sprague and Norwalk. The weevils have been released to control MAM in North Haven, Greenwich, Newtown, New Milford and Bridgewater (2009), Stamford, Westport and Fairfield (2010) and Sprague and Norwalk (2011). Since the 2009 first release, weevils have survived two Connecticut winters, intense spring flooding, and reproduced with multiple generations and feeding impact recorded at most sites. Dispersal has also been recorded to at least 0.5 mile from initial release sites.

Releasing weevils on MAM in Sprague in June 2011 (photo by Cheah)

Impact: Establishment of biocontrols for mile-a-minute weed would provide a natural control to limit spread and range expansion of a noxious and prolific invasive weed, and reduce the need for chemical control, especially in watershed areas, in utility right-of ways etc.

Insect Management

Dr. Richard Cowles conducted an experiment to investigate absorption of systemic insecticides applied to the trunks of four species of trees. The insecticides tested were imidacloprid, dinotefuran, and clothianidin; the tree species were red maple, flowering cherry, green ash and river birch. The effects of surfactants were inconsistent, but there were great differences in foliar residues, and interactions between tree species and insecticides. Flowering cherry, in general, had the greatest absorption, followed by maple, ash, and birch. Clothianidin was absorbed the poorest of the three insecticides, but all three insecticides were readily detected in foliage. Both imidacloprid and dinotefuran are readily absorbed

through maple bark, suggesting that this application method may be suitable for use in Asian longhorned beetles quarantine areas.

Dr. Richard Cowles continued pyrethroid resistance studies in bed bugs in collaborations with **Drs. Anderson, Krol**, and **Ridge**. Direct analysis of permethrin residues demonstrated that 90% of a one-microgram dose was degraded in 24 hours. Experiments will continue to compare metabolism of Type 1 and Type 2 pyrethroids. The pyrethroid-resistant bed bugs collected in Connecticut are extremely resistant to Type 1 materials and only susceptible to extreme dosages of most Type 2 compounds – dosages they are unlikely to encounter from field applications of these insecticides. Investigation of alternatives to pyrethroids demonstrated that certain botanicals, silica aerogel dust, and an EPA Section 25b Exempt Product (TechDust, manufactured by Paragon Professional Products) are highly effective against bed bugs in laboratory trials. Another exempt product, EcoExempt D, was inferior to the other tested dusts.

Impact:

- Valent BioSciences Corporation has obtained U.S. EPA registration approval for basal bark spray use of the insecticide Safari (dinotefuran) to hemlock trees, nursery crops, and Christmas trees for control of scales, adelgids, and other sucking insect pests. New York State Dept. of Environmental Conservation approved the use of dinotefuran in a basal trunk spray for eastern hemlocks, which is the only use currently approved in that state outside of enclosed structures. Both uses are largely based on Dr. Cowles' research.
- Golf course superintendents continue to reduce their reliance on pyrethroid insecticides, and are increasingly using the biorational insecticide spinosad to target larvae of the annual bluegrass weevil.

Strawberry sap beetle research

Field experiments initiated by **Dr. Hugh Smith** to study strawberry sap beetle were continued by **Dr. Cowles**. Strawberry sap beetle adults were found to be capable of escaping from most adhesives used in traps. A trap was designed for live capture of sap beetles in field tests. We have found it very difficult to improve upon the standard whole wheat bread dough, which previous researchers had determined to be highly attractive to the adults. Larvae of strawberry sap beetle were also trapped, surprisingly at times and locations where we did not anticipate them to be active. A laboratory rearing procedure for strawberry sap beetle was developed. Larvae from that colony were then exposed to insect pathogenic nematodes, demonstrating that they are susceptible to infection by *Steinernema carpocapsae*, *S. feltiae*, *S. kraussei*, and *Heterorhabditis bacteriophora*.

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

Strawberry breeding

Strawberry root-feeding insects and root diseases such as black root rot can limit the productivity of perennial matted row strawberries in Connecticut. **Dr. Richard Cowles** initiated a strawberry breeding program and after years of selection from several thousand progeny of several crosses, a line was chosen for patenting because of its tolerance to root diseases, black vine weevil, and exceptional fruit qualities. This year a plant patent was submitted for a new cultivar, 'Rubicon' strawberry. This cultivar originated from a cross by Dr. Cowles in 2000 between 'Idea' and 'Primetime' strawberries.

Impact: Extending the productivity of strawberry plantings with tolerance to root diseases and black vine weevil will help growers increase profitability while reducing insecticide use.

Rubicon strawberry fruit.

Mycology Research

Dr. DeWei Li conducts research on indoor molds of human health concern, fungal succession on water-damaged building materials, and infiltration of mushroom spores from outdoors into residences.

***Toxic indoor mold - Stachybotrys* and *Memnoniella* biosystematics study:**

Stachybotrys thaxteri Li was described as a species new to science. The nomenclatural status of *Stachybotrys cannae*, "*Stachybotrys pallida*", and "*Stachybotrys striatispora*" has been studied and clarified. This study showed that *Stachybotrys cannae* is not a species of *Stachybotrys.* It belongs to a different genus and its true identity is *Periconiella portoricensis.* "*Stachybotrys pallida*", and "*Stachybotrys striatispora*" are invalid names which subsequently have no taxonomic values.

Impact: Controversies concerning three species of *Stachybotrys* were settled. These results provide significant information to mycologists and biologists about the nomenclatural status of these species which will help with identification and assist in research.

New fungal taxa:

Specimens were collected throughout the year indoors and outdoors. **Dr. DeWei Li** described two species new to science (*Stachybotrys thaxteri* and *Rhexodenticula zhengii*.). A key to the species of *Rhexodenticula* was developed so that mycologists, biologists, and the public can use it to identify the species of *Rhexodenticula*. Descriptions of three more new species have been submitted for publication.

Impact: The identification and publication of new species are important additions to fungal biodiversity and biosystematics. The roles of these new species in the ecosystem and different environments remain to be studied.

Calvatia gigantea (Giant puffball) basidiospore production study

Dr. DeWei Li determined that this common fungus is able to produce five trillion basidiospores in a single fruiting body.

Impact: Giant puffball is an important allergen in the air, the information of *C. gigantea* with such a high potential of releasing a very large number of spores into the air is very important to the public, allergic patients and medical practitioners for allergy diagnosis, management, and treatment.

Dr. Li with a giant puffball.

The effect of rotation crops on root rot of Common Bean

Rotation and cover crops have been increasingly used by vegetable farmers in the Northeast to improve soil quality, prevent erosion, increase organic matter, and to suppress nematodes, root diseases and other pests. Many studies have documented the various benefits of cover crops including preventing erosion, increasing organic matter, recycling of nutrients and improving soil quality in general. However, few studies have focused on the effect of specific cover crops on the common soilborne root pathogens of vegetables grown in the Northeast (*Rhizoctonia, Pythium, Fusarium, Thielaviopsis*, *Pratylenchus* and *Meloidogyne*). The effectiveness of eight cover crops in managing root rot diseases of vegetables was evaluated by **Dr. James LaMondia** as a part of a NE-IPM grant-supported project conducted in New York, Pennsylvania and Connecticut. Dr. LaMondia determined that beans grown in pathogen-infested plots had the highest shoot and root weights and lowest levels of disease following tillage radish and rapeseed. The effects of these cover crops on soil health parameters are being evaluated in New York State.

Impact: The identification of rotation and cover crops that reduce disease and increase soil health parameters may protect farm sustainability by adding non-chemical integrated pest management tools.

Fig 7: Range of snap bean growth after cover crops in Connecticut microplots.

Management of foliar nematodes on ornamentals

The plant parasitic nematode *Aphelenchoides fragariae* can infect foliage and cause leaf death and plant defoliation. As part of an IR-4 funded grant, **Dr. James LaMondia** conducted experiments to determine the efficacy of Avid (abamectin), Azatin (azadirachtin), Kontos (spirotetramat) as foliar and drench treatments, MeloCon (*Paecilomyces lilacinus* Strain 251), Neemix 4 (azadirachtin), NI-108X (biological), Pylon (chlorfenapyr), Safari 20SG (dinotefuran), and Proclaim (Emamectin benzoate). Treatments were applied to the foliage of *Anemone sylvestris* 'Serenade' and *A. sylvestris* 'Pamina' or as a soil drench. *Aphelenchoides fragariae* were inoculated and leaves sampled over to time to monitor nematode populations. Numbers of *A. fragariae* extracted from Serenade were low and there were no significant differences between treatments. Foliar nematode populations increased over time in Pamila. The lowest nematode numbers in foliage were observed in the Pylon, Neemix, Kontos drench and Avid treatments. The untreated controls had nearly one thousand times more *A. fragariae* per plant. None of the treatments were completely free of infection after 2 to 3 months, so plant protection chemicals will not stand-alone for foliar nematode management. For practical management of *A. fragariae*, multiple applications of the more efficacious materials may be required in combination with sanitation.

Impact: The identification of labeled insecticides with activity against foliar nematodes will greatly reduce losses due to this pathogen.

Foliar nematode symptoms on Anemone and Salvia.

Tobacco disease research

The Connecticut Agricultural Experiment Station Valley Laboratory was established in 1921 (as the Tobacco Substation), to combat tobacco problems and diseases such as wildfire, a devastating disease caused by a bacterial plant pathogen. Wildfire was eventually eliminated by the development of plant resistance, and ever since, tobacco breeding to incorporate genetic plant resistance to plant pathogens has been ongoing. Plant resistance to major pathogens is the most economical, environmentally responsible, and often most effective way to control plant diseases. The development of plant resistance to Tobacco Mosaic Virus (TMV) in the 1950's, to ozone damage (weather fleck) in the 1960's, black shank in the 1970's, and Fusarium wilt in the 1980's and early 1990's effectively controlled serious diseases which each threatened to seriously impact or even wipe out cigar wrapper tobacco production in the Connecticut River Valley.

There are currently a number of pathogens that threaten the crop. **Dr. James LaMondia** conducts a breeding program to develop resistance to the tobacco pathogens: *Fusarium oxysporum* (causing Fusarium wilt); *Globodera tabacum* (the tobacco cyst nematode); tobacco mosaic virus, and *Peronospora tabacina* (blue mold) for both shade and broadleaf types. Initial crosses for cyst nematode resistance were made in 1987 between two flue-cured tobacco lines which each carried resistance to the Tobacco cyst nematode but were unmarketable and Connecticut broadleaf inbreds. The initial hybrids between CT and flue-cured types were backcrossed twice to CT broadleaf to restore broadleaf characteristics, and then inbred over 10 generations. Plants were selected for wilt resistance and agronomic type under field conditions and for TMV and TCN resistance in greenhouse screens. The resulting inbred (F10 generation) was not of suitable quality, so it was backcrossed again to the broadleaf cultivar 'Scantic' and again selfed to an inbred using pedigree selection with field and greenhouse selection for resistance and agronomic broadleaf tobacco characteristics. The resulting inbreds were progeny tested to select plants with stable homozygous resistance to TMV and the TCN and were evaluated for Fusarium wilt and blue mold resistance.

The result of this breeding program was 27 generations of selection for broadleaf agronomic characteristics with 8 cycles of selection each for Fusarium wilt, TMV and TCN resistance. The male-sterile F1 hybrid 'B2' is highly resistant to Fusarium wilt, TMV and the TCN. An unexpected benefit that Dr. LaMondia discovered was that the TCN-resistant inbred parent used to make the B2 hybrid was fairly resistant to blue mold and the B2 hybrid itself was also moderately resistant to the disease. Blue mold leaf spot, caused by the downy mildew pathogen *Peronospora tabacina*, has been a recurring problem in Connecticut from 1997 through 2010, causing losses up to the tens of millions of dollars annually. As a result, growers must apply fungicides on a regular basis to protect against the disease. When compared to the highly resistant tobacco varieties NC 2000 and NC 2002 developed in North Carolina, the moderately resistant varieties KT 200 and KT 206 developed in Kentucky and Tennessee, and susceptible C9 broadleaf in the same experiment, B2 was intermediate to the highly resistant NC lines and moderately resistant KT lines.

Plant resistance is the only practical means of control for Fusarium wilt and TMV. The effects of TCN resistance are more economical and actually better than preplant soil fumigation (which costs approximately $500 per acre) as tobacco cyst nematode populations that have been reduced by the

fumigation subsequently increase as a result of growing a susceptible tobacco variety. TCN resistant B2 causes cyst nematodes to hatch, enter roots, and then die as a result of resistance, effectively reducing cyst nematode populations by more than 60% while still producing a tobacco crop. Blue mold resistance would act to reduce the number of fungicide applications required to control the disease and increase crop quality. Over several years at the CAES Valley Laboratory Research Farm and in small plots with cooperating growers, B2 wrapper leaf quality was consistently as good as or better than the current broadleaf standard inbred variety C9. The use of an inbred with growers saving seed from year to year often results in genetic drift and the loss of resistance to pathogens over time. The use of a male sterile hybrid that does not produce seed will result in a stable, uniform variety with no genetic drift over time.

Impact: The development of a male-sterile hybrid broadleaf cigar wrapper tobacco with resistance to most of the major pathogens, including Fusarium wilt, TMV, the TCN and blue mold, should allow sustainable crop production with reduced losses to disease and much reduced pesticide inputs. B2 is being released as a new cultivar and seed production has been licensed to a local company. Proceeds will support further research on plant resistance.

Potato Virus Y Disease in Tobacco

In late June 2009, stunted shade and broadleaf cigar wrapper tobacco plants in Massachusetts were observed with veinbanding, mosaic, and leaf mottle symptoms. **Dr. LaMondia** determined that symptoms were the result of infection by Potato Virus Y (PVY) and other related aphid-transmitted poty viruses. Symptoms in tobacco were initially widespread and severe in the Connecticut River Valley in Massachusetts and eventually spread to northern Connecticut. At least 3,000 acres of potatoes were present near the earliest affected area in Massachusetts and volunteer potato plants were found in high incidence in fields rotated from potato in 2008 to tobacco in 2009. Growers indicated that volunteer potato tubers survived over winter in both 2007-2008 and 2008-2009. Early symptom development was greatest for tobacco in close proximity to potato crops. It is known that many species of aphids transmit these viruses in a nonpersistent manner. Soil temperatures recorded at 20 cm deep in Windsor CT were as low as -4.7 C in 2007, and only as low as -1.85 C in 2008 and 2009. Critical temperatures for potato tuber death were reported to be -2.8 C or lower, so temperatures were consistent with observations of volunteer tuber survival in 2008 and 2009. Potato can serve as a virus reservoir, and volunteer tubers likely increased virus incidence for early-season aphid transmission. Severely affected tobacco crops were unmarketable as cigar wrapper tobacco and destroyed. Insurance estimates concluded that over 600 acres of shade and broadleaf tobacco in Massachusetts and Connecticut were destroyed as a result of infection by one or more poty viruses. Total indemnity was over $4,750,000 for crops that would have had a value of approximately $10,000,000 if harvested and sold at typical crop values. Additional quality losses in harvested and cured tobacco further increased the impact of the disease on the 2009 crop.

Dr. LaMondia monitored winter soil temperatures at different depths in Connecticut and Massachusetts over the winters of 2009 and 2010 and concluded that potato tuber overwinter survival would only occur in protected areas and not in large open fields as in the past two years. Little or no PVY occurred in 2010, but symptoms were seen in potato in 2011 and sampling of potato crops indicated that

PVY levels were higher than normal for a year with little or no volunteer survival. Severe symptomatic potato plants were almost all (94%) positive; mildly symptomatic plants were about 25% positive; and randomly drawn potato plants had 19% infection. Virus infection of seed tubers can be an important source of an epidemic. Tobacco, tomatoes and pepper were initially free of PVY but incidence increased over the season as aphids moved the virus from nearby potatoes into the other crops.

Impact: Information associating severe crop losses with PVY and the source of virus inoculum as well as the prediction of potato tuber survival based on soil temperatures and the magnitude of virus inoculum reservoirs for the 2010 and 2011 seasons allowed growers to make informed decisions on planting and early season aphid management options.

Necrotic strain of PVY in tobacco.

Weed research

Dr John F. Ahrens, Emeritus Plant Scientist, conducts research primarily on weeds in nursery production and Christmas trees and answers grower and other citizen requests for information. Although he officially retired in 1992, he continues to conduct and publish research results and works with growers to help them achieve success in controlling their many problem weeds. His advice on vegetation control is sought by growers and scientists throughout the northeastern United States, Canada and beyond. Dr. Ahrens has been a long-time advisor to the Connecticut Christmas Tree Growers Association and chairs

their Fire Safety and Tree Improvement Committees. He visits growers of all crops who request his assistance and is active in the New York and the New Hampshire/Vermont Christmas Tree Associations. He takes the lead in annually updating the New England Guide to Chemical Weed and Brush control in Christmas Trees. Dr. Ahrens has, for many years, cooperated in the Interregional IR-4 program that sets priorities and produces data to support the federal registration of herbicides that could be valuable tools for growers of ornamental crops. In January, 2011, the IR-4 Project awarded him their first" Soar" Award for his 'Service, Outreach, Altruism and Research'.

SERVICE ACTIVITIES

Requests for information

A total of 5,956 inquiries were answered at the Valley Laboratory during the past year. The majority of these queries (81%) were answered by **Dr. LaMondia** (1,875 – 90% commercial), and by **Dr. Mervosh** (1,610), and **Ms. Rose Hiskes** (1,355) in the inquiry office. About 55% of the information requests to the inquiry office were from the public sector; the remainder was from commercial growers and pest control operators.

Valley Lab scientists made 112 presentations to grower, professional and citizen groups, (approximately 6,158 people), were interviewed 19 times and made 200 visits to commercial and municipal fields, nurseries, greenhouses, Christmas tree farms, forests and private landscapes to diagnose complex problems or conduct research projects.

Dr. LaMondia initiated and maintained the Connecticut River Valley Blue Mold Web Site to keep tobacco growers current with the progress of this devastating disease in North America, and the potential exposure to the pathogen and management options in the Valley. He worked with the CT DEEP to obtain a Section 18 registration for Revus fungicide for control of Phytophthora blight in snap beans in CT.

Thomas Rathier, emeritus soil scientist, visited more than 15 different specific urban sites where community gardens either already existed or were planned by community organizers. At each site, Mr. Rathier made an assessment of the horticultural capabilities of the site as well as the likeliness of metal contamination being found in soils on the site. Samples were taken at each site and analyzed by Mr. Rathier and **Mr. Musante** (Analytical Chemistry Department). Mr. Rathier subsequently relayed results to appropriate stakeholders along with suggestions for remediation and/or avoidance of soils whose metal concentrations exceed the Connecticut standards for remediation.

Soil testing

A total of 4,090 soil tests were expertly performed by **Ms. Diane Riddle** during the past year. About 59% were performed for commercial growers, 38% for homeowners, 2% for municipalities, and the remainder for Station research. Of the commercial samples submitted, 45% were for landscapers;

26% for tobacco growers; 11% for vegetable growers, 8% for nursery growers; 6% for golf course superintendents; 2% for fruit growers, 2and % for Christmas tree growers.

Gordon S. Taylor Conference Room

Many agricultural organizations used the conference room at the Valley Laboratory regularly for their meetings. During the past year, 20 different groups used the room on 50 occasions. Our most frequent users were the Connecticut Department of Agriculture, Connecticut Rhododendron Society, Connecticut Invasive Plants Working Group, Connecticut Farmland Trust, , Connecticut Chapter of the National Organic Farmers Association, Connecticut Invasive Plants Council, and the Connecticut Nursery and Landscape Association. **Ms. Jane Canepa-Morrison** scheduled the appointments and **James Preste** arranged the furniture for scheduled meetings and ensured that the room was available after hours.

Tobacco Shed and Equipment

This winter's record snowfall took its toll on many of Connecticut's agricultural structures. The Valley Laboratory tobacco shed, constructed in 1923, buckled under the strain and partially collapsed. Farm manager **Jim Preste** worked hard to remove and clear snow to pull out and secure equipment before it could have been damaged. Three bents of the shed were saved and reconstructed to allow tobacco research in the future and a new equipment shed is being constructed on the site of the demolished portion to store and work on equipment and tractors.

Tobacco shed roof collapse during winter 2011.

Repair and replacement of the Valley Lab damaged tobacco shed.

BULLETINS

1022 Utilization of Leaf Compost as a Soil Amendment in Cut Flower Production. 9 pages. Dr. Abigail A. Maynard. 2010

1023 Analysis of Animal Feed Products Sold in Connecticut 2008. 17 pages. Craig L. Musante and Dr. MaryJane Incorvia Mattina. 2010

1024 Pesticide Residues in Produce Sold in Connecticut 2007. 12 pages. Dr. Walter J. Krol, Dr. Brian D. Eitzer, Dr. MaryJane Incorvia Mattina, and Terri Arsenault. 2010

1025 Effects of Fruit Thinning on Yield, Fruit Quality, and Vine Performance of Red Bordeaux Winegrape Cultivars. 9 pages. Dr. William R. Nail. 2010

1026 Invasive Aquatic Plants: Lake Candlewood, Lake Zoar. Monitoring Report 2008. Prepared for FirstLight Hydro Generating Company pursuant to Federal Energy Regulatory Commission Article 409, License No. 2576-058 80 pages. Gregory J. Bugbee and Roslyn Reeps. 2009

1027 Connecticut's Invasive Aquatic and Wetland Plants: Identification Guide. 36 pages. Gregory J. Bugbee and Martha E. Balfour. 2010

1028 Control of *Potamogeton crispus* and *Myriophyllum spicatum* in Crystal Lake, Middletown, CT. 20 pages. Gregory J. Bugbee. 2009

1029 Heirloom Tomato Trials – 2007-2009. 13 pages. Dr. Abigail A. Maynard. 2010

1030 The History of Public Health Entomology at The Connecticut Agricultural Experiment Station 1904-2009. 68 pages. Dr. John F. Anderson. 2010

SCIENTIFIC JOURNAL ARTICLES PUBLISHED BY OUR STAFF

DURING 2010-2011

DEPARTMENT OF ANALYTICAL CHEMISTRY

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