Record of the Year 2011-2012

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

2011-2012

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

Each year brings new challenges to scientists and other staff members in our agency. A fungus, (*Cylindrocladium pseudonaviculatum*), new to the United States and detected in Connecticut during October of 2011, caused heavy mortality of boxwood plants in our nurseries and landscape settings. Stop sale notices were issued to businesses that had infected plants. The infected plants were destroyed by burial or incineration. Experiments on fungicide control were initiated to develop a control strategy. The diagnostic laboratory in the Department of Plant Pathology and Ecology kept up with heavy demands to identify fungus infections. In another important program, there has been extensive monitoring for the emerald ash borer (*Agrilus plannipennis*), an important insect pest of ash trees, at more than 100 sites in the state. A solitary wasp (*Cerceris fumipennis*), which hunts beetles in the family Buprestidae (including the emerald ash borer), is the main focus of the bio-surveillance effort. The hot summer of 2012 caused a heavy buildup of mosquitoes infected with the West Nile encephalitis virus. There were at least seven human cases. A new formulation was developed to control bed bugs, and a provisional patent application was filed. Analytical chemists were busy testing foods for unwanted chemicals. New knowledge has been gained on evaluating grape cultivars, a variety of niche crops for growers, and monitoring for powdery mildew infections in vineyards. A new project was started on growing hops for the microbrewery industry. Biochemists made new discoveries on the development of plant leaves and photosynthesis.

Good progress has been made on improving our buildings. The architectural plans for the Jenkins-Waggoner Laboratory are in the final stages. Construction has started on the Griswold Laboratory, and the pre-design phase plans for the Valley Laboratory renovations are nearly complete.

The Experiment Station's outreach and service components complement the research programs by providing new information to our state residents. More than 22,000 people received answers to their questions, and there were more than 2 million page views on our website. New facts sheets were posted on a regular basis.

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, 2012 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. Joan Nichols
Dr. Johan C. Varekamp

Norma O'Leary, who served on the Board of Control for16 years, retired on January 17, 2012. Her position was taken over by Joan Nichols on January 18, 2012.

The Board of Control met on August 3, 2011, October 18, 2011, January 17, 2012, and April 17, 2012.

STATION STAFF

The Experiment Station exists to advance scientific knowledge, and that advance depends completely upon the quality and dedication of its staff. The following was the staff of The Connecticut Agricultural Experiment Station as of June 30, 2012.

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

ANALYTICAL CHEMISTRY
Dr. Jason C. White, Department Head
Terri Arsenault
William A. Berger
Roberto de la Torre Roche
Dr. Brian D. Eitzer
Dr. Lester Hankin, Emeritus
Dr. Walter J. Krol
Dr. MaryJane Incorvia Mattina, Emeritus
Craig L. Musante
Kittipath Prapayotin-Riveros
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

ENTOMOLOGY
Dr. Kirby C. Stafford, III, Department Head
Elizabeth E. Alves
Dr. John F. Anderson, Distinguished Scientist
Tia Blevins
Mark Creighton
Bonnie L. Hamid
Rose Hiskes
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
Chia-Ying Chen
Shannon L. Finan
Jordan Gibbons
Dr. Melissa C. Hardstone
Dr. Mark R. June-Wells
Dr. Charisma V. Lattao
Dr. Goudarz Molaei
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
Michelle Salvas

PLANT SCIENCE DAY 2012

A pleasantly warm, breezy, sunny day was enjoyed by visitors to the Lockwood Farm on Plant Science Day 2011.

Close to 900 visitors took advantage of the annual open house.

The **Short Talks** under the Main Tent were very well attended:

Dr. Chris T. Maier	The Brown Marmorated Stink Bug: Another Harmful Invasive Insect from Asia
Dr. Victoria L. Smith	Healthy Plants – Healthy Business: Support of the Green Industry by Inspection
Dr. Abigail A. Maynard	The Experiment Station's New Crops Program
Dr. Goudarz Molaei	To Bite or Not to Bite: Mosquitoes and Transmission of West Nile and Eastern Equine Encephalitis Viruses in Connecticut

The **Demonstration Tent** was constantly busy with interested visitors.

Ira J. Kettle	Beekeeping Basics
Dr. Gale E. Ridge	Introduction to Bed Bugs, Self-Protection and Management

Pesticide Credits were available for interested participants. Dr. Robert E. Marra conducted a 1-hour guided tour of selected field plots where visitors could discuss experiments and topics with scientists at the different stops. The stops on the tour included:

Dr. Francis J. Ferrandino	Environmentally-Friendly Control of Powdery Mildew on Vegetable Plants
Dr. Carole Cheah	Biological Control of Hemlock Woolly Adelgid and Mile-a-Minute Weed in Connecticut
Dr. James A. LaMondia	Oilseed Crops for Biological Control of Soilborne Pathogens
Dr. Wade H. Elmer	Use of Earthworms and Biochar to Suppress Verticillium Wilt of Eggplant

Walking Tours of the Farm were conducted by Dr. Robert E. Marra. Stops on the tour included:

Dr. Kimberly A. Stoner	Herbs and Cut Flowers as Potential Nectar and Pollen Sources for Bees
Dr. Abigail A. Maynard	Calabaza Squash, Beach Plum, Paw-Paw, and Japanese Plum Trials
Dr. Robert E. Marra	Biological Control for bacterial Spot of Peaches
Dr. Sandra L. Anagnostakis	Hybrid Elm Trees

Dr. Jeffrey S. Ward conducted a **Tour of Native Woody Shrubs** where he talked on using native shrubs for naturalistic landscapes without the use of pesticides and fertilizers.

The Bird and Butterfly Garden was the site of more demonstrations. Visitors attended the following talks:

Jane Canepa-Morrison	Deadheading Perennials: The Why, When, and Where
Jeffrey Fengler	Butterfly Identification Walk

The six **Barn Exhibits** drew many visitors in throughout the day. The exhibits were:

"Methods Used to determine Trace Level Contamination in Foods, Products, and the Environment". Investigators: Dr. Brian D. Eitzer, Dr. Walter J. Krol, Dr. Chtristina S. Rob, and Dr. Jason C. White – Assisted by: Terri Arsenault, William A. Berger, Craig L. Musante, and John F. Ranciato

"Honey Bee Disease: Characterizing American Foulbrood and Nosemosis in Connecticut". Investigator: Dr. Douglas W. Dingman – Assisted by: Regan B. Huntley

"Wild Bees on Connecticut Vegetable Farms and the Flowers They Use". Investigator: Dr. Kimberly A. Stoner.

"The Function of Charcoal in Soil". Investigator: Dr. Joseph J. Pignatello – Assisted by: Dr. Charisma Lattao

"Viticulture Research in Connecticut". Investigator: Dr. William R. Nail.

"Assessing Internal Decay in Hardwood Trees Using Sonic and Electrical Impedance Tomography". Investigator: Dr. Robert E. Marra – Assisted by Joseph P. Barsky

The most visited tent during the day is always the **Question and Answer Tent** where visitors can bring a wide variety of questions to staff members. Dr. Yonghao Li, Mary Inman, Dr. Todd Mervosh, and Dr. Gale Ridge manned the tent.

The **Kids Korner** tent was visited by more than 300 children who got tattoos and goodie bags. They then were able to go to the "Girl Scouts of America Table" where they could get a self-guided worksheet (Passport for Kids) and guide to six plots at the Farm. Special explanations for various research was available to children at these plots. They got their passports stamped at each stop, and children who got all six stops stamped received a prize.

The day's activities began at 10:00AM with short talks under the main tent.

At 11:20AM Dr. Louis A. Magnarelli welcomed all visitors to Lockwood Farm.

The **Century Farm Award** was presented by Dr. John F. Anderson to the family at Collins Powder Hill Farm from Enfield, CT.

Collins Powder Hill Farm, at 9 Powder Hill Road in Enfield, Connecticut, was established in 1868. Fruits, vegetables and tobacco, as well as a few animals, were grown on the farm. In the 1900's, an apple orchard became the new enterprise for the farm. Like many other Connecticut farms, diversification and adapting to changing times over the years are critical to the survival of the farm. The Collins family developed a well-known chicken farm raising mostly breeding stock. Cows were then introduced and a dairy operation co-existed with egg and meat production. Today the principal family members (John and Ashley Collins and Jack and Mavis Collins) oversee a 180-acre farm with a dairy herd of about 170 cows, which includes an extensive breeding program of Holstein and Jersey stock, a composting business, and a creamery where premium ice cream is sold. Corn and alfalfa are now important crops. The Collins family has about 158 acres in farmland preservation. Numerous family members and employees over several generations have contributed to the success of the farm.

After the Century Farm Award was presented, Dr. Louis A. Magnarelli introduced Mr. Gregory M. Schaan, President and Chief Executive Officer of Imperial Nurseries, Inc. in Granby, Connecticut. Mr. Schaan was The **Samual W. Johnson Memorial Lecturer**. He gave the talk "Impact of the Nursery Industry on Connecticut's Economy".

After a brief presentation by the Experiment Station Associates, the morning's program was ended.

Plant Science Day 2011 was the success it was because of the hard work of all – professional, technical, clerical, maintenance, and farm crew staff.

EVENTS HELD AT THE STATION, NEW HAVEN

Bed Bug Forum VI

On October 6, 2011, Dr. Gale E. Ridge held the 6th in a series of forums on bed bugs at the Station. There were two visiting speakers: Allison Taisey from Cornell spoke about community approaches to bed bug management, citing successes with housing authority programs in Manitoba, Canada and Portland, Oregon. Dr. Christina Sorrentino Schmalisch from Boston spoke about the nature of and intervention for hoarding, and how the disorder (which is a complex of disorders) impedes the management of bed bugs in residential settings. Three members from the CCABB Board also spoke: Attorney Judith R. Dicine (Housing Matters, Office of the Connecticut Chief State's Attorney) spoke on landlord tenant bed bug legal matters, Mr. Tim Callahan (Director of Norwalk Health Department) spoke on health department responses to bed bug issues, and Mr. Michael Lipsett (owner of Connecticut Pest Elimination) spoke on the current management of bed bugs. The program focused on the human side of the bed bug equation (135 attendees).

Workshop on Bed Bugs for Recycle and Reuse Industries

On October 17, 2011, Dr. Gale Ridge hosted a workshop for the reuse and recycling industries in Connecticut on the management of bed bugs in their businesses. The program is the practical portion of the recently published Best Practices for Bed Bug Management of Mattresses, Bedding, and Upholstered Furniture Businesses. Representatives from rental centers, major charities, thrift stores, transfer stations, hotel liquidators, refurbishers, and recyclers attended. Attendees came from across Connecticut with visiting executives from Montana, Kentucky, Florida, and Missouri (50 attendees).

AgriScience Fair

On May 11, 2012, an AgriScience Fair was held in Jones auditorium for high school students in Future Farmers of America (FFA). More than 40 high school students presented their science projects, which were judged by several CAES staff members. The Fair was organized by Dr. Wade H. Elmer.

EVENTS HELD AT THE VALLEY LABORATORY

Christmas Tree Twilight Meeting

The annual Christmas Tree Twilight Meeting was held at the Valley Laboratory on the evening of July 19, 2011 in cooperation with the Connecticut Christmas Tree Growers Association. Approximately 50 growers attended the meeting which featured CAES scientists presenting talks and answering questions at Christmas tree plantings on the farm. Speakers and topics were the following: Dr. Sharon Douglas, "Disease management in Christmas trees"; Mr. Thomas Rathier, "How roots get water from soil"; Dr. Todd Mervosh, "Herbicide experiment: mesotrione"; Dr. Richard Cowles, "Management of insect pests"; and Dr. John Ahrens, "Evaluation of exotic fir

species." Growers having pesticide applicator licenses received 2 hours of re-certification credits for attending this meeting. Jim Preste helped with preparations for the meeting.

Nursery And Landscape Research Tour

The Nursery and Landscape Research Tour was held at the Valley Laboratory on September 13, 2011. Twenty people attended the meeting which started with outdoor presentations on current research projects followed by indoor talks covering a range of plant diseases and insect pests. Speakers and topics were the following: Dr. John Ahrens, "New and experimental herbicide evaluations"; Dr. Todd Mervosh, "Weed control in container-grown ornamentals"; Dr. Carole Cheah, "Mile-a-minute weed: biological control project"; Dr. James LaMondia, "Management of foliar nematodes"; Dr. Yonghao Li, "Common and new plant diseases"; Dr. Victoria Smith, "Progress in regulation: *Phytophthora ramorum* and chrysanthemum white rust"; Ms. Rose Hiskes, "Common and new arthropod pests" and "Asian longhorned beetle update"; Dr. Claire Rutledge, "Emerald ash borer update"; and Dr. Richard Cowles, "Bark application of systemic insecticides." Licensed pesticide applicators received 4 hours of re-certification credits for attending this meeting. Jim Preste helped with preparations for the meeting.

Workshop on "Identification, Assessment and Management of Soilborne Plant Pathogens in Vegetable Production Systems"

A full-day workshop on "Identification, Assessment and Management of Soilborne Plant Pathogens in Vegetable Production Systems" was conducted at the Valley Laboratory on December 7, 2011, 22 growers, county extension educators, regional specialists, crop consultants, IPM practitioners, and other agricultural service providers from Connecticut, Rhode Island, and Massachusetts participated. This SARE-funded workshop was presented by Drs. Beth Gugino of Penn State University, George Abawi of Cornell-Geneva, and Dr. James LaMondia of the Valley Laboratory. It was designed to train participants in the identification, assessment and management of soilborne pathogens and to provide resources that can be used on-farm and in various outreach activities.

Annual Tobacco Research Meeting

One hundred and twenty five people attended the Connecticut Agricultural Experiment Station's annual Tobacco Research Meeting held at the Suffield High School auditorium on February 21, 2012. Dr. Jim LaMondia welcomed growers, showed the CAES public service announcement and spoke about research topics and recent developments at the Station. The meeting addressed a wide variety of issues of concern to growers. James LaMondia spoke about research on management of tobacco pathogens including poty viruses, target spot and blue mold fungicide resistance. Thomas Rathier spoke about the responsible agronomic practices in tobacco and Christina Berger spoke about important changes in regulations affecting soil fumigation. Jim LaMondia spoke about the CORESTA pesticide residue program and strategies to reduce pesticide residues in wrapper leaves. Mr. Clif Parker spoke about updates and changes in the Risk Management program and insurance programs and Rebecca Dubbs of the New England Agricultural Statistics Service provided updates on the CT Valley tobacco crop statistics. Ross Eddy of the Farm Services Administration provided updates on FSA services to growers. Jane

Canepa-Morrison, Michelle Salvas, and Jim Preste assisted with much of the behind the scenes work for the meeting. The meeting qualified for pesticide applicator re-certification credit in both Connecticut and Massachusetts and 70 persons received credit.

Spotted Wing Drosophila Workshop

Twenty research and extension personnel representing all of the New England States and New York attended a Spotted Wing Drosophila workshop held at the Valley Laboratory on March 7, 2012. Dr. Richard Cowles hosted and presented a 2.5 hour "Spotted Wing Drosophila: Current and potential management methods" training session. The meeting was organized by Glenn Koehler of the University of Maine.

THE STATION IN THE COMMUNITY

East Rock Festival 2011

The Experiment Station participated in the Second Annual East Rock Festival on Orange Street on Saturday, September 17, 2011. The festival took place on four blocks of Orange Street between Willow and Cottage Streets in New Haven. Drs. Robert Marra, Goudarz Molaei, Gale Ridge, and Claire Rutledge were on hand to talk with visitors about research and public service activities at the Experiment Station, which included diseases of trees and shrubs, the nondestructive assessment of internal decay in trees, human diseases caused by vectors such as mosquitoes, ticks, and other arthropods as well as bed bugs, and invasive forest pests. They fielded numerous questions and distributed fact sheets, coloring books, and other literature to interested citizens. The CAES staff also displayed a poster on the joint collaborative works by the Department of Analytical Chemistry with the US Food and Drug Administration through the Food Emergency Response Network. This is the first year that the Station participated in this event, having been invited because of the Station's history as a part of the East Rock neighborhood and the importance of the Station's contributions to agriculture, forestry, and human health. Visitors of all ages examined specimens of mosquitoes, ticks, bed bugs, Asian longhorned beetle, and emerald ash borer, as well as cross-sections of trees with internal decay. Attendance at the festival was estimated by the organizer to be about 5,000 people, including at least 1,000 young people.

Two Bedding Plant Meetings Held

Dr. Wade H. Elmer co-sponsored two Bedding Plant Meetings with Ms. Leanne Pundt and Dr. Richard McAvoy of the University of Connecticut. Topics 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 February 7, 2012 the meeting was held at the Tolland Cooperative extension Center in Vernon, CT, and on February 14, 2012 the meeting was held at the University of Connecticut, Torrington Campus, in Torrington, CT.

Tobacco Research Meeting held at the Suffield Vo-Ag Center

One hundred and twenty five people attended the Connecticut Agricultural Experiment Station's annual Tobacco Research Meeting held at the Suffield High School auditorium on February 21, 2012. Dr. James LaMondia welcomed growers, showed the CAES public service announcement and spoke about research topics and 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 blue mold fungicide resistance. Thomas Rathier spoke about the responsible agronomic practices in tobacco and Christina Berger spoke about important changes in regulations affecting soil fumigation. Dr. LaMondia also spoke about the CORESTA pesticide residue program and strategies to reduce pesticide residues in wrapper leaves. Mr. Cliff Parker spoke about updates and changes in the Risk Management Program and insurance programs and Rebecca Dubbs of the New England Agricultural Statistics Service provided updates on the CT Valley tobacco crop statistics. Ross Eddy of the Farm Services Administration provided updates on FSA services to growers. Jane Canepa-Morrison, Michelle Salvas, and Jim Preste assisted with much of the behind the scenes work for the meeting. The meeting qualified for pesticide applicator re-certification credit in both Connecticut and Massachusetts and 70 persons received credit.

New Haven Public Schools Science Fair at Yale University

From May 15-17, Drs. Douglas Dingman, Sharon Douglas, Robert Marra, and Richard Peterson served as special awards judges for the New Haven Public Schools Science Fair, choosing winners on behalf of the Station. Two awards were granted: the first was "The Connecticut Agricultural Experiment Station Award ($100) for the best project related to food, plants, insects, or the environment. They unanimously chose Ms. Jane Hosen's 2nd grade class from Wexler-Grant School for their project titled "Plants and Worms." The second award was the "Albert E. Dimond Award of The Connecticut Agricultural Experiment Station ($150) for the best project demonstrating an innovative approach to discovery in plant science. The awardee was selected by CAES judges and Ms. Susan Dimond Brown, founder of the award and daughter of Dr. Dimond. The recipient of this award was Emily Lynn, a 6th grader from Ms. Vanessa Clayton's class at Conte-West Hills School, for her project titled "Don't Trash Your Future – Recycle." Dr. Marra presented the CAES award and certificates to students representing their class at the Awards Ceremony on May 17th, which was held at Battell Chapel of Yale University.

THE STATION OUT OF STATE

Eastern Plant Board, Eastern Chapter of the Horticultural Inspection Society and Cooperative Agricultural Pest Survey Meeting, Held in Burlington, Vermont

April 16-19, 2012, members of the Experiment Station Survey and Inspection Team attended the meetings of the Eastern Plant Board, Eastern Chapter of the Horticultural Inspection Society (HIS), and cooperative Agricultural Pest Survey, held at the Hilton on the Lake in Burlington,

Vermont. Dr. Victoria Smith participated in the EPB meeting, as President, and gave talks on boxwood blight and chrysanthemum white rust. An informational table on boxwood blight was also presented. Tia Blevins participated as the treasurer of HIS, Steve Sandrey participated as HIS Archivist, and Peter Trenchard presented a talk on Boxwood Blight. Rose Hiskes participated in the CAPS meeting as CT State Survey Coordinator. Approximately 85 people attended.

DONATIONS MADE TO THE COMMUNITY

Valley Laboratory

A total of 22,670 lbs. of tomatoes, plums, cabbage, corn, squash and watermelon grown at the Valley Laboratory were donated to Foodshare of Hartford. James Preste, 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 donated 14 Christmas trees to charities and municipalities, 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 Farm

With the help of the farm crew – Richard Cecarelli, Rollin Hannan and Michael McHill, the scientists growing produce on the plots at Lockwood Farm helped donate a total of 15,491 lbs. of eggplant, tomatoes, sweet corn, pears, acorn squash, peppers, delicata squash, parsley, butterut squash and calabasa squash to the Connecticut Foodbank, East Haven. Farm Manager Richard Cecarelli made the arrangements for the food to be distributed.

LOCKWOOD LECTURES

Dr. Gary W. Miller

On April 3, 2012, Dr. Gary W. Miller gave a Lockwood Lecture on “SILVA- a stand analysis and prescription protocol”. Dr. Miller is a research Silviculturist for the USDA Forest Service – Northern research station in Morgantown, WV.

Dr. David R. Houston

On May 23, 2012, the Plant Pathology Department hosted Dr. David R. Houston, principal Plant Pathologist (retired) from the USDA Forest Service, Forest Insect and Disease Laboratory, Hamden, CT, who delivered the Lockwood Lecture “Beech Bark Disease: Biology, Ecology, and Forest Responses. Dr. Houston is a forest pathologist who is internationally recognized as the world’s authority on the scale-fungus disease complex known as Beech Bark Disease. He has also done groundbreaking research on the patterns of disease development in a number of other complex dieback-decline diseases of hardwoods, including ash, oak, and maple. In addition to

his 35 years with the U. S. Forest Service, Dr. Houston has held numerous advisory positions with scientific and professional organizations, including the Forest Science Board of the Society of American Foresters, the American Phytopathological Society, the Northeastern Forest Pest Council, and the International Union of Forestry Research Organizations. Dr. Robert E. Marra organized the visit by Dr. Houston.

AWARDS GIVEN TO STATION STAFF

Terry Arsenault received a Group Recognition Award from Margaret Hamburg, Commissioner of the US FDA "For exceptional contribution and outstanding dedication to the agency's response effort to the Deepwater Horizon Oil Spill Disaster July 13, 2011.

Dr. Walter Krol received a Group Recognition Award from Margaret Hamburg, Commissioner of the US FDA "For exceptional contribution and outstanding dedication to the agency's response effort to the Deepwater Horizon Oil Spill Disaster July 13, 2011.

Dr. Jason White received a Group Recognition Award from Margaret Hamburg, Commissioner of the US FDA "For exceptional contribution and outstanding dedication to the agency's response effort to the Deepwater Horizon Oil Spill Disaster" July 13, 2011.

Dr. William Nail was re-elected Secretary of the American Society of Enology and Viticulture – Eastern Section (2011-2013) on July 13, 2011.

Dr. Wade H. Elmer and Dr. Joseph J. Pignatello were awarded the Plant Disease Journal Editor's Pick for the Month of July for their article "Effect of Biochar Amendments on Mycorrhizal Associations and Fusarium Crown and Root Rot of Asparagus in Replant Soils" July 29, 2011.

Dr. Wade H. Elmer was awarded an APS service award for his work as Divisional Forum Representative, August 2011.

Dr. Scott C. Williams was voted Adjunct Professor in the Department of Natural Resources and the Environment at the University of Connecticut September 2011.

Dr. Scott C. Williams was elected Treasurer of the Connecticut Urban Forest Council September 9, 2011.

Dr. Walter J. Krol received a 5-year recognition award from the Association of Official Analytical Chemists September 15, 2011.

Dr. Jason C. White was elected President of the International Phytotechnology Society at the 8th International Phytotechnologies Conference in Portland, Oregon September 16, 2011.

Dr. Walter Krol received a 25-year service award from the American Chemical Society September 21, 2011.

Dr. Christina S. Robb was elected to the Executive Board of the Eastern Analytical Symposium October 17, 2011.

The Station received a leadership award from the Connecticut Urban Forest Council in recognition of plant diagnostic and other forestry work conducted by Station staff at the Annual Conference on Urban and Community Forestry in Wallingford. Dr. Kirby Stafford accepted the award on behalf of the Station October 20, 2011.

Greg Bugbee's and Jordan Gibbons' poster entitled "Using GIS to Monitor Invasive Plants in Candlewood Lake," presented at Geographic Information System Day at the State Capitol, was awarded First Place in the category "Best Use of GIS to Solve an Environmental Problem" out of more than 60 entries. Judging was by members of the CT GIS Council November 17, 2011.

John Shepard was elected to a three-year term on the Board of Directors of the Northeastern Mosquito Control Association in December, 2011.

Tracy Zarrillo was credited as editor for the Discover Life Bee Genera Guide, http://www.discoverlife.org/mp/20q?guide=Bee_genera. She continues to volunteer her services to further efforts to make bee taxonomy more accessible to researchers. She is currently working on this editing project, as well as doing photo coordination for the various species guides. January 2012.

A joint effort by Vickie Bomba-Lewandoski (coordinator of booth set up), Katherine Dugas (booth set up and manning), Peter Trenchard, Stephen Sandrey, Diane Riddle, and Rose Hiskes (all workers at the booth), won first prize for Educational Exhibits in the Special Exhibits Division at the Federated Garden Clubs of Connecticut, Inc. Fabulous Fifties Flower and Garden Show 2012 held in Hartford. February 23-26, 2012.

Robert E. Marra was sworn in as a Commissioner on the West Haven Tree Commission February 21, 2012.

Dr. Scott Williams was elected Executive Treasurer of the Northeast Chapter of The Wildlife Society March 27

Joseph P. Barsky was presented with the Mollie Beattie Young Forester Leadership Award from the New England Society of American Foresters at the Annual Winter Meeting in Amherst, MA April 5

Dr. Victoria Smith, in appreciation for 5 years of service on the National Cooperative Agricultural Pest Survey (CAPS) Committee, USDA, was presented with a silver coin containing one troy ounce of silver and embossed with the CAPS theme art on one side and the USDA symbol on the other. The presentation was made at the Eastern Plant Board meeting held in Burlington, VT on April 16-19, 2012.

Dr. Wade H. Elmer and Dr. Robert E. Marra received the Outstanding Paper of the Year Award from the Quinnipiac University chapter of Sigma Xi for the paper titled "New species of *Fusarium* associated with dieback of *Spartina alterniflora* in Atlantic salt marshes" authored by Dr. Elmer and Dr. Marra, and published in Mycologia 103:806-819 (2011) April 19, 2012

Dr. Gale Ridge's bed bug training video titled "They're Back," which she produced, won the Bronze Tally Award for internet/online informational video May 29

Dr. Scott Williams, Michael Short, and Joseph P. Barsky were awarded certificates of appreciation at the State Future Farmers of America Convention at Suffield High School for their continued partnership with the organization May 19

The Station was presented with the Gustav A. L. Mehlquist Award by The Connecticut Horticultural Society. The award, a plaque and check for $500.00, was accepted by Dr. Louis A. Magnarelli on behalf of the Station. The plaque reads "In recognition of the organization's outstanding contributions to research and horticulture benefitting the State of Connecticut and the nation", and was awarded on June 21, 2012

EXPERIMENT STATION ASSOCIATES

Behind the Scenes Tour – Three Wholesale Nurseries

On October 5, 2011, the Experiment Station Associates visited three wholesale nurseries that are not open to the general public. They visited Imperial Nurseries, Stone Gate Nurseries, and Sunny Borders Nurseries. They learned how the professionals propagate and shape trees, shrubs, and flowers and turn them into desirable specimens. Lunch was provided by Imperial Nurseries.

White Flower Farm, Freund's Farm, Laurelbrook Farm

On June 7, 2012 the Associates visited three outstanding facilities. The first stop was White Flower Farm in Morris, CT. They visited the greenhouses, had a guided tour of the display gardens, and ended at the retail store. The second stop was Freund Farm where the dairy, greenhouse operation and cow pot production facility were visited. After the tours the Freunds provided a bountiful luncheon for everyone. The last stop on the tour was Laurelbrook Farm in East Canaan. Farm production was seen, as well as the composting facility.

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

DEPARTMENT OF ANALYTICAL CHEMISTRY

JASON C. WHITE

- President of the International Phytotechnology Society
- Serves as Managing Editor for the *International Journal of Phytoremediation*
- Editorial Board of *Environmental Pollution*
- Member of 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
- Serving on the Society of Environmental Toxicology and Chemistry (SETAC) Nanotechnology Advisory Group and on the USDA "Nanotechnology Risk Assessment" Multistate Research Coordinating Committee

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, 2012
- 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, 2012

CHRISTINA S. ROBB

- On the Board of the Eastern Analytical Symposium and chairs the "Food Analysis" session at the November meeting each year
- Serves 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 MCHALE

- Chairman, Institutional Biosafety Committee

RICHARD PETERSON
- Vice President and voting delegate, Quinnipiac Chapter Sigma Xi
- Radiation Safety Officer
- Served on the editorial board for the online ISRN Botany journal

NEIL SCHULTES
- Steering Committee at Yale University for Bioethics section of the Institute for Social and Policy Studies
- Masters Research Committee for a student advised by Dr. George Mourad at the University of Indiana/Purdue
- Linnaean Society of London Fellow
- Institutional Biosafety Committee
- Institutional Animal Care and Use Committee
- Station Health and Safety Committee
- Plant Science Day Committee
- Sigma Xi Programs Committee

DOUG 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
- Technical Advisor, Connecticut Academy of Science and Engineering

KIRBY C. STAFFORD III
- Chair, 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, Board, 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 L. SMITH
- Northeast Area Association of State Foresters Firewood Working Group; member
- National Plant Board Board of Directors; member
- National Plant Board National Meeting Agenda Committee; member
- National Plant Board Systems Approach to Nursery Certification 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

KIMBERLY A. 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 Public Health
- Adjunct Professor, Department of Pathobiology, University of Connecticut
- Chairman, Multi-State Research Project NE-1043: Biology, Ecology & Management of Emerging Disease Vectors
- Subject Editor, *Journal of Medical Entomology*
- Member, State of Connecticut Mosquito Management Program
- Member, Peabody Fellows Biodiversity and Human Health Program, Yale University

PHILIP M. ARMSTRONG
- Visiting Research Scientist, Yale University School of Public Health
- Member, Multi-State Research Project NE-1043: Biology, Ecology & Management of Emerging Disease Vectors

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

GOUDARZ MOLAEI
- President, Connecticut Entomological Society
- Member, Multi-State Research Project NE-1043: Biology, Ecology & Management of Emerging Disease Vectors

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*
- President,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

JOHN J. SHEPARD
- Member, Board of Directors, Northeastern Mosquito Control Association

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

CHARLES R. VOSSBRINCK
- Visiting Assistant Professor, Department of Pathology, Albert Einstein College of Medicine, Yeshiva University
- Member, Multi-State Research Project NE-1043: Biology, Ecology & Management of Emerging Disease Vectors

DEPARTMENT OF FORESTRY AND HORTICULTURE

JEFFREY S. WARD
- Technical Standards Committee Chair, State Vegetation Management Task Force

- 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, New Forests, 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*.

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
- Secretary, American Society of Enology and Viticulture- Eastern Section
- Chair, NE-1020: Multi-state Evaluation of Winegrape Cultivars and Clones
- Statistics and Data Collection, Protocol Subcommittees for NE-1020: Multi-state Evaluation of Winegrape Cultivars and Clones
- Connecticut Farm Wine Development Council
- Steering Committee, New England Vegetable and Fruit Conference
- National Risk Management (Sustainable) Guidelines working group, National Viticulture Extension Leadership

SCOTT C. WILLIAMS
- Adjunct Professor, University of Connecticut, Department of Natural Resources and the Environment,
- Executive Treasurer, Connecticut Urban Forest Council
- Executive Treasurer, The Wildlife Society, Northeast Section
- Scientific Advisor, Fairfield County Municipal Deer Management Alliance
- Wildlife Management Advisor, Northeast Organic Farming Association
- Chairman, Town of Guilford Inland Wetlands Commission
- Commissioner, Town of Guilford Land Acquisition Commission
- Commissioner, Town of Guilford East River Preserve Management Plan Committee
- Commissioner, Town of Guilford High School Environment/Energy Sustainability Subcommittee

DEPARTMENT OF PLANT PATHOLOGY AND ECOLOGY

SANDRA L. ANAGNOSTAKIS

- Park Naturalist and Board Member, Sleeping Giant Park Association
- International Registrar for Cultivars of *Castanea*, International Society for Horticultural Science
- Member, Board of Directors, The Northern Nut Growers Association, Inc.

SHARON M. DOUGLAS

- Member, Local Arrangements Committee (2013), 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

WADE H. ELMER

- Divisional Forum Representative for Northeastern Division of American Phytopathological Society
- Senior Editor *Phytopathology*
- Associate Editor *Crop Protection*
- Member, Site Selection Committee, Northeastern Division of American Phytopathological Society
- Member, Constitution Committee (Ad Hoc), Northeastern Division of American Phytopathological Society
- Member, Membership Committee (Ad Hoc), American Phytopathological Society
- Member, Widely Prevalent Fungi List Committee, American Phytopathological Society
- Member, Connecticut State Consulting Committee for Agricultural Science and Technology
- Member, Northeast Research, Extension and Academic Programs Committee for IPM
- Member, Program Committee, Connecticut Greenhouse Growers Association
- Member, Governor's Advisory Committee for AgriScience and Technology Education

ROBERT E. MARRA

- Chair, Local Arrangements Committee (2013), Northeastern Division of American Phytopathological Society
- Inoculum Book Review Editor, Mycological Society of America
- Member, Local Arrangements Committee, Mycological Society of America, 2012, New Haven
- Member, USDA-APHIS-PPQ Cooperative Agricultural Pest Survey Committee (CAPS) for Connecticut

VALLEY LABORATORY

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 A. 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

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"
- President- Society of Nematologists
- Senior Editor, *Journal of Nematology*
- 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

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
- Connecticut Nurserymen's Foundation – member of Scholarship Committee

THOMAS M. RATHIER
- Vice President, Member of the program, tree improvement and merit award committees, The Connecticut Christmas Tree Growers Association

- Member of Steering Committee, Connecticut Invasive Plant Working Group
- Member, Cooperative Agricultural Pest Survey
- Member, Water Use and Conservation Committee, Connecticut Nursery and Landscape Association

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. Occasionally they report their research to elected officials. At still other times, newspapers, radio and television reporters interview our staff. These occasions are listed below.

AHRENS, JOHN F.

- Spoke on The Tree Improvement Project at the Connecticut Christmas Tree Growers Association Twilight Meeting at the Valley Laboratory in Windsor (50 attendees) *July 19, 2011*
- Gave the paper "Weed Control Practices in the Northeastern United States at the 10th Biennial Christmas tree Research and Extension Conference in Eichgraben, Austria (40 attendees) *August 21-26*
- Attended an IR-4 Ornamentals Workshop in Sacramento, CA to help set priorities for IR-4 supported research projects to support needed pesticide registrations for ornamental crops *October 5-7*
- Presented the paper "Tolerance of Conifers to Mesotrione alone or Combined with Other Herbicides" by John F. Ahrens and Todd L. Mervosh at the 66th Annual Meeting of the Northeastern Weed Science Society in Philadelphia, PA *January 3-6, 2012*
- Spoke at a Twilight Meeting of the Connecticut Christmas Tree Growers Association at the Yurechko's Tree Farm in Jewett City, CT on the subjects of weeds and conifer species adaptation to varying soil conditions *June 5, 2012*

ANAGNOSTAKIS, SANDRA L.

- Gave an invited talk titled "Diseases of Butternuts" at the Schatz Tree Genetics Colloquium in Mont Alto, PA (80 attendees) *July 10-13, 2011*
- Gave two talks titled "History of Chestnut Breeding in the US" and "Diseases of Butternuts" at the Northern Nut Growers Association Annual Meeting held in Logan, Utah (100 attendees) *July 16-20*
- Talked about her chestnut research on Len & Lisa's "Garden Talk Show" on WTIC *July 23*
- With Pamela Sletten, organized the annual NE-1033 federal project meeting for chestnut research held at the Incarnation Center in Ivoryton. She also gave a report on CAES chestnut research over the past year (39 attendees) *October 27-30*
- Spoke to a 5th grade group about tree diseases and breeding trees for resistance (20 student and 2 adult attendees) *November 29*
- Judged the nut exhibit at the Pennsylvania Farm Show and was interviewed by local access TV about the process of evaluating nut samples *January 6, 2012*
- Sampled American chestnut trees at Smith Middle School in Glastonbury while being filmed for a documentary on chestnut problems and solutions *January 19*
- Gave the presentation "Planting hybrid chestnut trees" to the Fairfield Conservation Commission in Fairfield (35 attendees) *February 18*
- Gave the talk "Growing nuts in Connecticut" for the NOFA meeting in Manchester (65 attendees) *March 3*

- Reported on "The Big Planting" at the Forest Health Monitoring Workshop held in Jones Auditorium (60 attendees) *March 6*
- Spoke about forest diversity to two groups of students visiting the Station from Hebron High School (30 attendees) *March 23*
- Worked with the Fairfield Garden Club, the Fairfield Tree Warden, and the Fairfield Conservation Commission to plant 100 timber chestnut trees, with about 97% American genes. The Garden Club of America is celebrating its 100th anniversary, and this project is Fairfield's contribution to that celebration *April 20*
- Staffed a table with Station information at the Worthington Hooker School Fair in New Haven (300 attendees) *May 12*
- Spoke about tree growth and problems to a group of visiting students from Worthington Hooker Middle School in New Haven (20 youths and 2 adults) *May 18*
- Staffed a table with Station information at the Norwalk-Wilton Tree Festival (1,160 adult and 840 youth attendees) *May 19*
- Gave a talk titled "Orchard and timber chestnuts for Connecticut" for the East Granby Land Trust (15 attendees) *May 24*

ANDREADIS, THEODORE G.

- Was interviewed about the first isolation of West Nile virus this summer from mosquitoes collected in Bridgeport by Jeevan Vittal, Fox 61 News *July 1, 2011*
- Was interviewed about the first isolation of West Nile virus this summer from mosquitoes collected in Bridgeport by Matthew Kozar of News 12 Norwalk *July 1*
- Was interviewed about mosquitoes and West Nile virus by Deborah Boxtie of NBC 30 *July 18*
- Was interviewed about the isolation of Jamestown Canyon virus and West Nile virus from mosquitoes this year by Nancy Burton of The Patch *July 18*
- Was interviewed about the isolation of West Nile virus from mosquitoes collected in Greenwich and Stamford by Marc Sims of Connecticut Public Radio *July 27*
- Was interviewed about the mosquito and arbovirus surveillance program for the 2011 season and the effects of the abundance of early spring mosquitoes on West Nile virus by Brigitte Ruthman of the Waterbury Republican American *July 27*
- Was Interviewed about the build-up of West Nile virus in the state by Dan Kane of WFSB TV3 *July 28*
- Was interviewed about West Nile virus activity in Stamford by Anthony Buzzeo of the Stamford Daily *July 28*
- Was interviewed about the isolations of West Nile virus over the summer from mosquitoes collected in New Britain, Stamford, and Westport, by Fran Schneidau *August 3*
- Discussed the State Mosquito Trapping and Testing Program and impact of budget cuts on the mosquito research and surveillance programs with State Representative Patricia Dillon *August 3*
- Was interviewed about the rapid build-up of West Nile virus this summer and the detection of virus in mosquitoes collected in 15 towns in CT by Steve Coats of WTIC Radio *August 9*

- Presented the talk "West Nile virus: a retrospective look at an emerging mosquito-borne disease in the western hemisphere" to the North Branford Rotary Club (15 attendees) *August 10*
- Was interviewed about the isolation of West Nile virus from mosquitoes collected in 19 towns and the risk of human infection by Bill Weir of the Hartford Courant *August 16*
- Was interviewed about West Nile virus and the State Mosquito Trapping and Testing Program by a group of graduate students from the Yale University School of Forestry *August 22*
- Was interviewed about West Nile virus activity over the summer in CT and impact of budget cuts on the program by Steve Kotchco of Connecticut Public Radio *August 23*
- Was interviewed about West Nile virus activity over the summer and mosquito-borne diseases in CT by Cory Garfman of the Journal Inquirer *August 24*
- Was interviewed about the first detection of West Nile virus in mosquitoes collected in New London County over the summer by Judy Bensen of The Day *August 25*
- Was interviewed about the State Mosquito Trapping and Testing Program, West Nile virus, and the impact of Federal budget cuts on the program by Craig Lemoult of National Public Radio *August 25*
- Was interviewed about the occurrence of two human cases of West Nile virus in residents of Bridgeport and New Haven by Amanda Cuda of the Connecticut Post *September 8*
- Was interviewed about the occurrence of two human cases of West Nile virus in residents of Bridgeport and New Haven by Mark Sims of Connecticut Public Radio *September 8*
- Was interviewed about the impact of the hurricane and associated flooding on mosquito populations and West Nile virus by Judy Bensen of The Day *September 13*
- Was interviewed about the impact of the hurricane and associated flooding on mosquito populations and West Nile virus by Brian Burnell of New England Cable News *September 14*
- Was interviewed about the impact of the hurricane and associated flooding on mosquito populations and West Nile virus by Ken Hogan of WFSB TV *September 14*
- Was interviewed about the impact of the hurricane and associated flooding on mosquito populations and West Nile virus by Chris Woodside of the Stonington-Mystic Patch *September 14*
- Was interviewed about the impact of the hurricane and associated flooding on mosquito populations and West Nile virus by Bob Miller of the Danbury News Times *September 15*
- Attended an Advisory Committee Meeting of the Yale Peabody Museum Fellows Program on Biodiversity and Human Health to discuss the NIH funded grant "Climate and Patterns of Vector-Borne Disease: Development of Translational Science Curricula *September 28*
- Was interviewed about West Nile and Eastern Equine Encephalitis virus activity in the state of Connecticut for the 2011 season by Amanda Cuda of the Connecticut Post *October 12*
- Presented a seminar entitled "West Nile Virus: A Retrospective Look at an Emerging Mosquito-Borne Disease in the Western Hemisphere" at the Mystic Aquarium (25 attendees) *October 26*
- Presented an overview of the Station's research and surveillance programs on mosquitoes and mosquito-borne diseases and discussed potential collaborative research initiatives with Dr. Albert Ko, the new Division Head and Dr. Durland Fish, Epidemiology of Microbial Disease Department, Yale School of Public Health *October 28*

- Presented the invited talk "The Contribution of *Culex pipiens* Mosquitoes to Transmission and Persistence of West Nile Virus in North America" at the 57th Annual Meeting, Northeastern Mosquito Control Association, held in Plymouth, MA (190 attendees) *December 5-7*
- Was interviewed about the Station's research and surveillance programs on mosquitoes and arboviruses by Michael Patrick, Waterbury Republican *March 5*
- Hosted the Annual Meeting of Multi-State Research Project NE-1043, Biology, Ecology & Management of Emerging Disease Vectors held at CAES and presented a research update on *Takaokaspora nipponicus*: a novel microsporidian parasite from *Ochlerotatus j. japonicus* *March 13*
- Was interviewed about the impact of the abnormally warm weather on mosquito populations and West Nile virus by Dan Kane of WFSB TV3 *March 13*
- Was interviewed about the impact of the abnormally warm weather on mosquito populations and West Nile virus by Cable News 12 Norwalk, CT *March 14*
- Was interviewed about the impact of the abnormally warm weather on mosquito populations and West Nile virus by William Weir of the Hartford Courant *March 19*
- Was interviewed about the impact of the abnormally warm weather on mosquito populations and West Nile virus by Fox 61 News *March 20*
- Was interviewed about the impact of the spring drought on anticipated mosquito populations and West Nile virus by Jocelyn Maminta of WTNH TV *April 2*
- Was interviewed about the Mosquito Trapping and Testing Program and the impact of spring drought on anticipated mosquito populations and West Nile virus by Quanah Leonard of the Waterbury Republican American *April 4*
- Was interviewed about the Mosquito Trapping and Testing Program and the impact of spring drought on anticipated mosquito populations and West Nile virus by Sam Gingerella of WTIC Radio *April 11*
- Was interviewed about the impact of the spring drought on anticipated mosquito populations and West Nile virus for Sabne Schoenberg's TV show "Homes & Estates" on Cablevision 88 *April 12*
- Hosted a day long workshop and field trip on mosquitoes and mosquito-borne diseases for a group of 10 Connecticut high school science teachers as part of the Peabody Museum's SEPA NIH Mosquito Biology Program *April 26*
- Was interviewed about the Mosquito and Arbovirus Surveillance Program for 2012 and the outlook for this summer's mosquito population and West Nile virus activity by Brian McCready of the New Haven Register *May 11*
- Was interviewed about the Mosquito and Arbovirus Surveillance Program for 2012 and the outlook for this summer's mosquito population and West Nile virus and eastern equine encephalitis activity by Steve Kotchko of Connecticut Radio Network *May 31*
- Was interviewed about the start of the State Mosquito and Arbovirus Surveillance Program for the 2012 season by Marc Sims, Connecticut Radio Network *June 5*
- Was interviewed about the start of the mosquito trapping and testing program and the projected outlook for the 2012 season by Anya Winslow, News 12, Norwalk *June 6*
- Was interviewed about mosquitoes and the projected forecast for West Nile virus activity in the state for 2012 by Fran Schneidau, CBS Radio *June 18*

- Was interviewed about the Station's research and surveillance programs on mosquitoes and mosquito-borne diseases by Jim Buchanan, WICC Radio, Fairfield *June 21*
- Was interviewed about the abundance of mosquitoes this spring and its impact on anticipated West Nile virus activity by Dave Collins of the Associated Press *June 28*
- Was interviewed for an update on the status of mosquitoes and West Nile virus in the state by Marc Sims, Connecticut Radio Network *June 29*

ARMSTRONG, PHILIP M.
- Presented an invited seminar entitled "West Nile Virus: Ecology and Evolution of an Invasive Pathogen in Northeastern US" to the Sigma Xi Chapter at Quinnipiac University *February 23*
- Participated in the Annual Meeting of Multi-State Research Project NE-1043 "Biology, Ecology & Management of Emerging Disease Vectors" held at CAES and presented the invited talk "Molecular Evolution of West Nile Virus in a Northern Temperate Region" *March 13*
- Met with scientists at the University of Western Australia and gave an invited seminar entitled "West Nile Virus: Ecology and Evolution of an Invasive Pathogen in Northeastern USA *May 8 and 9*

ARSENAULT, TERRI
- Gave a platform presentation entitled "Analysis of tetramine by GC-MS" at the annual FDA FERN Chemistry Cooperative Agreement (cCAP) Technical Meeting in Madison, WI (75 attendees) *August 23-25, 2012*
- Participated in a workshop on packaging and shipping of Division 6.2 Infectious Substances Category A and B and Dry Ice that was sponsored by The Connecticut Department of Public Health BioResponse Laboratory and Hartford Hospital *September 30*
- With Rose Hiskes and Katherine Dugas, presented a poster focused on making scientific observations of different insects, and identification of two invasive insects at the Girl Scout 100th Anniversary Jubilee at the Durham Fairgrounds (300 attendees) *May 19, 2012*

AYLOR, DONALD E.
- Gave the talk "Atmospheric Transport of Pollen and Spores" in the Atmosphere/Ocean/Climate Dynamics Seminar Series in the Ecology and Geophysics Department at Yale University in New Haven (12 attendees) *December 15, 2011*
- Helped judge the finalists in the Physical Sciences Teams Competition at the Annual Connecticut Science Fair at Quinnipiac University in Hamden *March 15, 2012*

BARSKY, JOSEPH P.
- Met with officials from Yale University to provide plant identification expertise for the PlaNYC Reforestation Initiative at Kissena Park, Flushing, NY (3 participants) *July 26, 2011*
- Spoke to agricultural students at Lyman Memorial High School about invasive plant ecology, safe procedures when using field equipment, and demonstrated flame weeding procedures, Lebanon (18 students) *October 13*
- Met with Department of Energy and Environmental Protection Foresters to discuss a forest stand rehabilitation project *October 13*

- Hosted The Connecticut Agricultural Experiment Station booth at the Brooksvale Fall Festival, Hamden (1,000+ attendees) *October 15*
- Discussed crop tree management at Barkhamsted Reservoir *October 20*
- Gave two presentations on "Forest research protocols" to students from Co-Op High School, New Haven at East Rock Park (20 students, 3 teachers) *October 26*
- Spoke on equipment safety at the Invasive Shrub Control Workshop in Norfolk in cooperation with University of Connecticut Cooperative Extension (21 attendees) *October 29*
- Staffed a CAES display at the screening of "The Green Fire", a film highlighting the career of Aldo Leopold, at the Peabody Museum, New Haven *November 12*
- Spoke on safety issues when using forestry and herbicide equipment at an NRCS Barberry Control Workshop at White Memorial Conservation Center (26 attendees) *November 15*
- Prepared and administered the forestry identification exam for the 2011 Connecticut Future Farmers of America Forestry Career Development Event at UConn, Storrs (35 students) *November 21*
- Participated in the Connecticut Tree Protective Association Annual Winter Meeting in Southington *January 19, 2012*
- Participated in the Agricultural Compliance Review for Lyman Hall High School, Wallingford *January 24*
- With Jeffrey S. Ward, met with MDC foresters to discuss strategies to regenerate forests in areas of high deer density in West Hartford *February 9*
- With Jeffrey S. Ward, met with officials from the Winchester Land Trust to discuss forest management (4 attendees) *February 22*
- Staffed a CAES booth featuring Boxwood Blight and invasive exotic insects at the Garden Expo, Fairfield (1,500 attendees) *March 17*
- Moderated "Lightening Round" oral poster presentations at the New England Society of American Foresters at the annual Winter Meeting in Amherst, MA *April 5*
- Completed the Connecticut Tree Protective Association course Arboriculture 101 *April 11*
- Represented CAES at a booth at the Norwalk-Wilton Tree Festival at Cranbury Park, Norwalk *May 19*
- Gave six talks on "How trees grow" to 4th grade students at the Southington School Nature Day (132 students, 21 adults) *May 31*

BLEVINS, TIA

- Participated in the 38th annual Horticultural Inspection Society, Eastern Chapter's meeting in Burlington, VT. As Treasurer, she presented the financial report to the members *April 16-19, 2012*
- Participated in an information update session about Systems Approach to Nursery Certification at the Eastern Plant Board's 87th annual meeting *April 17*
- Participated in a USDA Forest Service digital aerial sketch mapping and Geolink software training workshop at the Bear Brook State Park, Allenstown, NH *May 23*

BUGBEE, GREGORY J.

- Spoke at the annual meeting of the Coventry Lake Association on the results of the CAES IAPP Survey of Coventry Lake (50 attendees) *July 14, 2011*

- Was interviewed by the Associated Press on invasive aquatic plants in CT *August 12*
- Was interviewed about invasive aquatic plants in lakes Candlewood, Lilinonah, and Zoar by George Linkletter of Danbury Public TV *August 26*
- Was interviewed about Invasive Aquatic Plants in Lake Candlewood by George Linkletter of Newtown Public TV *September 20*
- Was interviewed on invasive aquatic plants in Lakes Candlewood, Lillinonah and Zoar by George Linkletter at the Newtown Public Television Studio *October 1*
- Presented an update to the Connecticut Invasive Plants Council on the CAES Invasive Aquatic Plant Program at the Department of Agriculture in Hartford (15 attendees) *November 8*
- With Jordan Gibbons, presented a poster entitled "Using GIS to Monitor Invasive Plants in Candlewood Lake" at Geographic Information System Day at the State Capitol *November 17*
- Spoke to fifth graders from the New Haven Public Schools Talented and Gifted Program on Soils and Invasive Aquatic Plants (15 students) *November 20*
- With Michael Cavadini, taught a science class on Soils at the New Haven Cooperative Arts and Humanities Magnet School *December 7*
- With Jordan Gibbons, presented the results of the 2011 aquatic plant survey of Lake Quassapaug and spoke on weed management options at a town meting held at the Middlebury Public Library (approx. 60 attendees) *January 31, 2012*
- With Jordan Gibbons, presented an Invasive Aquatic Plant Identification Seminar at Connecticut IB Academy in East Hartford (40 attendees) *February 2*
- Presented a seminar on Soil Science for Arborists at the Bartlett Arboretum in Stamford (30 attendees) *February 9*
- With Jordan Gibbons and Mark June-Wells presented an Invasive Aquatic Plant identification seminar at the Connecticut Envirothon at Sacred Heart University in Fairfield (70 attendees) *February 18*
- Met with members of the Fence Rock Lake Association in Guilford to discuss the Station's discovery of *Egeria densa* in Fence Rock Lake and arrange control strategies (7 attendees) *February 29*
- Was interviewed by Bob Miller of the News Times regarding the effects of the warm winter on weed control in Candlewood Lake *March 2*
- Spoke to the Old Ripton Garden Club in Shelton on "Container Gardening Indoors and Out" (35 attendees) *March 5*
- Spoke on "Connecticut Considers Banning Phosphorus in Lawn Fertilizer" at the Connecticut Conference on Natural Resources held at UCONN (45 attendees) *March 12*
- Spoke to the Caudatowa Garden Club in Ridgefield on "Improving Soil in the Home Garden" (45 attendees) *March 13*
- With Jordan Gibbons, gave an Invasive Aquatic Plant workshop at Three Rivers Community College in Norwich (40 attendees) *March 14*
- With Michael Cavadini, proctored the Awesome Aquifer event at the 2012 Science Olympiad in Farmington (30 attendees) *March 17*
- Spoke to the Branford Land Trust on Invasive Aquatic Plants (10 attendees) *March 27*
- With Michael Cavadini, gave a soil testing demonstration to juvenile detainees at the Cheshire correctional facility (10 attendees) *March 28*

- Spoke on "Improving Soil in the Home Garden" to the Wethersfield Garden Club (50 attendees) *April 4*
- With Jordan Gibbons, spoke on "Invasive Aquatic Plants" to two groups from Middletown High School (30 attendees) *April 20*
- Was interviewed about invasive aquatic plants in Connecticut by Lillianna Vinan of the Yale Daily News *April 24*
- Spoke on "Container Gardening Indoors and Out at a garden seminar series given by the Cheshire Public Library (30 attendees) *April 25*
- With Jordan Gibbons gave an update to the Grannis Lake Association in East Haven on "CAES IAAP Research on Grannis Lake and Prospects for the Future" (25 attendees) *May 1*
- Spoke to the Cheshire Garden Club on Soil Fertility and Compost (25 attendees) *May 7*
- Judged the Future Farmers of America Science Fair in the Jones auditorium *May 11*
- Spoke to the Fence Rock Lake Association in Guilford on CAES IAPP Surveillance for Brazilian Waterweed possible control options (25 attendees) *May 14*
- Spoke to students from the Hooker School in New Haven on "Invasive Aquatic Plants" (25 attendees) *May 18*
- With Jordan Gibbons, spoke at the annual meeting of the Northeast Chapter of the North American Lake Management Society on "Using Geospatial Technology in the Mapping and Control of Invasive Aquatic Plants" (40 attendees) *June 9*
- Spoke on "Invasive Aquatic Plants in Connecticut" to a group of students from Central Connecticut State University (20 attendees) *June 13*

CECARELLI, RICHARD

- Led two different field trips for talented and gifted students from New Haven Public School System (38 fifth graders) at Lockwood Farm *May 2 and May 10*.

CHEAH, CAROLE A.

- Gave a short presentation on biological control of mile-a-minute weed and hemlock woolly adelgid in Connecticut for the Pesticide Credit Tour at Plant Science Day (46 attendees) *August 3, 2011*
- Gave a poster presentation on biological control of mile-a-minute weed for the Valley Laboratory Nursery and Landscape Research Tour (20 attendees) *September 13*
- Was interviewed by Bob Pollack on artificial diet project for hemlock woolly adelgid predators for the Station Associates Bulletin *October 28*
- Gave a presentation on progress in development of an artificial diet for the mile-a-minute biocontrol weevil at the 2012 MAM Biological Control Cooperators Meeting at Trenton, NJ (80 attendees) *February 16, 2012*
- Visited and discussed mile-a-minute and hemlock woolly adelgid biocontrol projects with cooperators from the Phillip Alampii Beneficial Laboratory, NJDA *February 17*
- Gave a presentation on progress in biological control of mile-a-minute weed in Connecticut at the 2012 Forest Health Monitoring Workshop (60 participants) in New Haven *March 6*
- Gave a workshop on control of mile-a-minute weed through state and NGO partnerships at the 2012 Connecticut Land Conservation Conference at Wesleyan University, Middletown (11 attendees) *March 24*

- Was interviewed about biological control of Hemlock Wooly Adelgid in Connecticut and the effects of cold temperatures on survival by Patterson Clark of the Washington Post *March 28*
- Gave a joint presentation on the threat of elongate hemlock scale to hemlock sustainability with David Irvin of the Department of Energy and Environmental Protection Forestry at the 2012 Northeast Forest Pest Council joint meeting with the New England Society of American Foresters at Amherst, MA a(130 attendees) *April 5*
- With Dr. DeWei Li, submitted a poster on "the red bark phenomenon" at the 2012 Northeast Forest Pest Council joint meeting with the New England Society of American Foresters at Amherst, MA *April 5*
- Hosted a tour of the Kenneth White Insectary at the Valley Laboratory and explained methods for rearing Hemlock Woolly Adelgid predators to entomologists from the Maine Forest Service *April 5*
- Assisted in informing the legislators, members of the public and other stakeholders on the mission and activities of The Connecticut Agricultural Experiment Station at the Legislative Office Building *April 26*
- Participated in a conference call on hemlock woolly adelgid biocontrol rearing of predators with Maine Forest Service and University of Southern Maine *May 16*
- Hosted a tour of the Kenneth White Insectary and engaged in collaborative discussion on rearing procedures for HWA predators with Dr. Joseph Staples, University of Southern Maine *May 29*
- Together with Dr. DeWei Li, met with Dr. David Houston, retired US Forest Service, to discuss research collaboration in New Haven *May 23*
- Was interviewed about biological control of mile-a-minute weed by Grace Williams for the Wilton Bulletin *June 14*
- Met with Land and Water Association members at Doolittle Lake, Norfolk, to check hemlocks and discuss HWA and elongate hemlock scale management options for hemlocks *June 18*

COWLES, RICHARD S.

- Gave the talk "Managing Armored Scales in Christmas Trees" and helped with the insect and mite portion of a walking tour for the "Conifer pests ID and Control Workshop" hosted by The Hudson Valley Commercial Horticulture Education Program of Cornell Cooperative Extension, Milton, NY (32 attendees) *July 12, 2011*
- Discussed "Root Feeders in Strawberries and Strawberry Sap Beetles" to a UConn Twilight Growers' IPM Meeting, South Windsor (50 attendees) *July 14*
- Talked about "Insect Management on Christmas Trees" at the CT Christmas Tree Growers' Association Meeting at the Valley Laboratory (50 attendees) *July 19*
- Gave two presentations: "Systemic Insecticides for Trees and Shrubs" and "Insecticide Mode of Action, Resistance Management, and IPM" to the MA Association of Lawn Care Professionals, Boyleston, MA (45 attendees) *July 28*
- Provided an overview of progress on the Fir Genetic Improvement Project at the Valley Laboratory (5 attendees) *July 29*
- Presented the field exhibit "Trunk sprays to manage hemlock woolly adelgid" at Plant Science Day (30 attendees) *August 3*

- Helped with the insect and mite portion of a twilight walking tour for the Connecticut Christmas Tree Growers' Association meeting in New Milford (25 attendees) *August 30*
- Made the first detection in New England of spotted wing drosophila, *Drosphila suzukii*, from traps in Fairfield County intended to monitor strawberry sap beetle activity *August 19*
- Presented the field exhibit "Bark application of systemic insecticides" at the Nursery Field Day, Valley Laboratory (15 attendees) *September 13*
- Spoke to the Connecticut Christmas Tree Growers' Association meeting, Mansfield, CT (35 attendees) *September 17*
- Conducted two "pest walks" with Dr. George Hudler to train attendees of the Sentinel Plant Network in pest observation and diagnosis at the Arnold Arboretum in Boston, MA (40 attendees) *September 22 and 23*
- Spoke to farmers about "Cover crops and ground covers in perennial crops – IPM implications" at a Natural Resources Conservation Service Meeting, East Windsor (40 attendees) *November 15*
- Presented a lecture on the "Spotted wing drosophila: Current and potential management methods" to fruit growers at a meeting hosted by University of Rhode Island, Cumberland, RI (40 attendees) *November 29*
- Spoke to farmers about "Spotted wing drosophila: Current and potential management methods" at the Connecticut Pomological Society meeting, Glastonbury (80 attendees) *December 6*
- Discussed "Bed bug biology and management" with Connecticut Community Care, Inc., an organization with the mission to assist people to live at home, Bristol, CT (40 attendees) *January 5, 2012*
- Gave the talk "Spotted wing drosophila: Current and potential management methods" at the Massachusetts Vegetable and Small Fruit Growers' Meeting, Northampton, MA (100 attendees) *January 6*
- Gave the talk "SWD IPM ASAP" at the Connecticut Vegetable and Small Fruit Growers' Conference, Vernon (150 attendees) *January 19*
- Spoke on "Turf insect management, opportunities for managers" to the Connecticut Grounds Keepers' Association, Berlin, CT (300 attendees) *January 24*
- Presented the talk "Spotted wing drosophila: Current and potential management methods" at the Massachusetts Farm Winery Association meeting, Sturbridge, MA (50 attendees) *February 7*
- Presented the talk "SWD IPM ASAP" at the Connecticut Farm Fresh Meeting, Glastonbury (7 attendees) *February 25*
- Spoke on "Insects and mites of rhododendrons" to the CT Rhododendron Society, Windsor (45 attendees) *February 7*
- Was interviewed about the new insect and disease tolerant strawberry cultivar 'Rubicon' by Vinti Singh February 22
- Presented the talks "Managing armored scales" and "Difficult to manage insect pests" to the Penn State Cooperative Extension Christmas Tree Growers' short course in Hazelton, PA (100 attendees)*March 3*

- Led a 2.5 hour "Spotted wing drosophila: Current and potential management methods" training session for New England research and extension personnel at the Valley Lab, Windsor (20 attendees) *March 7*
- Gave the talks "Systemic insecticides to manage insect pests" and "Managing common insect pests" to arborists at Rainbow Tree Care arborist training seminars in Suffern, NY (10 attendees) *March 13*
- Gave the talks "Systemic insecticides to manage insect pests" and "Managing common insect pests" to arborists at Rainbow Tree Care arborist training seminars in Hartford, CT (20 attendees) *March 14*
- Gave the talks "Systemic insecticides to manage insect pests" and "Managing common insect pests" to arborists at Rainbow Tree Care arborist training seminars in Natick, MA (60 attendees) *March 15*
- Gave the presentation "SWD IPM ASAP" at the Eastern Branch Entomological Society Meeting, Hartford, CT (60 attendees) *March 17*
- Gave the presentation "SWD IPM ASAP" at the Insect Detection, Evaluation and Prediction Symposium (30 attendees) *March 18*
- Spoke on "Spotted wing drosophila: protecting home fruit" at the Experiment Station Associates Annual Meeting (25 attendees) *March 29*
- Presented "Spotted Wing Drosophila" at Plant Science in the Spring (25 attendees) *April 25*
- Presented the talk "Managing armored scales in Christmas trees" and conducted a walking tour of pests for the Rhode Island Christmas Tree Growers' Association, Exeter, RI (35 attendees) *May 5*
- Gave the talk "Insect management" at a walking tour for the Connecticut Christmas Tree Growers' Association in Griswold, CT (40 attendees) *June 5*
- Gave a class on "Insect management to the New Hampshire/Vermont Christmas Tree Growers' Association in Deerfield, New Hampshire (60 attendees) *June 23*
- Gave the talk "Spotted wing drosophila management" to the Massachusetts Blueberry Growers' Association in Paxton, MA (25 attendees) *June 23*

CREIGHTON, MARK H.

- Spoke with members at a meeting of the Eastern Beekeepers Association at UCONN in Storrs *June 9*
- Gave a presentation on honey bees with an observation hive at the Mt. Laurel Senior Center in Glastonbury (20 attendees) *June 12*
- Spoke with members at a Connecticut Beekeepers Association Field Day and demonstrated a hive inspection at Lockwood Farm *June 16*
- Assisted Dr. Douglas W. Dingman with a Nosema Microscope workshop for the Backyard Beekeepers Association at the Station (15 attendees) *June 30*

DE LA TORRE ROCHE, ROBERTO

- Visited the CT Department of Public Health Electron Microscopy Laboratory and discussed collaborative research on the detection of nanoparticles in agricultural crops with Laboratory staff *June 8*

DINGMAN, DOUGLAS W.

- Presented an informal talk regarding honey bees and beekeeping to the children of Cheryl Romeo, Oxford, CT *August 10*
- Attended a CBA committee meeting and helped outline an upcoming program on sustainable beekeeping at Massaro Farm located in Orange, CT *August 11*
- Presented two demonstrations on microscopic testing for Nosema in honey bees as part of a sustainable beekeeping program held in Woodbridge at Massaro Farm *August 20*
- Participated in the Programming Committee meeting of Quinnipiac Chapter of Sigma Xi *August 25*
- Presented the talk "Honey Bee Basics" to the Cheshire Garden Club *October 3*
- Participated in a committee meeting of the Connecticut Beekeepers Association and helped outline the upcoming program on sustainable beekeeping in the coming year and updated them on the research program being initiated *October 26*
- Was Master of Ceremonies and speaker introduction for the Quinnipiac Chapter of Sigma Xi's Albert Noble presentation series at Quinnipiac University *October 27*
- Participated in the CT Beekeepers Association annual SNEBA in Old Lyme, CT *November 19*
- Presented a short talk/demonstration of honey bee diseases and research to pupils of the gifted and talented program in the New Haven Public School System *November 29*
- Presented a lecture on Honey Bee Genetics and Research to high school students in the Regional Agriculture Science and Technology Program at Southington High School *December 8*
- With Dr. Neil P. Schultes presented a lecture for Station staff on Introduction to Genomics in Jones Auditorium *January 12, 2012*
- With Dr. Neil P. Schultes presented a lecture for Station staff on Next Generation DNA Sequencing Technologies in Jones Auditorium *January 30*
- With Dr. Neil P. Schultes, presented the lecture "Genomics for CAES" to Station staff in Jones Auditorium February 7
- Participated in Connecticut Beekeepers Association's Bee School, New Haven *February 11*
- Was program spokesman for Sigma Xi annual seminar series, Hamden *February 23*
- Presented the seminar "Honey Bee basics at the Connecticut Flower and Garden show in Hartford *February 24*
- Reviewed his research project with officers of the CT Beekeepers Association and the American Honey Princess *March 16*
- Participated in a meeting with officials from the Westport Weston Health District, the East Shore District Health Department, the Norwalk Health Department, and the Yale Institute for Biospheric Studies to outline procedural details for conducting microbial source tracking in three Long Island Sound watersheds with Connecticut *March 20*
- Presented honey bee information and research efforts to Hebron community school students touring the Station *March 23*
- Attended an evening meeting with Ted Jones (CT Beekeepers Assoc.) and Jason Morrill (Massaro Community Farm) regarding community outreach and research being conducted on bee colonies at Massaro Farm, Woodbridge, CT *April 12*
- Participated in the CT Beekeepers Association quarterly meeting, Hamden, CT *April 14*

- Met with officials from the Westport Westin Health District and the Department of Ecol. Evol. Biol., Yale University to discuss procedural details for microbial source tracking experiments, New Haven, CT *April 16*
- Presented the seminar "Honey bee basics" to Avon Senior citizens at the Avon Senior Center, Avon, CT *April 30*
- Presented Part 1 of a seminar on digital video editing and production to Station personnel at the 11:00AM lecture series in Jones Auditorium *May 1*
- Presented the second part of the digital video editing and production seminar *May 2*
- Served as one of four judges from the Station for the New Haven Public School Science Fair *May 15-16*
- Presented a short discussion on honey bee disease research to students from Hooker public school (New Haven) *May 18*
- Participated in a meeting of the Backyard Beekeepers Association regarding AFB research and the organization of a workshop to train beekeepers on use of a compound light microscope to monitor bee hives for Nosema spore presence *May 24*
- Taught a workshop with Mark Creighton on using an optical microscope to monitor beehives for Nosema presence and how to sequentially sample bees to determine the infection rate of the population, at a Backyard Beekeepers Association Meeting at the Station in New Haven *June 30*

DOUGLAS, SHARON M.

- Gave a presentation titled "Current Diseases of Christmas Trees" at the twilight meeting of the Connecticut Christmas Tree Growers Association at the Valley Lab in Windsor (50 attendees) *July 19, 2011*
- Participated in, answered questions about tree diseases, and organized the summer meeting of the Connecticut Tree Protective Association held at the Farmington Club in Farmington (561 adult and 36 youth attendees) *July 21*
- Was interviewed about the impact of high temperatures and drought on plants and plant diseases by Bill Weir of the Hartford Courant *July 22*
- Represented the Station and answered questions about Plant Science Day and plant diseases on Len & Lisa's "Garden Talk" show" on WTIC *July 23*
- Participated in the monthly meeting of the CTPA Board of Directors in New Haven *August 9*
- Participated in a conference call of NEPDN diagnostic laboratories *September 6*
- Was interviewed about the impact of Tropical Storm Irene on fall foliage by John Burgeson of the Connecticut Post *September 7*
- Was interviewed about Tropical Storm Irene's impact on crops in Connecticut by Judy Benson of The New London Day *September 8*
- Assisted the CT Tree Protection Examining Board with administering the oral exam to candidates for the arborist license *September 14*
- Discussed research and service of the Department of Plant Pathology and Ecology and CAES with Yale senior Rae Bicheu *September 15*
- Participated in the monthly meeting of the CTPA Board of Directors *September 15*
- Gave the presentation "Understanding plant diseases" as part of the Federated Garden Club's Garden Study School in Jones Auditorium (14 attendees) *September 20*

- Was interviewed about fall color and how it will be affected by foliar diseases of trees, especially maple, by Bob Miller of the Danbury News-Times *September 22*
- Was interviewed about the unusual warm weather and its impact on crops and fall color by Bridgette Ruthman of the Waterbury Republican-American *September 26*
- Organized and participated in the CTPA Workshop titled "Trees and the Law" held at Aqua Turf in Plantsville (129 attendees) *October 4*
- Gave a presentation on "Poisonous plants" to members of the Branford Garden Club in Branford (74 attendees) *October 6*
- Gave a presentation titled "Eco-friendly management of plant diseases" to members of the Hardy Plant Society, Connecticut Chapter, in Wethersfield (24 attendees) *October 26*
- Was interviewed about the unusual snow storm in late October and damage to trees and shrubs by Ritchie Rathsack of the Meriden Record-Journal *November 2*
- Gave the invited talk "Key diseases of conifers" at the 2011 Tree Care Industry Association Expo at the Hartford Convention Center (850 attendees) *November 3*
- Participated in the monthly Board of Directors Meeting of the CTPA at the Station *November 8*
- Was interviewed about why some trees and shrubs are flowering in November and implications for climate change by Mary O'Leary of the New Haven Register *November 28*
- Organized an evening workshop on "Winter moth" co-sponsored by the CTPA and CNLA at the CT Department of Energy andEnvironmental Protection Marine Headquarters in Old Lyme (25 attendees) *December 1*
- Was interviewed about boxwood blight by Jen Burnstein of FOX TV *December 6*
- Participated in the monthly Board of Directors meeting of the CTPA at Aqua Turf in Plantsville *December 13*
- Was interviewed about boxwood blight in Connecticut by Nancy Crevier of The Newtown Bee *December 15*
- Was interviewed about boxwood blight in Connecticut by Penny Overton of the Waterbury Republican-American *December 15*
- Participated in a conference call about boxwood blight in the U.S. with plant pathologists from North Carolina and Virginia *December 22*
- Gave a presentation titled "Boxwood blight – A new threat to boxwood in the U.S." at the CNLA/CGGA Winter symposium held at Manchester Community College (140 attendees) *January 5, 2012*
- Was interviewed about boxwood blight in Connecticut by Kathryn Boughton of the Litchfield County Times *January 10*
- Was interviewed, along with Dr. Robert E . Marra, about boxwood blight and other exotic, introduced fungal pathogens by Susan Milius of Science News *January 17*
- Participated in the Annual Meeting of the CTPA as a member of the CTPA Board of Directors and reported about the CTPA Education Committee's activities at Aqua Turf in Plantsville. Attendance at this meeting exceeded previous records. (840 attendees) *January 19*
- Gave the presentation "Eco-friendly management of plant diseases" for the Danbury Garden Club (45 attendees) *January 20*

- Gave the invited presentation "Boxwood blight – A new threat to boxwood in the U.S." at New England Grows 2012 held at the Boston Convention Center (625 attendees) *February 3*
- Was interviewed about boxwood blight by Kelli Rodda, Editor of Nursery Management Magazine, at New England Grows 2012 *February 3*
- Participated in the Board of Directors meeting of the CTPA in the CAES Board Room *February 14*
- Gave the presentation "Understanding plant diseases" as part of the CT NOFA Organic Land Care Workshop held in Jones auditorium (45 attendees) *February 21*
- Participated in a multi-state boxwood blight conference call *February 24*
- Was interviewed about the unseasonably warm winter temperatures and early flowering by Kendra Bobowick of The Newtown Bee *February 29*
- Gave an invited presentation on "Boxwood blight: implications for New England" at Northeast Nursery's annual meeting, Danvers, MA (125 attendees) *March 13*
- Gave a presentation titled "Boxwood blight: a new threat to boxwood in CT and the US" at the Bartlett Spring Horticultural Forum at Fairfield University in Fairfield (85 attendees) *March 14*
- Was interviewed about the impact of the unusually warm weather on plants by Steve Grant for the Hartford Courant *March 15*
- Was a guest, along with Dr. Victoria Smith, on the Wayne Norman Radio Show (WILI Radio, Willimantic *March 19*
- Presented a poster on "Boxwood blight" and answered questions about the new disease at Ag Day at the Capitol in Hartford *March 21*
- Was interviewed about pachysandra as a new host of *Cylindrocladium pseudonaviculatum*, the cause of boxwood blight, by Nancy Crevier of The Newtown Bee *March 22*
- Participated in a webinar titled "Boxwood blight: where we are and where we hope to be" organized by ANLA (219 attendees) *March 23*
- Gave a presentation titled "Boxwood blight – A new threat to boxwood in CT" at the Annual Meeting of the Experiment Station Associates in Jones Auditorium (35 attendees) *March 29*
- Was interviewed about boxwood blight by Roxanne Washington of the Plain Dealer newspaper of Cleveland, OH *March 29*
- Was interviewed about early flowering, frost, and implications for climate change by Melissa Bailey of the New Haven Independent *March 29*
- Was interviewed about boxwood blight and its impact on Connecticut growers and homeowners by Jan Spiegel of The Connecticut Mirror *April 4*
- Gave a presentation on "Poisonous plants" for the Evening Branford Garden Club in the Branford Community Center (17 adult attendees) *April 9*
- Was interviewed about the arborist law and arborist exam in Connecticut by Scot Haney of WFSB Channel 3 *April 10*
- Was one of 50 invited attendees from nine countries who participated in the international "Royal Horticultural Society Boxwood summit" held in London at the RHS Lawrence Hall and Conference Center to discuss boxwood blight in CT (50 attendees) *April 26*
- Gave a presentation titled "Diseases of woody ornamentals used for bonsai" for the Bonsai Society of Greater New Haven in Jones Auditorium (30 attendees) *May 10*

- Assisted in judging projects at the State FFA Agriscience Fair held in Jones Auditorium *May 11*
- Judged projects at the New Haven Public School Science Fair for the winners of the CAES Award and the CAES-A. E. Dimond Award *May 14 - 15*
- Was interviewed about boxwood blight and its impact on landscape design and use by Constance Casey from Landscape Architect Magazine *May 15*
- Organized and participated in a meeting of the CTPA Education Committee to develop a workshop on soil health as it relates to tree health in New Haven *May 21*
- Gave the presentation "The history of plant disease – The Irish potato famine and more" for the Orchard Valley Garden Club of Southington in Southington (52 attendees) *May 22*
- Gave the presentation "Prevention and management of common diseases in the landscape" to members of the Garden Club of Woodbridge in Woodbridge (45 attendees) *June 5*
- Participated in a meeting of the CTPA Board of Directors at The Farmington Club (12 attendees) *June 5*
- Participated in the Connecticut Tree Protection Examining Board's June meeting and assisted with the oral exam required to become a licensed arborist *June 6*
- Gave the presentation "An update on boxwood blight in Connecticut" and participated in the ESA field trip to White Flower Farm, Freund's Farm and Market, and Laurel Brook Farm in Litchfield County (32 attendees) *June 7*
- Participated in the CT Cooperative Agricultural Pest Survey meeting to discuss plants for FY13 held in Jones Auditorium (15 attendees) *June 8*
- Attended the June meeting of the Connecticut Horticultural Society held in Farmington (75 attendees) *June 21*
- Participated in a conference call with the Boxwood Blight Working Group to discuss research funded by the FY12 Farm bill (10 attendees) *June 28*

DUGAS, KATHERINE

- Participated in a CTPA sponsored field trip to see the ongoing control, survey, and replanting efforts for the Asian longhorned beetle infestation in Worcester, MA *July 12, 2011*
- With Rose Hiskes, staffed a table about the CAPS Program at the CNLA Summer Field Day at Veterans Park in Watertown *July 13*
- With Rose Hiskes and Dr. Claire Rutledge, staffed an insect identification table at the CTPA Summer Meeting held at the Farmington Club in Farmington (561 adult and 36 youth attendees) *July 21*
- Gave a talk about common garden insects and toured the QVWA's butterfly garden at the Quinnipiac Valley Watershed Association's Midsummer Celebration in Meriden *July 24*
- Staffed a table educating the public about Asian longhorned beetle, Emerald ash borer, and other forest pests at the Sharon Audubon Festival in Sharon *August 13*
- Staffed an information table on the Asian longhorned beetle and Emerald ash borer at the Woodstock Agricultural Fair in Woodstock, CT *September 3 & 5*
- Staffed an information table on the Asian longhorned beetle and Emerald ash borer at the Hebron Harvest Fair in Hebron *September 11*
- Instructed attendees at the Hamden Farmers Market on the risk of moving firewood and forest pests *September 16*

- Assisted the Middlesex County Master Gardeners at a table in the Discovery Tent and distributed information about garden pests and invasive species at the Durham Fair in Durham *September 23 & 24*
- Staffed the CAES booth in the Connecticut Building at the Big E in West Springfield, MA *September 27*
- Participated in a meeting of the CAPS committee at the Valley Laboratory in Windsor *October 17*
- Staffed a display table about Asian longhorned beetle and Emerald ash borer at the Annual Meeting of the Connecticut Association of Conservation & Inland Wetlands Commissions held at Mountain Ridge in Wallingford (150 attendees) *November 12*
- Staffed a display table about bed bugs at the second annual Bridgeport Health Fair held at Bridgeport University (200 visitors to the table) *November 18*
- Spoke about the Insect Information Office to visiting students from the New Haven Gifted and Talented Program (20 students) *November 29*
- With Dr. Kirby C. Stafford, III and Rose Hiskes, participated in a conference call of the Forest Pest Outreach and Survey Project (27 participants) *November 30*
- Staffed an information table about forest pests at the CNLA Winter Symposium in Manchester, CT *January 4, 5, 2012*
- Staffed a CAES information table about forest pests at the CTPA Annual Meeting held at Aqua Turf in Plantsville (840 attendees) *January 19*
- Staffed an information table about forest pests at the Northeast RV and Camping Show in Hartford *January 20*
- Staffed an information table about forest pests and boxwood blight at the CGKA Winter Meeting in Cromwell, CT *January 24*
- Gave a talk on insects to first and third grade students at the St. Thomas' Day School in New Haven (38 students) *February 10*
- Gave a talk on insects at the Westbrook Library for the Potapaug Audubon Society (30 attendees) *February 18*
- Staffed the CAES table at the CT Flower and Garden Show in Hartford *February 24-25*
- Gave a lecture about working in the field of Entomology at Mitchell College in New London (15 student attendees) *March 8*
- Participated in the Entomological Society of America Eastern Branch Annual Meeting in Hartford where there were CAES booths dedicated to bed bugs, Asian longhorned beetle, and emerald ash borer (250 attendees) *March 17*
- Distributed teaching materials, handouts, and outreach materials about forest pests to educators at the Connecticut Outdoor and Environmental Education Association Annual Meeting in New Britain (75 attendees) *March 23*
- With Rose Hiskes, participated in a conference call about Forest Pest Outreach *April 13*
- With Rose Hiskes and Terri Arsenault, attended the Girl Scouts' 100th Anniversary Jubilee held at the Durham Fairgrounds and helped staff a booth that included information about scientific observation, invasive forest pests, and promoting Plant Science Day. Over 8,000 attendees were recorded by the Girl Scouts of Connecticut, and at least 300 girls stopped by the CAES booth to make plant and insect drawings *May 19*

- Displayed an Asian longhorned beetle/Emerald ash borer exhibit at Trail Day at Camp Laurel in Lebanon, CT *June 3*
- Led a staff training session on recognizing and reporting Asian longhorned beetle and emerald ash borer at Camp Laurel in Lebanon (50 participants) *June 22*

DURGY, ROBERT

- Taught a University of Connecticut Master Gardener program class on vegetables in North Haven (47 attendees) *February 9, 2012*
- Taught a University of Connecticut Master Gardener program class on vegetables in Norwich (41 attendees) *February 14*
- Taught a University of Connecticut Master Gardener program class on vegetables in Stamford (36 attendees) *February 20*
- Taught a University of Connecticut Master Gardener program class on vegetables in Torrington (38 attendees) *February 22*
- Taught Math Calculations and Calibration for Pesticide Applicator's Training in East Haven (46 attendees) *February 16*
- Taught Math Calculations and Calibration for Pesticide Applicator's Training in West Hartford (19 attendees) *February 28*
- Presented two workshops at the CT-NOFA End of Winter conference entitled "Top Ten Vegetable Insect Pests" (33 attendees) and "Deer Fencing for Large and Small Farms" (23 attendees) *March 3*

EITZER, BRIAN D.

- Along with Dr. Kimberly Stoner, hosted officials from the US EPA Environmental Fate and Effects Division to discuss research findings on pesticides and honey bees *July 6-7, 2011*
- Participated in an FDA FERN CAP Chemistry conference call for LC-MS Exactive users *July 7*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cCAP) Laboratory conference call *July 14*
- Participated in a US FDA food safety contract conference call focused on funding state laboratory accreditation *July 14*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *August 11*
- Gave a platform presentation entitled "Validation of a QuEChERS high resolution LC-MS pesticide screen" at the annual FDA FERN Chemistry Cooperative Agreement (CCAP Technical Meeting in Madison, WI (75 attendees) *August 25*
- Presented a talk entitled "The role of Pesticides in Honey Bee Decline" at the monthly Laboratory Preparedness network meeting at the Department of Public Health in Hartford (20 attendees) *September 12*
- Participated in the Thermo Scientific Symposium on "Separation Science and Mass Spectrometry" in Westborough, MA *September 13*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory Conference Call *September 15*

- Along with Dr. Kimberly Stoner, presented a webinar entitled "Routes of Exposure of Bees to Pesticides" to the Environmental Fate and Effects Division of the US EPA (70 attendees) *September 27*
- Participated in an FDA FERN Exactive Users Group Conference Call *September 28*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cCAP) laboratory conference call *October 13*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cDAP) Exactive LC-HRMS users conference call *October 19*
- Presented a poster entitled "Analysis of pesticides in honey bees and related matrices" at a Yale University Peabody Museum of Natural History screening of an Audubon Connecticut sponsored film entitled "Vanishing of the Bees" (30 attendees) *October 26*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *November 10*
- Presented the poster "Movement of Soil-Applied Systemic Insecticides Into the Pollen and Nectar of Squash: Are Concentrations High Enough to Impact Pollinators?" at the 32nd Annual Meeting of the Society for Environmental Toxicology and Chemistry Meeting in Boston, MA *November 13-16*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *December 8*
- Attended the ISO/IEC 17025 and Accreditation Course held in New Haven *January 5-6, 2012*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cCAP) Laboratory conference call *January 12*
- Participated in a conference call on ISO/IEC 17025:2005 accreditation with Hitelia Castellanos of the US FDA *January 30*
- Participated in the American Bee Research Conference where he participated in the annual PI meeting for The Coordinated Agricultural Program on Sustainable Solutions to the Problems of Managed Bees, and the PI meeting for NC1173 multi-state Hatch grant on Sustainable Solutions to Problems Affecting Bee Health", held in Greenbelt, Maryland *February 6-9*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cCAP) Laboratory conference call *February 9*
- Participated in an FDA FERN Northeast Regional conference call *February 14*
- Participated in a FERN cCAP conference call on the use of the Exactive LC/MS system for the monitoring of pesticides in produce *February 22*
- Participated in two FDA conference calls discussing potential funding for laboratory accreditation *March 7, 8*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *March 8*
- Was a judge at the Connecticut Science Fair at Quinnipiac University in Hamden, CT *March 14-15*
- Participated in a FERN cCAP conference call about High Resolution Mass Spectrometry *March 21*

- Participated in a Principal Investigator planning meeting for the SCRI funded grant entitled "Pollination security for fruit and vegetables in the Northeast" at the University of Massachusetts *March 26*
- Was interviewed about the effects of pesticides on honey bees by Bob Miller of the Danbury-News Times *April 12*
- Participated in an FDA FERN Chemistry Cooperative Agreement cCAP Laboratory conference call *April 12*
- Served as a judge at the Future Farmers of America, Environmental Science Contest which took place at the University of Connecticut *April 27*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *May 10*
- Participated in an FDA MFRPS conference call *May 23*
- Participated in an FDA FERN LC-MS Executive Working Group conference call *May 30*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *June 14*
- Was interviewed about the effect of pesticides on honey bees by Greg Latkey of the Advocate *June 21*

ELMER, WADE H.

- Presented the poster "Partial saturation of potted ornamentals reduced Pythium root rot on flooded floor greenhouses" and gave reports at the Divisional Forum Committee Meeting and the Ad Hoc Membership Committee Meeting at the 2011 American Phytopathological Society International Plant Protection Congress Joint Meeting held in Honolulu, HI *August 7-11, 2011*
- Was interviewed about Sudden Vegetation Dieback by Rae Bicheu, a senior at Yale University September 19
- Participated in the State Advisory meeting for Agricultural Science and Technology at the Sound School in New Haven *September 22*
- Gave an invited seminar titled "Sudden Vegetation Dieback along Atlantic and Gulf Coast Marshes: Plant Pathogens and Herbivores" to the Department of Plant Pathology at Pennsylvania State University in University Park, PA *October 10-11*
- Participated in the Divisional Forum Meeting of the American Phytopathological Society in New Brunswick, NJ (6 attendees) *October 12*
- Participated in the Extension/Industry Meeting of the Northeastern Divisional Meeting of the APS (NEDAPS) (30 attendees) *October 12*
- Presented the Divisional Forum Report and the Site Selection Report at the business meeting of NEDAPS (30 adult attendees) *October 13*
- Gave the presentation "Role of Drought, Flooding, and/or Infection by *Fusarium palustre* on *Spartina alterniflora* and the effect on herbivory by the purple marsh crab" at the NEDAPS meeting in New Brunswick, NJ (20 attendees) *October 14*
- Attended the 100-year Celebration of the Department of Plant Pathology at Rutgers in New Brunswick, NJ (100 attendees) *October 14*

- Moderated and gave a presentation titled "Root rots of ornamentals: symptoms and diagnosis" at the Connecticut Greenhouse Growers' Association meeting "Pesticides and Roast Beef" held in Jones Auditorium (50 attendees) *October 19*
- Spoke about "Plant Parts and Their Diseases" to the second-grade classes at Mile Creek School in Old Lyme (90 students and 8 adults) *October 21*
- Gave an invited seminar titled "Sudden Vegetation Dieback Along Atlantic and Gulf Coast Marshes" at the Agricultural Research Service Facility in Peoria, IL (18 attendees) *October 24*
- Gave the presentation "Role of plant stress, *Fusarium*, and marsh crabs in Sudden Vegetation Dieback" at the 21st Biennial Conference of the Coastal and Estuarine Research Federation in Daytona Beach, FL (45 attendees) *November 6-10*
- Gave a talk on "Factors Associated with Sudden Vegetation Dieback in Branford Salt Marshes" at the Branford Land Trust (18 attendees) *November 29*
- Participated in a class project at Greenwich High School on the effect of biochar on Verticillium wilt of eggplant *January 27, 2012*
- Co-organized the Bedding Plant Meeting and gave the talk "Update on emerging diseases, and new fungicides" in Vernon (55 attendees) *February 7*
- Spoke about "Earthworms and soil health" to an Adult Continuing Education Class at Middletown High School in Middletown (16 attendees) *February 7*
- Co-organized the Bedding Plant Meeting and gave the talk "Update on emerging diseases, and new fungicides" at the UConn branch campus in Torrington (39 adult attendees) *February 14*
- Was interviewed about his biochar research and Sudden Vegetation Dieback by Mike Patrick of the Waterbury Republican-American *March 5*
- Presented the paper "Role of plant disease and drought stress of *Spartina alterniflora* on herbivory by marsh crabs in salt marshes affected by Sudden Vegetation Dieback" at the Connecticut Conference on Natural Resources held at UConn in Storrs (35 attendees) *March 12*
- Spoke about Sudden Vegetation Dieback to two groups of students visiting the Station from Hebron High School (30 attendees) *March 23*
- Was invited as a visiting scientist to the China Agricultural University in Beijing, China where he presented the lectures "Fusariuim crown and root rot of asparagus (18 attendees) "Fusarium diseases of ornamentals" (18 attendees) and "Mineral nutrition and plant disease" (27 attendees) *March 25-31*
- Was invited as a visiting scientist to Fudan University in Shanghai, China where he presented the seminar "Sudden Vegetation Dieback" (15 attendees) *April 2*
- Presented the talk "Role of plant disease and drought stress of *Spartina alterniflora* on herbivory by marsh crabs in salt marshes affected by Sudden Vegetation Dieback" at the spring meeting of the New England Estuarine Research Society in Plymouth, MA (40 attendees) *April 13-14*
- Participated in the Connecticut State Agricultural Science and Technology Education Consulting Committee Meeting in Rockville (8 attendees) *May 3*
- Co-sponsored and served as a judge at the State FFA Agriscience Fair held in Jones Auditorium (33 student and 9 adult attendees) *May 11*

- Gave the presentation "Sustainability in the garden" at Comstock Ferre Seed Company in Wethersfield (5 attendees) *May 20*

FERRANDINO, FRANCIS J.
- Gave a talk describing the Southern New England Powdery Mildew Modeling Project at a twilight meeting of the Massachusetts Farm and Winery Growers Association held at Coastal Vineyards in South Dartmouth, MA (18 attendees) *July 14, 2011*
- Gave the talk "Pruning and training tomato plants to minimize disease" to the East Haddam Garden Club at the Gillette Castle Visitors Center (21 attendees) *August 17*
- Delivered a paper entitled "An overview of the Southern New England Grape Information Network 2008-2011" at the 100th Annual Meeting of the Northeastern Division of the American Phytopathological Society hosted by Rutgers University and held in New Brunswick, NJ (50 attendees) *October 12-14*
- Gave the talk "An overview of the Southern New England Grape Information Network (2008-2011) at the Forest Health Monitoring Workshop held in Jones Auditorium (60 attendees) *March 6, 2012*

GENT, MARTIN P. N.
- Organized and moderated a colloquium on "Advances in Understanding Plant Metabolism Related to Crop Quality and Composition" and presented a talk on "Composition of Hydroponic Lettuce: Effect of Time of Day, Plant Size, and Season" at the Annual Meeting of the American Society for Horticultural Science near Kona, HI *September 24-28, 2011*
- Gave a seminar on "Life in the greenhouse at The Connecticut Agricultural Experiment Station" to a class at Mitchell College, New London (12 students) *February 2, 2012*
- Gave the report "Rate of change of composition of lettuce in response to nitrogen depletion or resupply" at the Regional Research Committee Meeting for NE1035 "Commercial Greenhouse Production: Component and System Development" in Storrs, CT *June 26*

GIBBONS, JORDAN
- With Mark June-Wells, Charles Vossbrinck, Gregory Bugbee, and Michael Cavadini, presented a poster titled "Using GIS to monitor Invasive Plants in Candlewood Lake" at Geographic Information Day in Hartford, CT *November 17, 2011*
- With Gregory Bugbee, presented an Invasive Aquatic Plant Identification Seminar at Connecticut IB Academy in East Hartford (40 attendees) *February 2, 2012*
- With Gregory Bugbee and Mark June-Wells, presented an Invasive Aquatic Plant Identification seminar at the Connecticut Envirothon at Sacred Heart University in Fairfield (70 attendees) *February 18*
- Presented a poster titled "The Aquarium Trade: A Potential Risk for Non-native Plant Invasions" at the Connecticut Conference of Natural Resources in Storrs, CT *March 12*
- With Gregory Bugbee, gave an Invasive Aquatic Plant Workshop at Three Rivers Community College in Norwich (40 attendees) *March 14*
- Spoke on "Applying Geographical Information Systems in a Science Career" to students attending a GIS Networking Night at Westfield State University in Westfield, MA (80 attendees*) April 3*

- With Gregory Bugbee, spoke on "Invasive Aquatic Plants" to two groups from Middletown High School (30 attendees) *April 20*
- With Gregory Bugbee, gave an update to the Grannis Lake Association in East Haven on "CAES IAAP Research on Grannis Lake and Prospects for the Future (25 attendees) *May 1*
- With Gregory Bugbee, spoke at the annual meeting of the Northeast Chapter of the North American Lake Management Society on "Using Geospatial Technology in the Mapping and Control of Invasive Aquatic Plants" (40 attendees) *June 9*

HARDSTONE, MELISSA

- Presented the invited talk "Oviposition Site Selection of *Ochlerotatus japonicas*" at the57th Annual Meeting of the Northeastern Mosquito Control Association held in Plymouth, MA (190 attendees) *December 5-7*

HISKES, ROSE T.

- Gave the talk "Forest Pest Update and the CAPS Program" to Master Gardeners at the University of Connecticut Research Farm in Storrs (25 attendees) *July 7, 2011*
- With Katherine Dugas, staffed a CAPS and Forest Pest table at the summer meeting of the Connecticut Nursery and Landscape Association in Newtown (400 attendees) *July 13*
- With Katherine Dugas and Dr. Claire E. Rutledge, staffed a CAPS and Forest Pest table at the summer meeting of the Connecticut Tree Protective Association held at the Farmington Club in Farmington (561 adult and 36 youth attendees) *July 21*
- Gave the talk "Pests of Plants" to the Washington Garden Club in Washington, CT (25 attendees) *August 11*
- Organized and announced a "Plant Identification Workshop" for the Connecticut Accredited Nursery Professional (CANP) Class conducted by the Connecticut Nursery and Landscape Association in New Haven *August 30*
- Staffed a forest pest and CAES booth at the Hebron Harvest Festival in Hebron, CT *September 9*
- Gave talks on "Insect Pests of 2011" and "A Forest Pest Update" at the Nursery and Landscape Research Tour at the Valley Lab in Windsor (20 attendees) *September 13*
- Gave a talk and walk on invasive plants at Boulder Knoll Farms in Cheshire (6 attendees) *September 17*
- Participated in an Emerald ash borer workshop in New Paltz, NY *September 23*
- Staffed a CAES "Forest Pest" booth at the Big E in West Springfield, MA *September 27*
- Staffed a Plant Identification Workshop for the Connecticut Accredited Nursery Professional course run by the Connecticut Nursery and Landscape Association at the Valley Laboratory in Windsor (8 attendees) *October 8*
- Gave the talk "Forest Pests" to the Insect Pests of Turf and Ornamentals class at Naugatuck Valley Community College in Waterbury (15 attendees) *October 12*
- Gave the talk "Forest Pests" to the Connecticut Accredited Nursery Professional course run by the Connecticut Nursery and Landscape Association at the Station in New Haven (53 attendees) *October 18*
- Gave the talk "Plants Out of Place" and gave an invasive plant and insect update to the Country Gardeners Garden Club of Glastonbury (16 attendees) *October 19*

- Staffed a Forest Pest booth at the Urban Forestry Conference in Wallingford *October 20*
- Gave a brief talk on forest pests to Knox Parks tree planting volunteers in Hartford (56 attendees) *October 29*
- Participated in a Connecticut Invasive Plant Working Group Symposium Planning Committee meeting in Windsor *November 10*
- Was interviewed about the warm fall temperatures and their effect on plants and insects by Mary O'Leary of the New Haven Register *November 28*
- Participated in a Forest Pest and Outreach Survey Project conference call *November 30*
- Participated in a Connecticut Invasive Plant Working Group Symposium Planning Committee meeting in Windsor *November 30*
- Staffed a Forest Pest table at the Connecticut Nursery and Landscape Association winter meeting in Manchester, CT *January 4, 5, 2012*
- Participated in a Connecticut Invasive Plant Working Group symposium planning committee meeting in Windsor, CT *January 10*
- Taught Ornamental and Turf Insect Pest Management to the Massachusetts Organic Landcare Course in Worcester, MA (40 students) *January 11*
- Participated in a Citizen Volunteer Survey Project Webinar *January 18*
- Staffed a Forest Pest and Question and Answer table at the Annual Meeting of the Connecticut Tree Protective Association held at Aqua Turf in Plantsville, CT (840 attendees) *January 19*
- Staffed a Forest Pest table at the Connecticut RV and Camping Show at the Connecticut Convention Center in Hartford *January 22*
- Gave a talk on "Butterfly Gardening" to the East Hartford Garden Club in East Hartford, CT (18 attendees) *January 23*
- Staffed a Forest Pest table at the CGKA Winter Meeting in Cromwell, CT *January 24*
- Participated in a Forest Pest Project conference call *January 25*
- Participated in a Connecticut Invasive Plant Working Group symposium planning committee meeting in Windsor *February 1*
- Gave the talk "Butterfly Gardening and Exotic Forest Pests" to the Franklin Garden Club in Franklin (10 attendees) *February 15*
- Participated in a CAPS State Survey Coordinator conference call *February 16*
- Taught Insect Pest Management in ornamentals and turf for the Connecticut NOFA Organic Landcare Course in New Haven (40 attendees) *February 17*
- Participated in a Forest Pest Project conference call *February 22*
- With Diane Riddle, Katherine Dugas, Peter Trenchard, and Stephen Sandrey, staffed a Forest Pest table at the Flower Show at the Connecticut Convention Center in Hartford *February 23-26*
- Participated in a Connecticut Invasive Plant Working Group Symposium Planning Committee meeting in Windsor *March 1*
- With Katherine Dugas, participated in a conference call with Joan Allen of UConn about Forest Pest Outreach *March 2*
- Collaborated with the state Computer IT Consultant BEST-DAS on the Pesticide Guide Toward Integrated Pest Management for Arborists and Nursery Growers in East Hartford *March 15*

- With Katherine Dugas, met with Terri Arsenault to plant a Forest Pest Station at the Girl Scout's 100th Anniversary Jamboree in Durham on May 19 *March 16*
- With Katherine Dugas, staffed a Forest Pest Table at the "Bug's World" section at the Eastern Branch Meeting of the Entomological Society of America held at the Hilton Hotel in Hartford *March 17*
- Staffed a Forest Pest Booth at the Master Gardeners Annual Symposium at Manchester Community College in Manchester (91 visitors) *March 24*
- Participated in a Forest Pest Project conference call *March 28*
- With Katherine Dugas, participated in a conference call with Joan Allen of UConn about Forest Pest Outreach *April 13*
- Met with the Director of Vernon Greenways Volunteers to plan Asian longhorned beetle and Emerald ash borer surveys on the rail trails in Vernon *April 19*
- Participated in a Forest Pest Project conference call *April 25*
- Gave a talk on "Insect Pests of Plants" to Master Gardener Mentors at the Bartlett Arboretum in Stamford (47 attendees) *April 25*
- With Katherine Dugas and Terri Arsenault, attended the Girl Scouts' 100th Anniversary Jubilee held at the Durham Fairgrounds, staffing a booth that included information about scientific observation, invasive forest pests, and promoting Plant Science Day. Over 8,000 attendees were recorded by the Girl Scouts of Connecticut, and at least 300 girls stopped by the CAES booth to make plant and insect drawings *May 19*
- Gave a talk on Forest Pests to the arboriculture class at Naugatuck Valley Community College in Waterbury (22 attendees) *May 1*
- Gave a talk on insects to the garden club and biology students at Manson Youth Institute in Cheshire (18 attendees) *May 2*
- Gave a talk on Forest Pests to senior citizens at the East Windsor Senior Center in Broad Brook (22 attendees) May 10
- Gave a talk on"Pests of the Garden" to the Heritage Village Garden Club in southbury (37 attendees) *May 16*
- Gave a forest pest talk to Yale School of Forestry summer interns who will be working with community groups on tree care in the Insect Inquiry Office (7 students) *May 18*
- With Katherine Dugas and Terri Arsenault staffed a scientific observation and forest pest table at the Girl Scout 100th Year Anniversary Jamboree in Durham *May 19*
- Participated in a Forest Pest Project conference call *May 30*
- Gave talks on insects and forest pests to 8 groups of fourth graders at Southington Nature Day in Pathorn Park in Southington *May 31*
- Participated in a Connecticut Invasive Plant Working Group symposium planning committee meeting in Windsor *June 6*
- Organized and led a statewide Cooperative Agricultural Pest survey meeting in New Haven (15 attendees) *June 8*
- Participated in a USDA APHIS PPQ IPHIS training in Wallingford *June 26*

INMAN, MARY K.

- Gave a talk on "Houseplants" to the Nichols Garden Club in Trumbull (27 attendees) *October 11, 2011*

- Spoke on “Diseases of trees” in the Tree Conditions Lab for Arboriculture 101 held in Jones Auditorium (35 attendees) *March 7, 2012*
- Participated in the Northeast Plant Diagnostic Network Meeting held in Rye Brook, NY (25 attendees) *April 3-5*
- Staffed the CAES booth and answered questions about the invasive insects Emerald ash borer and Asian longhorned beetle and tree diseases at the Norwalk-Wilton Tree Festival (1,600 adult and 840 youth attendees*) May 19*
- Gave the talk “Diseases of Trees” to the Association of CT Tree Wardens in Jones Auditorium (52 attendees) *June 12*

IVES-PARISI, JOAN
- Spoke on the advantages of using the PCard for commodities and services at a Purchasing Card meeting held in Rocky Hill (150 attendees) *September 14*

JUNE-WELLS, MARK
- With Gregory Bugbee and Jordan Gibbons, presented an Invasive Aquatic Plant Identification seminar at the Connecticut Envirothon at Sacred Heart University in Fairfield (70 attendees) *February 18, 2012*

KETTLE, IRA J.
- Manned information tables with displays on honey bees, Asian longhorned beetle, and Emerald ash borer for Friends of Harkness Park at Harkness Park in Waterford, CT (1,058 visitors) *September 11, 2011*
- Gave a honey bee presentation at the Apples and Honey Festival held at the Jewish Community Center in Woodbride (155 visitors) *September 18*
- With Stephen Sandrey, manned a table with displays on honey bees, Emerald ash borers and Asian longhorned beetle at Celebrating Agriculture at the Woodstock Fairgrounds in Woodstock (552 attendees) September 24
- Answered questions for and met one on one with beekeepers at the Southern New England Beekeepers Assembly in East Lyme, CT *November 19*

KROL, WALTER J.
- Participated in a conference call with officials from the CT Department of Consumer Protection regarding findings of pesticide violations in imported herb samples *July 1, 2011*
- Participated in an FDA FERN-wide hotwash call on a recently completed mycotoxin proficiency test *July 6*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cCAP) Laboratory conference call *July 14*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cCAP) Laboratory conference call *August 11*
- Was filmed performing the homogenization and analysis of produce by Karyl Evans Productions LLC for a public service announcement being prepared for the CAES *August 12*
- Participated in the FERN Northeast Region Conference Call *September 13*
- Presided as Secretary at the New Haven Section American Chemical Society Executive Board Meeting *September 29*

- Participated in a conference call with members of the FCC (FERN) regarding the comparison of DART and LC/MS as they pertain to pesticide residues in herb samples *October 12*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cDAP) laboratory conference call *October 13*
- Presented the lecture "The Deepwater Horizon Oil Spill: Development and Implementation of Testing Methodology for the Reopening of Waters to Fishing" at the ACS New Haven Section meeting in Hamden, CT (37 attendees) *October 20*
- Spoke to Boy Scout Troop 51 from Cheshire about analytical chemistry to help them fulfill their Chemistry Merit Badge requirements (10 attendees) *November 8*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory Conference Call *November 14*
- As invited speaker, presented the talk "Implementing QuEChERS Sample Preparation for the Analysis of PAH's in Seafood: A State Laboratory Response" at the Eastern Analytical Symposium and Exposition in Somerset, NJ (30 attendees) *November 14*
- Was interviewed about pesticides on organic produce by Vera-Lynn Kubinec, Associate Producer, CBC Television, Winnipeg, Manitoba, Canada *November 29*
- Was interviewed about the work done at the Station for the Deepwater Horizon Oil Spill by Meg Evans of LC/GC Magazine for an article in the December 8, 2011 edition of E-Separation Solutions *November 30*
- Was interviewed for a news report for CBC Canada regarding pesticide residues in organic foods by Vera-Lynn Kubinec, Associate Producer CBC Television, Winnipeg, Manitoba, Canada in the WVIT 30 news studio in West Hartford, CT *December 8*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *December 8*
- Was interviewed about the prevalence of pesticide residues in organic food by Terry MacLeod and Marcy Markusa of CBC Winnipeg, Manitoba, Canada during their live morning radio talk show *December 8*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cCAP) Laboratory conference call *January 12, 2012*
- Participated in a conference call on ISO/IEC 17025:205 accreditation with Hitelia Castellanos of the US FDA *January 30*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cCAP) Laboratory conference call *February 9*
- Participated in an FDA FERN Northeast Regional conference call *February 14*
- Presided as Secretary at the New Haven Section of the American Chemical Society Executive Board Meeting *February 23*
- Participated in two FDA conference calls discussing potential funding for laboratory accreditation *March 7, 8*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cCAP) Laboratory conference call *March 8*
- Participated in an EPA sponsored Pesticide Regulatory Education Program Laboratory Issues Course in Davis, California *March 19-22*

- Gave the talk "The Role of Pesticides in Honey Bee Decline: Methodology Issues for Removing Pesticides in Bees, Pollen, Honeycomb" at the University of California, Davis (40 attendees) *March 22*
- Presented the talk "CAES Market Basket Survey – Pesticide Contamination of Fresh and Dried Herbs" at the University of California, Davis (40 attendees) *March 27*?
- Participated in an FDA FERN Chemistry Cooperative Agreement (cCAP) Laboratory conference call *April 12*
- Presented a poster concerning the pesticide residue monitoring program in food in the State of Connecticut Capitol Corridor *April 26*
- Presided as Secretary at the New Haven Section of the American Chemical Society Executive Board Meeting *April 26*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *May 10*
- Hosted approximately 60 students, teachers and parents who attended an award banquet in the Jones Auditorium as part of the New Haven Section American Chemical Society National Chemistry Week and presented awards for both the 2011-2012 Poster Contest and the Chemistry Olympiad, which was held in March in the Quinnipiac University Chemistry Laboratory *May 22*
- Participated in an FDA MFRPS conference call *May 23*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *June 14*

LAMONDIA, JAMES A.

- Was interviewed about the effect of the high heat conditions on the tobacco crop by Aaron Kupec of WTIC News *July 22, 2011*
- Was interviewed about blue mold and the progress of the tobacco crop by Dana Whalen of WTIC News *July 22*
- Was interviewed about the cultural implications of climate change in New England in regard to the cultural history of tobacco production by Professor Adam Sweeting of Boston University *July 28*
- Was interviewed about the native plant, educational, and Connecticut introduction gardens at the Valley Laboratory by Julie Simmons Harrison of WFSB's Better Connecticut *July 28*
- Spoke to participants of the pesticide credit tour at Plant Science Day about research efforts to use biofumigation to control soilborne pathogens (40 participants) *August 3*
- Discussed plant pathology and biocontrol research with Dr. Haim Gunner of Performance Biocontrol at the Valley Laboratory in Windsor, CT *August 24*
- Was interviewed about strawberry research and the plant patent for Rubicon strawberry by Bob Pollack for the Connecticut Academy of Science and Engineering Newsletter and Station Associates Newsletter *September 7*
- 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 (20 persons) *September 13*

- Examined candidates for the Connecticut Arborist License and participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven *September 14*
- Met with grant cooperators to plan a series of SARE soilborne plant pathogen workshops, Middletown, NY *September 28 and 29*
- Discussed Valley Laboratory research and services and Vo-Ag education with an Associate Consultant of Agricultural Science and Technology Education in the State Department of Education *October 5*
- Participated in the Steering Committee meeting for the CT Vegetable and Small Fruit Growers Conference in Vernon *October 5*
- Spoke about research results at the annual meeting of the Northeast Regional Multistate Nematology Technical Committee (NE-1040) held in Burlington, VT (15 attendees) *October 9-11*
- Presented a research paper entitled "Potyvirus infection of potato may threaten other solanaceous crops" at the Northeast Division Meeting of the American Phytopathological Society (65 attendees) *October 12-14*
- Conducted a tour of the renovated tobacco shed and new barn for the CAES Board of Control at the Valley Laboratory *October 18*
- 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 (60 attendees) *November 2*
- Co-sponsored with colleagues from Cornell-Geneva and Penn State University, a day-long SARE-funded workshop on the identification assessment and management of soilborne plant pathogens in vegetable systems held at the Valley Laboratory (22 people) *December 7*
- Examined candidates for the Connecticut arborist license and participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven *December 14*
- Participated in a conference call with scientists and regulators from North Carolina, Virginia, and Connecticut concerning boxwood blight *December 22*
- Was interviewed about shade and broadleaf tobacco culture and pesticide use by Steve Woodruff of the NRCS in Greensboro, NC *January 4, 2012*
- Participated in a planning meeting of the Connecticut Agricultural Information Council *January 9*
- Presented the talk "Is *Peronospora tabacina* becoming less sensitive to dimethomorph fungicide?" and participated in a Tobacco Disease Council discussion of nematode diseases of tobacco at the 45th Tobacco Workers' Conference in Williamsburg, VA *January 16-20*
- Was interviewed about wrapper tobacco types grown in Connecticut, shade tobacco culture and diseases, and broadleaf tobacco culture and diseases for three segments of "On the Farm" a radio program produced by Eddie Beasley of the University of Georgia Cooperative Extension System *January 18*
- Participated in a meeting between Station researchers and regulatory personnel and Connecticut nurserymen concerning boxwood blight *January 30*
- Spoke about research on management of tobacco pathogens including poty viruses, target spot and blue mold fungicide resistance and presented information about the CORESTA pesticide residue program and strategies to reduce pesticide residues in cigar wrapper leaves at the CAES Tobacco Research Meeting held in Suffield (125 attendees) *February 21*

- Participated in a meeting of the Connecticut Agricultural Information Council *February 22*
- Participated in a USDA ARS Research National Program Panel Review for Nematology *February 23*
- 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 6*
- Examined candidates for the Connecticut arborist license and participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven *March 7*
- 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 14*
- With colleagues at Cornell-Geneva and Penn State, conducted a day-long SARE-funded workshop on the identification, assessment and management of soil-borne plant pathogens in vegetable systems held in Allentown, PA (30 attendees) *March 20*
- With colleagues at Cornell-Geneva and Penn state conducted a day-long SARE-funded workshop on the identification, assessment and management of soil-borne plant pathogens in vegetable systems held in Saratoga, NY (13 attendees) *March 22*
- Was interviewed for an article about soil-borne vegetable diseases by Chris Torres for Lancaster Farming *March 20*
- Spoke about infection of Pachysandra and fungicide research during the ANNLA webinar "Boxwood blight update: Where we are and where we hope to be" (230 participants) *March 23*
- Spoke about fungicide resistance, efficacy and managing disease and fungicide residues in shade and broadleaf tobacco at a Windsor Shade Tobacco meeting in Windsor Locks (15 attendees) *March 27*
- With Thomas Rathier, met with officials from the green industry to discuss the development of water and soil best management practices for the Nursery and Landscape Industry in Connecticut *March 28*
- Was interviewed about cigar wrapper tobacco culture, plant pathology, research, and strategies for pesticide residue management by Randall Barron of Altria *March 30*
- Participated in a meeting concerning pesticide residue issues conducted by Lancaster Leaf for broadleaf tobacco growers in Enfield (65 attendees) *April 17*
- Manned a display at the Capitol Corridor and answered questions about Station activities *April 26*
- Was interviewed about Station activities and boxwood blight by Jon Lender of the Hartford Courant *April 26*
- Spoke about CORESTA guidance residue levels and strategies to reduce pesticide residues in wrapper leaves at a meeting hosted by Crop Production Services in Broad Brook (80 attendees) *May 2*
- Was interviewed about shade tobacco production by Cheryl Ursin for Tobacco Retailer Trade Magazine *May 15*
- Was interviewed about science careers by Alex Collins, a high school freshman *May 18*
- Examined candidates for the Connecticut arborist license and participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven *June 6*

- Was interviewed by Chris Bickers for the Tobacco Farmer Newsletter *June 7*
- Was interviewed about cigar wrapper tobacco culture and plant pathology research by Aroosa Masroor of the CT Mirror *June 19*

LI, DE WEI
- Gave the presentation "Christmas trees and airborne fungi in residences" at the Pan-American Aerobiology Association 2011 Aerobiology Symposium in San Diego, CA (30 attendees) *August 7-9, 2011*
- Gave the presentation "What does the development of fungal systematics mean to DNA-based methods for indoor mold investigations?" at the 6th International Scientific Conference on Bioaerosols, Fungi, Bacteria, Mycotoxins in Indoor and Outdoor Environments and Human Health, in Saratoga Springs, NY (120 attendees) *September 6-9*

LI, YONGHAO
- Helped in the CAES booth and answered questions about tree diseases at the CTPA summer meeting held at the Farmington Club in Farmington (561 adult and 36 youth attendees *July 21, 2011*
- Gave the talk "Common and new diseases in 2010-2011" at the Nursery and Landscape Research Tour at the Valley Lab in Windsor (14 attendees) *September 13*
- Spoke about plant disease problems at the CCTGA's Annual Field Day held at Cedar Ledge Tree Farm in Mansfield (45 attendees) *September 17*
- Participated via conference call in a committee meeting of a graduate student (M.S. Candidate) at the University of Tennessee *September 20*
- Gave the talk "Highlights from the Plant Disease Information Office in the 2011 season" in the Extension/Industry Meeting at the Annual Meeting of the Northeastern Division of the American Phytopathological Society in New Brunswick, NJ (30 attendees) *October 12*
- Presented the poster "Update from the Plant Disease Information Office in Connecticut" at the third meeting of the National Plant Diagnostic Network held in Berkeley, CA (180 attendees) *November 6-9*
- Participated in the Identification, Assessment and Management of Soilborne Plant Pathogens in Vegetable Production Systems Workshop in Windsor *December 7*
- Staffed the CAES Plant Pathology booth and answered questions about tree diseases at the Annual Meeting of the Connecticut Tree Protective Association held at Aqua Turf in Plantsville (840 attendees) *January 19, 2012*
- Gave the talk "Diseases of Trees" at Bartlett Arboretum & Gardens in Stamford (17 attendees) *March 8*
- Was interviewed about boxwood blight by Robert Vitale of The Columbus Dispatch, Columbus, Ohio *March 26*
- Gave a presentation titled "Highlights from the Plant Disease Information Office" at the Northeast Plant Diagnostic Network meeting held in Rye Brook, NY (25 attendees) *April 3-5*
- Spoke about plant disease diagnostics to a group of visiting students from Middletown High School (30 attendees) *April 20*
- Spoke about plant disease diagnostics to a group of visiting students from Worthington Hooker Middle School in New Haven (20 student and 2 adult attendees) *May 18*

- Spoke about plant disease diagnostics to visiting tree wardens touring the Station (15 attendees) *June 12*
- Spoke about plant disease diagnostics to visiting students from Central Connecticut State University (17 attendees) *June 13*

MAGNARELLI, LOUIS A.

- Was interviewed about program cuts in the Station's research by Robert Cyr of the Record Journal *July 25, 2011*
- Was interviewed about Plant Science Day by Ray Andrewsen of WQUN Radio in Hamden *July 27*
- Was interviewed about Station research by Mr. Waters of WQUN Radio *August 3*
- Gave a tour to State Senator Robert Kane and Lisa Hammersly of the Senate Republican Office and spoke about Station research programs *August 8*
- Gave a report on Station research and other activities to the Experiment Station Associates in New Haven *August 8*
- Was interviewed about the Memorandum of Understanding for the Experiment Station and the Department of Energy and Environmental Protection concerning the Emerald ash borer and Asian longhorned beetle by Bob Miller of the Danbury News Times *August 11*
- Spoke about the financial status of the Station to nursery growers in Windsor *September 13*
- Gave a report on services provided by the Station at a meeting of the Working Lands Alliance in Windsor *September 13*
- Spoke about a bamboo problem at a meeting of the Invasive Plants Council in Hartford *September 13*
- Welcomed officers of the Federated Garden Clubs of Connecticut to Jones Auditorium and spoke about the Station's budget *September 19*
- Welcomed participants of the Landscape Design Course in Jones Auditorium and spoke about the Station's budget *September 20*
- Was interviewed about bond funds for the Griswold Research Center by Mark Davis of WTNH-TV *September 23*
- Was interviewed about bond funds for the Griswold Research Center by Judy Benson of The Day *September 23*
- Spoke about Station research to members of the New Haven Farm Bureau *October 3*
- Spoke about Station research to members of the Experiment Station Associates *October 4*
- Participated in the NE-1040 multistate meeting on plant-parasitic nematode control (as Administrative Advisor), in Burlington, VT *October 10-11*
- Was interviewed about mosquitoes by Abe Katz of the New Haven Register *November 3*
- Spoke about Station research to members of the Experiment Station Associates *November 28*
- Was interviewed about boxwood blight by Steve Grant of the Hartford Courant *December 9*
- Was interviewed about boxwood blight by Bob Miller of the Danbury News Times *December 12*
- Was interviewed about boxwood blight by Jen Bernstein of Fox News *December 13*
- Was interviewed about bamboo by Phyllis Swebilius of the New Haven Register *December 19*

- Gave an update report on research and outreach activities at the Connecticut Tree Protective Association meeting in Southington *January 19, 2012*
- Participated in an Invasive Plants Council meeting in Hartford *February 14*
- Was interviewed about bamboo by Phyllis Swebilius of the New Haven Register *February 15*
- Was interviewed about the new strawberry cultivar and honey bees by Vinti Singh of the Connecticut Post *February 17*
- Was interviewed about Station research and outreach activities by Mike Patrick of the Republican American *March 5*
- Was interviewed about ticks and Lyme disease by Valerie Foster of Healthy Life Magazine *March 20*
- Was interviewed about ticks by WTIC Radio *March 22*
- Gave a report on tree pests at the Tree Warden's Annual Meeting in Farmington *March 22*
- Represented the Station at the annual meeting of the Valley Community Foundation in Derby as the Jones Family Farms Trust Fund for the Station was announced *March 26*
- Welcomed the participants of the Landscape Design School and gave a report on Experiment Station research and other activities *March 27*
- Participated in the annual meeting of the Experiment Station Associates in Jones Auditorium *March 29*
- Was interviewed about weather and the effects on insects and plants by Jan Spiegel of the Connecticut Mirror *April 3*
- Welcomed Federated Garden Club members in Jones Auditorium and gave a report on Station research *April 3*
- Was interviewed about the Experiment Station by Scott Haney of Channel 3 TV (WFSB) *April 10*
- Attended the Experiment Station Associates Board meeting and gave a progress report on Station research and other activities *April 16*
- Spoke to the Experiment Station Associates about Experiment Station budgets and activities on their bus trip *June 7*
- Was interviewed by members of the Governor's Council on Agricultural Development in Hartford *June 8*
- Was interviewed about bamboo by Phyllis Swebilius of the New Haven Register *June 13*
- Spoke about recent scientific advances to members of the Experiment Station Associates Board *June 13*
- On behalf of the Station, accepted the Gustav A. L. Mehlquist Award from the CT Horticultural Society in West Hartford *June 21*
- Was interviewed about honey bees by Greg Hlakey of the New Haven Register *June 22*

MAIER, CHRIS T.

- Was interviewed about the brown marmorated stink bug by John Burgeson of the Connecticut Post *August 3, 2011*
- Was interviewed about the brown marmorated stink bug by Anne Rowlands of the Connecticut Gardener Magazine *August 3*

- Displayed new entomological literature at a meeting of the Connecticut Entomological Society in Jones Auditorium *September 16*
- Spoke about the status of the brown marmorated stink bug and the spotted wing drosophila, two alien insects, at a meeting of the Advisory Committee of the Cooperative Agricultural Pest Survey at the Valley Laboratory in Windsor *October 17*
- Spoke about the spotted wing drosophila and its impact in Connecticut at the annual New England, New York and Canadian Fruit Pest Management Workshop in Burlington, VT *October 18*
- Displayed specimens of and distributional maps for the brown marmorated stink bug and the spotted wing drosophila at a meeting of the Connecticut Entomological Society at the University of Connecticut in Storrs *October 21*
- Was interviewed about the brown marmorated stink bug by Robert Pollack who writes for the Experiment Station Associates Bulletin *October 26*
- Displayed specimens of siricid woodwasps of Connecticut and literature on the wood-boring wasps at a meeting of the Connecticut Entomological Society at Yale University *November 18*
- Spoke about "Status of the Brown Marmorated Stink Bug and the Spotted Wing Drosophila" at the Annual meeting of the Connecticut Pomological Society in Glastonbury, CT *December 6*
- Was interviewed by Robert Pollack for a brief article on the brown marmorated stink bug to appear in the Bulletin of the Experiment Station Associates *January 6, 2012*
- Displayed new entomological literature on moths, butterflies, and their conservation at a meeting of the Connecticut Entomological Society in Jones Auditorium *January 20*
- Displayed the kudzu bug (Plataspidae), an eastern Asian bug that represents a new insect family for North America and that recently was discovered in the southeastern United States, at a meeting of the Connecticut Entomological Society at the University of Connecticut in Storrs *February 17*
- Gave the talk "Two Nasty Invasive Insects: Brown Marmorated Stink Bug and Spotted Wing Drosophila" at the Forest Health Monitoring Workshop in Jones Auditorium (60 attendees) *March 6*
- Discussed the trapping and biology of the spotted wing drosophila during the Spotted Wing Drosophila: 2012 New England Survey Coordination Meeting at the Valley Laboratory *March 7*
- Displayed flower flies that are Batesian mimics of bumble bees at the annual dinner meeting of the Connecticut Entomological Society in Jones Auditorium *April 27*
- Spoke about the trapping and the distribution of the brown marmorated stink bug and the spotted wing drosophila at the spring Twilight Meeting of the Connecticut Pomological Society at Rogers Orchards in Southington (60 participants) *June 20*

MARRA, ROBERT E.

- Helped man the Station booth and answered questions about tree diseases at the Connecticut Tree Protective Association summer meeting held at the Farmington Club in Farmington (561 adult and 36 youth attendees) *July 21, 2011*

- Was interviewed by a staff writer for Science Magazine about *Phytophthora ramorum* and the risks it poses to eastern forests and landscapes, vis-à-vis the circumstances surrounding our find of a *P. ramorum*-infected plant in the landscape in New Haven County *August 22*
- Hosted a table with information from the Plant Disease Information Office at the East Rock Street Festival on Orange Street in New Haven (5,000 visitors) *September 17*
- Was an invited speaker in a symposium on the Oomycetes and gave a talk titled "*Phytophthora ramorum*: An overview of risks and research challenges for Eastern North America" at the Annual Meeting of the Northeastern Division of the American Phytopathological Society in New Brunswick, NJ (50 attendees) *October 12-14*
- Presented the invited seminar "Assessing Internal Decay in Trees Nondestructively Using Tomography" at the NOFA Organic Land Care Annual Gathering at the University of Connecticut Storrs Campus (225 attendees) *December 6*
- Participated in a meeting of the Plant Science Day Planning Committee in Jones Auditorium *December 7*
- As a member of the Local Arrangements Committee for the 2012 Annual Conference of the Mycological Society of America, to be held in New Haven in July of 2012, participated in a conference call with members of the Committee to discuss conference details, including the mycological foray (to be held at West Rock Ridge State Park), symposium topics, and the opening reception at the Peabody Museum *December 13*
- Delivered over 50 poinsettias (donated from Drs. Gent and Elmer's flooded floor experiment) to Columbus House, a New Haven shelter for the homeless *December 21*
- Participated telephonically in a committee meeting in preparation for the upcoming annual meeting of the Mycological Society of America to be held in New Haven in July *January 10, 2012*
- Was interviewed, along with Dr. Sharon Douglas, about boxwood blight by Susan Milius, a writer from Science News *January 17*
- Discussed street tree selection criteria and issues with storm-damaged trees at the monthly meeting of the West Haven Tree Commission *January 17*
- Staffed the CAES Plant Pathology booth and answered questions about tree diseases at the Annual Meeting of the CTPA held at Aqua Turf in Plantsville (840 attendees) *January 19*
- Met with the State Park Ranger at West Rock Ridge State Park to discuss the Mycological Society of America foray, scheduled for July 2012 as part of the MSA meeting in New Haven *February 1*
- Presented a 2-hour talk titled "Eight Important Plant Diseases of Eastern North America" to nursery professionals at the New York Botanical Gardens in Bronx, NY (75 adult attendees) *February 22*
- Gave the talk "*Phytophthora ramorum*: an Overview of risks and challenges for Eastern North America" at the Forest Health Monitoring Workshop held in Jones Auditorium (60 attendees) *March 6*
- Was one of the hosts of the Connecticut Conference on Natural Resources at the University of Connecticut in Storrs (over 200 attendees) *March 12*
- Participated in a meeting of the West Haven Tree Commission to discuss the upcoming West Haven street tree inventory and to plan activities and events for Arbor Day *March 20*

- Met with administrators of the Metropolitan District Commission to evaluate the causes of a decline syndrome occurring in a stand of pine trees alongside Lake McDonough in Barkhamsted *April 17*
- Participated in a meeting of the West Haven Tree Commission to discuss plans for Arbor Day and the upcoming street tree sample inventory *April 23*
- Presented a poster on boxwood blight at the Spring Open House in Jones Auditorium *April 25*
- With Drs. Sharon Douglas, Douglas Dingman and Richard Peterson, participated in the New Haven Public School Science Fair as a judge for both the CAES Award and the Albert Dimond Award *May 15-16*
- Presented the Experiment Station Award to Ms. Jane Hosen's 2nd Grade class from Wexler-Grant School at the Awards Ceremony for the New Haven Public School Science Fair *May 17*
- With Dr. Sandra L. Anagnostakis, Mary Inman, and Joseph P. Barsky, represented CAES, fielding questions related to trees and tree health at the Norwalk-Wilton Tree Festival (1,160 adult and 840 youth attendees) *May 19*
- Planned a Lockwood Lecture and hosted Dr. David Houston who presented a Lockwood Lecture on Beech Bark Disease, in Jones Auditorium *May 22-24*
- Participated in a teleconference with other members of the Arrangements Committee in preparation for the 2012 annual meeting of the Mycological Society of America in July *May 29.*
- Met with the West Haven Tree Commission to continue work on the street tree inventory *June 12*
- Presented the talk "*Phytophthora ramorum*, the Sudden Oak Death pathogen: A threat to Connecticut's Forests and Landscapes" to the Orchard Valley Garden Club of Southington (41 attendees) *June 26*
- Participated in a conference call as a member of the Boxwood Blight Working Group *June 28*

MAYNARD, ABIGAIL A.

- Hosted a delegation of government officials from China at Lockwood Farm (19 adults) *July 8, 2011*
- Reported on Station activities at a quarterly meeting of the Council on Soil and Water Conservation (15 adult attendees) *July 21*
- Spoke about the New Crops Program on the radio Show Garden Talk on 1080 AM *July 23*
- Judged fruits and vegetables at the North Haven Fair *September 8*
- Discussed the New Crops Program at the Hindinger's Farm in Hamden *September 9*
- Discussed the New Crops Program at the Stone Garden Farm in Shelton *September 12*
- Discussed the New Crops Program at Rose's Berry Farm in South Glastonbury *September 14*
- Hosted the Pre-Kindergarten and 3rd Grade classes from Hamden Hall Country Day School at Lockwood Farm (36 students, 14 adults) *October 11*
- Talked about science careers to Upper School students at Hamden Hall Country Day School (8 students) *October 13*

- Hosted the Kindergarten class from Hamden Hall Country Day School at Lockwood Farm (14 students, 2 adults) *October 21*
- Represented the Station at a meeting of the State Technical Committee in Tolland *November 9*
- Spoke about careers in science to students at Hamden Hall Country Day School (16 students) *November 17*
- Spoke about the New Crops Program to a group of students from New Haven's Gifted and Talented Program (12 students, 12 adults) *November 29*
- Discussed the New Crops Program at Page's Farm in North Branford and the Hindinger Farm in Hamden *December 2*
- Reported on Station activities at a quarterly meeting of the Council on Soil and Water Conservation (15 attendees) *December 7*
- Spoke on "Composting and Utilization of Compost" to the Milford Garden Club (38 attendees) *January 10, 2012*
- Spoke on The Connecticut Agricultural Experiment Station's New Crops Program to the Connecticut Vegetable and Small Fruit Growers' Conference in Vernon, CT (175 attendees) *January 19*
- Assisted in the planning of a Lower School garden at Hamden Hall Country Day School *March 6-9*
- Represented the Station at a meeting of the State Technical Committee in Tolland (18 adult attendees) *March 14*
- Assisted with science fair projects at Hamden Hall Country Day School (12 student, 1 adult) *March 28*
- Discussed the New Crops Program and gave a greenhouse tour to students and teachers from the Village for Families and Children (10 student and 2 teacher participants) *April 10*
- Discussed the New Crops Program and gave a greenhouse tour to students and teachers from Middletown High School (36 students and 4 teacher participants) *April 20*
- Discussed the New Crops Program with students and teachers from the Hamden Collaborative Learning Center (6 student and 2 teacher attendees) *April 27*
- Discussed the New Crops Program with Upper School students at Hamden Hall Country Day School (12 students, 2 teachers) *May 17*
- Was interviewed by Vicki Mattern Hackman of Mother Earth News Magazine about sheet composting and other uses of leaves in the garden *June 8*

McHALE, NEIL A.
- Presented the seminar "The Genetics and Evolution of the Leaf Blade; a Living Solar Panel" to the Biology Department at Smith College, Northampton, MA *February 27, 2012*

MERVOSH, TODD L.
- Organized the meeting and spoke about "Herbicide Experiment: Mesotrione" at the Connecticut Christmas Tree Growers Association Twilight Meeting at the Valley Laboratory in Windsor (50 attendees) *July 19, 2011*
- Hosted the Directors of the Suffield Land Conservancy for a farm tour and Board meeting at the Valley Laboratory (7 attendees) *July 28*

- Led an invasive plants walk and discussion at the Sharon Audubon Center Festival in Sharon (7 participants) *August 14*
- Spoke about weed identification and management at a Connecticut Christmas Tree Growers Association twilight meeting in New Milford (15 attendees) *August 30*
- Was interviewed about biological control of mile-a-minute weed in Newtown by Kendra Bobowick of the Newtown Bee September 1, 2011
- Prepared a display of invasive plants and native plants and provided information at the Suffield Land Conservancy exhibit at "Suffield on the Green" (150 attendees) *September 10 and 11*
- Organized the meeting and gave the talk "Weed Control in Container-grown Ornamentals" at the Nursery & Landscape Research Tour at the Valley Lab (20 attendees) *September 13*
- Spoke about "Weed Management in Christmas Trees" at the fall meeting of the Connecticut Christmas Tree Growers Association in Mansfield, CT (40 attendees) *September 17*
- Participated in a steering committee meeting and a general meeting of the Connecticut Invasive Plant Working Group at the Valley Laboratory in Windsor (50 attendees) *November 10*
- Participated in a symposium planning meeting for the Connecticut Invasive Plant Working Group at the Valley Laboratory (16 attendees) *November 30*
- Was interviewed about potential invasiveness of bamboo species by Phyllis Swebilius of the New Haven Register December 19 and 22
- Presented research on "Tolerances of container-grown ornamentals to mesotrione, dimethenami-P, and pendimethalin plus dimethenamid-P applications" (co-author: Dr. John F. Ahrens) (35 attendees) at the annual meeting of the Northeastern Weed Science Society in Philadelphia, PA *January 4, 2012*
- Co-presented the talk "Approaches for swallow-wort control – deciding how to begin" with Nancy P. Cain (Cain Vegetation Management, Ontario, Canada) (45 attendees) at the annual meeting of the Northeastern Weed Science Society in Philadelphia, PA *January 5*
- Served as a judge of the student research poster contest at the annual meeting of the Northeastern Weed Science Society in Philadelphia, PA *January 6*
- Participated in a symposium planning meeting for the Connecticut Invasive Plant Working Group at the Valley Laboratory (15 attendees) *January 10*
- Taught a half-day training program sponsored by the Department of Energy and Environmental Protection on vegetation management for people with right-of-way applicator licenses (45 attendees) in North Haven *January 12*
- Taught a program, sponsored by University of New Hampshire Cooperative Extension on weeds and weed management in right-of-ways in Goffstown, NH (40 attendees) *January 26*
- Participated in a symposium planning meeting for the Connecticut Invasive Plant Working Group at the Valley Laboratory (15 attendees) *February 1*
- Spoke about services provided by CAES to the "Green Knees Gardeners" Club in Suffield (13 attendees) *February 9*
- Taught a program sponsored by University of New Hampshire Cooperative Extension on weeds and weed management in rights-of-way, Manchester, NH (32 attendees) *February 16*
- Answered questions about invasive plants at the CIPWG exhibit at the Connecticut Flower and Garden Show in Hartford (50 visitors) *February 26*

- Participated in a symposium planning meeting for the Connecticut Invasive Plant Working Group at the Valley Laboratory (13 attendees) *March 1*
- Spoke about "Japanese stiltgrass management in woodlands" at the Forest Health Monitoring Workshop at the Station in New Haven (60 attendees) *March 6*
- Participated in a Connecticut Nurserymen's Foundation Scholarship Selection Committee meeting at the Valley Laboratory *March 21*
- Participated in a symposium planning meeting for the Connecticut Invasive Plant Working Group at the Valley Laboratory (10 attendees) *April 4*
- Served on the Connecticut Nurserymen's Foundation Scholarship Committee, interviewed 4 student finalists, and helped select two recipients, at the Valley Laboratory (14 attendees) *April 4*
- Participated in a symposium planning meeting for the Connecticut Invasive Plant Working Group at the Valley Laboratory (10 attendees) *May 2*
- Presented the talk "Management of invasive swallow-worts" on a livehuddle.com webcast organized by Stewardship Network in Michigan (48 participants) *May 9*
- Led an invasive plant management walk for three volunteers at Tyler Mill Preserve in Wallingford *May 21*
- Spoke about weed management at a Twilight Meeting of the Connecticut Christmas Tree Growers Association in Griswold (45 attendees) *June 5*
- Participated in a symposium planning meeting for the Connecticut Invasive Plant Working Group at the Valley Lab *June 6*
- Presented a talk about management of invasive plants and led an invasive plant walk for middle-school and high-school science teachers in the Institute for Science Instruction and Study Program at Southern Connecticut State University in New Haven (8 teacher attendees) *June 28*

MOLAEI, GOUDARZ

- Hosted Jenna Hernandez, a student from Sacred Heart Academy, who completed her summer internship in his Laboratory *Summer 2011*
- Presented the invited lecture "Global Emerging & Reemerging Epidemics of Arboviruses" to the Department of Biology, Southern Connecticut State University *September 14*
- Presented the invited seminar "Discerning Mosquitoes and Their Catholic Counterparts that Govern the Transmission of Arboviruses in the USA" to the Connecticut Entomological Society *September 16*
- Participated in the Second Annual East Rock Festival on Orange Street and informed visitors about works on food testing, and vector-borne zoonotic diseases conducted at the Station *September 17*
- Participated in 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 mosquito feeding behavior March 13, 2012
- Presented the invited talk "Resurgence of Eastern Equine Encephalitis Virus in Northeastern U.S. and the Role of *Culiseta melanura* and Associated Mosquitoes" to the 99th Annual Meeting of the New Jersey Mosquito Control Association, held in Atlantic City, NJ *March 29*

- Presented a seminar entitled "A Genomic Bite of Mosquitoes" to CAES staff at the 11:00 AM Seminar Series *April 9*
- Participated at Worthington Hooker Elementary School's spring fair in New Haven and operated a booth to introduce the public to the activities at CAES, particularly the Center for Vector Biology & Zoonotic Diseases *May 12*
- Presented the invited lecture "Mosquitoes and Transmission of Viruses in the Metropolitan Area" at the Office of Vector Surveillance and Control, NYC Department of Health and Mental Hygiene, New York *May 16*

MUSANTE, CRAIG L.

- Participated in a workshop on packaging and shipping of Division 6.2 Infectious Substances Category A and B and Dry Ice that was sponsored by The Connecticut Department of Public Health BioResponse Laboratory and Hartford Hospital *September 30, 2011*
- Discussed the operation and use of the Agilent 7500ce ICP-MS for the elemental analysis of environmental samples with Donald Carew, Vice President of Analytical Consulting Technology, Inc. *November 9*
- Participated in an FDA FERN conference call on an upcoming surveillance exercise for arsenic in fruit juices *December 1*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *December 8*
- Visited the CT Department of Public Health Electron Microscopy Laboratory and discussed collaborative research on the detection of nanoparticles in agricultural crops with laboratory staff *June 8*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *June 14*

NAIL, WILLIAM R.

- Many vineyards were visited during the year to help growers in the selection of cultivars, location of new vineyards, vineyard management and any other advice needed by growers *July 2011 – June 2012*
- Presented a poster "Rootstock Influence on Vine Performance and Fruit Quality of Red Bordeaux Cultivars in Connecticut" at the American Society of Enology and Viticulture – Eastern Section Meeting in Baltimore, MD *July 11-14, 2011*
- Participated in three Board of Directors meetings of the American Society of Enology and Viticulture – Eastern Section in Baltimore, MD *July 10-14*
- Participated in a meeting of PIs for the SCRI Project "Improved grape and wine quality in a challenging environment: An eastern US model for sustainability and economic vitality" at the American Society of Enology and Viticulture – Eastern Section meeting in Baltimore, MD *July 26*
- Participated in a conference call meeting of the eXtension Viticulture Extension Educators Community of Practice *August 25*
- Visited with vineyard staff and inspected the vineyards at Sharpe Hill Vineyard in Pomfret *October 19*
- Visited with vineyard staff and inspected the vineyards at Stonington Vineyards in Stonington *October 20*

- Participated as Chair-Elect at the annual meeting of NE 1020: Multistate Evaluation of Winegrape Cultivars and Clones" in Boise, ID *November 2-3*
- Participated and served as Secretary at a Board of Directors Meeting of the American Society of Enology and Viticulture – Eastern Section in Traverse City, MI *November 13-14*
- Participated in a national conference call meeting of the eXtension Viticulture Extension Educators Community of Practice *November 18*
- Moderated the Viticulture I and Viticulture II sessions at the New England Vegetable and Fruit Conference in Manchester, NH *December 15*
- Participated in a webinar for the SCRI Northern Grapes Project (220 attendees) *January 5, 2012*
- Gave a pruning demonstration and general viticulture workshop at Silverman's Farm in Easton, CT (5 attendees) *January 11*
- Participated in a national conference call meeting of the eXtension Viticulture Extension Educators Community of Practice *January 25*
- Met with vineyard owner and staff at Chamard Vineyards in Clinton and inspected the replanted portion of the vineyard *February 9*
- Discussed pest and crop management strategies for the upcoming season with vineyard owner and staff at Savino Vineyards in Woodbridge *February 23*
- Was interviewed about the Connecticut grape industry by Alicia Gray of Southern Connecticut State University for her senior research project *March 21*
- Participated in a meeting of the Connecticut Farm Wine Development Council at the Connecticut Department of Agriculture in Hartford *April 5*
- Participated in a conference call meeting of the Board of Directors of the American Society of Enology and Viticulture – Eastern Section *April 19*
- Gave a poster presentation "Evaluation of New Winegrape Cultivars in Connecticut" at Plant Science Day in the Spring in Jones Auditorium *April 25*
- Participated in a national conference call meeting of the eXtension Viticulture Extension Educatiors Community of Practice (GCoP) *May 24*

PETERSON, RICHARD B.

- With Dr. Neil Schultes and Dr. Philip Armstrong, helped plan and served as a judge for the Sigma Xi sponsored Quinnipiac University First Annual Student Research Conference *April 19, 2012*
- Participated in the 29th annual Eastern Regional Photosynthesis Conference held at the Marine Biological Laboratory in Woods Hole, MA, where he presented a poster co-produced with Dr. Israel Zelitch and Dr. Neil Schultes entitled "Evidence That C3 Photosynthesis Precedes C4 Photosynthesis During Maize Leaf Development" *April 20-22.*

PIGNATELLO, JOSEPH J.

- Presented the talk "Adsorption of aromatic carboxylate ions to charcoal black carbon is accompanied by release of hydroxide ion" at the Annual Meeting of the American Chemical Society, Denver, CO *August 28, 2011*

- Gave the poster presentation "Sorption of the Antimicrobial Sulfamethazine to Black Carbon (Biochar)" at the Annual meeting of the American Chemical Society in Denver, CO *September 1*
- Presented two invited talks "What controls the bioavailability of contaminants in soil?" and "Preferential sites in soil organic matter probed with stable nitroxyl free radicals" at the annual meeting of the Soil Science Society of America, San Antonio, TX *October 16-21*
- Presented the talk "Catalytic oxidation for elimination of methyl bromide fumigation emissions" at the Methyl Bromide Alternatives Outreach annual meeting, San Diego, CA *October 31*
- Presented the paper "Catalytic Oxidation for Elimination of Methyl Bromide Fumigation Emissions" at the Methyl Bromide Alternatives Outreach Annual Meeting held in San Diego, CA *November 2*
- Presented an invited seminar entitled "Role of Black Carbon in the Fate of Pollutants: Chemistry at the Interface" to the Department of Chemistry, Old Dominion University in Norfolk, VA November 17
- Presented a poster and short talk entitled "Nanoscale Interactions Between Enginered Nanomaterials and Black Carbon (Biochar) in Soil" at the USDA NIFA-AFRI 2012 Nanotechnology Grantee Meeting, Orlando, FL *February 1-3, 2012*
- Presented the invited talk "Insight into interactions of polar and ionogenic organic compounds with black carbon" at the American Chemical Society National Meeting, San Diego, CA *March 25-29*
- Presented the talk "Novel Pathways in the Adsorption of Weak Organic Acids by Black Carbon" at the 6th SETAC World Congress, Berlin, Germany *May 20-24*
- Presented a poster "Sorption Selectivity Studied with Nitroxyl Paramagnetic NMR Relaxation Probes" at the NSF CBET Grantees Workshop in Baltimore, MD June 6-8, 2012
- Hosted Dr. Gerard Cornellisen from the Norges Geotekniske Institute in Oslo, Norway for discussions on collaborative research *June 13*
- Gave three lectures at Eurosoil 2012, held in Bari, Itali: "Adsorption of Weak Organic Acid Anions to Black Carbon: Proton Exchange-enabled Adsorption and Elevation of the pKa on the Surface"; "Effect of Biochar Properties and Weathering on Sorption of the Swine Antibiotic Sulfamethazine in Biochar-amended Soils"; "Sorption Selectivity of Neutral Organic compounds by Soil Organic Matter Probed With Nitroxyl Paramagnetic NMR Relaxation Probes *June 30-July 6*

PRAPAYOTIN-RIVEROS, KITTIPATH

- Participated in an FDA MFRPS conference call *May 23, 2012*
- Reinitiated the data exchange program between the Analytical Chemistry Department and eLEXNET/FDA *May 30*

RIDGE, GALE E.

- Spoke about insects and the science of entomology to visiting students from the Urban Initiative Program (15 attendees) *July 7, 2011*
- Published the Connecticut Health Department Bed Bug Identification Guide which was distributed to the 78 local health departments in the state of Connecticut *July 8*

- Participated in a bed bug online "chat" moderated by Matthew Sturdevant of the Hartford Courant with a simulcast through the Tribune properties, which included websites of the Los Angeles Times, Chicago Tribune, Baltimore Sun, Orlando Sentinel, Fort Lauderdale Sun Sentinel, The Morning Call of Allentown, PA, and the Daily Press of Newport News, VA *July 20*
- Presented two talks about bed bugs and self-protection to the Home Instead Senior Care In-Service in Shelton (80 attendees) *July 27*
- Was interviewed about insect inquiries by Connecticut citizens by the New Haven Register *August 3*
- Was interviewed about bed bugs by WQUN AM 1220 Radio *August 3*
- Was interviewed about the lily leaf beetle by the Republican-American *August 5*
- Was interviewed about chickens and their feeding activities on ticks by the Republican-American *August 10*
- Was invited to a meeting held by the Greenwich Health Department to assist them in planning more effective management of ongoing bed bug infestations in Greenwich Housing Authority properties. The meeting was attended by representatives from the Greenwich Housing Authority, Greenwich Health Department, pest management professionals, and representatives from housing and urban development *August 11*
- Spoke on managing bed bugs in their shelters to the Connecticut Coalition Against Domestic Violence in Bridgeport (80 attendees) *September 8*
- Spoke on managing bed bugs in their shelters to the Connecticut Coalition Against Domestic Violence in Wethersfield (80 attendees) *September 13*
- Was interviewed about the reemergence of bed bugs in the United States by The Patch *September 16*
- Spoke about the biology and behavior of bed bugs and self-protection for staff members to the Child Study Center staff at Yale University (60 attendees) *September 16*
- With Drs. Robert E. Marra, Claire E. Rutledge, and Goudarz Molaei, staffed several display tables on ticks, bed bugs, mosquitoes, Emerald ash borer, Asian longhorned beetle, and plant pathology research at the East Rock Street Festival in New Haven (5,000 visitors) *September 17*
- Was filmed working with her bed bug colony for the forthcoming Connecticut Health Department bed bug training video *September 21*
- Held Bed Bug Forum VI at the Experiment Station (135 attendees) *October 6*
- Presented a two hour evening workshop for the reuse and recycling industries on the handling of bed bugs in their work *October 17*
- Spoke on proactive management of bed bugs in shelters and other temporary accommodations to the Mercy Housing and Shelter Corp. in Hartford (40 attendees) *October 31*
- Participated as an advisor on bed bugs at a Product Stewardship Association meeting in Hartford *November 4*
- Spoke about the history of bed bug management and how it applied to Integrated Pest Management control methods today to Connecticut pest management professionals at a training conference held at the Farmington Marriott in Farmington (95 attendees) *November 8*

- Spoke to the doctors and medical staff at the Hospital for Special Care in New Britain about bed bugs and protective protocols for the institution (70 attendees) *November 16*
- Participated in an EPA webinar titled "Pesticide Misuse and the National Bed Bug Epidemic" *November 18*
- Spoke at a regional conference on bed bug management hosted by the Bed Bug Action Committee in Concord, New Hampshire (200 attendees). Her talk was recorded for public television for future broadcast. *November 21*
- With the CCABB Board, representatives from the Department of Energy and Environmental Protection, and the International Sleep Products Association, attended a meeting with Representative Andres Ayala, Jr. in Hartford for the purpose of giving him information and advice for his drafting of a bed bug bill to be presented to the Connecticut General Assembly in the spring of 2012 *November 29*
- Presented two talks on bed bug behavior and community management at Luther Ridge in Middletown (200 attendees) *December 16*
- Participated in a meeting with Danbury city officials and Western Connecticut directors of health regarding managing bed bugs in schools and the public response (15 attendees) *January 4, 2012*
- Presented a talk at a public outreach program at Danbury High School (75 attendees) *January 4*
- Spoke at Greenwich High School about bed bugs and was part of a panel of officials answering questions about bed bugs in schools (30 attendees) *January 25*
- Was interviewed about bed bugs by Channel 12 News *January 25*
- Ran a training program for the Hartford Board of Education on non-chemical treatments for bed bugs in schools *January 27*
- Participated in a meeting with the CCABB Board and Representatives concerning the Landlord/Tenant Bed Bug Bill (7 attendees) *January 30*
- Spoke about landlord/tenant law and bed bugs at a meeting of Connecticut Legal Services in Meriden (30 attendees) *February 2*
- Introduced Chimney Swift Bugs (discovered in a Greenwich school) as another species to be considered for identification in Connecticut at a bed bug training program of the Connecticut Pest Control Association (60 attendees) *February 10*
- Was a guest on the Colin McEnroe Show, a live National Public Radio show, and was part of a broad discussion about dust including dust mites *February 13*
- Was interviewed about a career in entomology by the Lancaster Farming Magazine *February 14*
- Was interviewed about insect activity during winter by The Day *February 15*
- Ran a training session for the Norwalk Health Department staff on bed bug identification *February 17*
- Was interviewed about her identification of Chimney Swift Bugs found at North Mianus School in Greenwich and the importance of expert identification by the Greenwich Times *February 21*
- Assisted the Chatham Health District with how to avoid accidental introduction of bed bugs by EMS technicians *February 29*

- Launched on Facebook and YouTube the "Bed Bug Training Video, "They're Back", a 7 minute informational video peppered with cartoons and staged scenarios to help health department staff manage bed bug issues and situations. *March, 2012*
- Spoke about bed bugs to the Winter Regional Conference of the New England Pest Management Association in Boxborough, MA (200 attendees) *March 16*
- With Katherine Dugas had a bed bug display at the public exhibit sponsored by the Entomology Society of America Eastern Branch Meeting in Hartford (1,173 visitors) *March 17*
- Spoke about the human side of the bed bug equation and the important role of public education and outreach in regard to bed bug management at a bed bug symposium at the Entomology Society of America Eastern Branch Meeting in Hartford (30 attendees) *March 18*
- Spoke about bed bugs to health department officials and nursing groups from across Connecticut at Southern Connecticut State University in New Haven (120 attendees) *March 21*
- Was interviewed about bed bugs and how they affect furniture banks and charities by Judy Benson of The Day *March 26*
- Was interviewed about ticks, the marmorated stink bug, Asian longhorned beetle, and the Emerald ash borer by Harlan Levi of the Journal Register *March 28*
- Advised landlord/tenant representatives about bed bugs at a meeting called by Representative Andres Ayala in Hartford while Bed Bug Bill No. 190 was deliberated on *March 28*
- Spoke to doctors at Danbury Hospital about the biology, history, and management of bed bugs in emergency rooms (40 attendees) *March 30*
- Spoke about bed bugs at the Northeast Recycling Council Conference in Northampton, MA *April 17*
- Visited and advised a major organic poultry operation in central Massachusetts that had two concurrent populations and forms of bed bugs *April 17*
- Was interviewed about bed bugs by WTIC Radio *April 19*
- Spoke about insect physiology to visiting students from Middletown High School (15 students) *April 20*
- Spoke about bed bugs to delegates at the Western Connecticut Mental Health Network Bed Bug Forum overseen by the Northwest Regional Mental Health Board in Waterbury (90 attendees) *April 20*
- Spoke about bed bug management protocols and legal implications at the New England Resident Service Coordinators Conference in Providence, RI (110 delegates) *May 3*
- Ran a bed bug in-service training for the Visiting Nurse Association in New Haven (35 attendees) *May 11*
- Spoke at a Chrysalis Charities bed bug workshop on how to manage bed bugs in poor and underserved populations of Hartford (150 attendees) *May 15*
- Was interviewed about bed bugs by the Waterbury Republican *May 16*
- Spoke about insect behavior and evolution to visiting students from the Worthington Hooker Middle School in New Haven (15 students) *May 18*

- Assisted soldiers from the Army Special Ops, stationed in Afghanistan with IPM, including heat treatment of bed bugs in their barracks. Treatment had to be modified due to the high altitude location of the buildings in the mountains bordering Afghanistan and Pakistan *May 31*

ROBB, CHRISTINA S.

- Organized and chaired the session "Seafood Analysis and the Gulf Oil Spill: The Federal/State Response" at the 2011 Eastern Analytical Symposium in Somerset New Jersey *November 14, 2011*
- Participated in an FDA FERN conference call on an upcoming surveillance exercise for arsenic in fruit juices *December 1*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *December 8*
- Participated in a USDA FSIS FERN Hotwash call on the recent "Capacity and Capability" exercise that Analytical Chemistry took part in *December 14*
- Participated in an FDA FERN Chemistry Cooperative Agreement (CCAP) Laboratory conference call *January 12, 2012*
- Participated in a conference call on ISO/IEC 17025:2005 accreditation with Hitelia Castellanos of the US FDA *January 30*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cCAP) Laboratory conference call *February 9*
- Participated in an FDA FERN Northeast Regional conference call *February 14*
- Participated in an FDA FERN conference call on an ongoing surveillance exercise for arsenic in fruit juices *February 29*
- Participated in the North Branford High School Eco Fair *April 12*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cCaP) Laboratory conference call *April 12*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *May 10*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *June 14*

RUTLEDGE, CLAIRE E.

- Staffed a table for CAES and answered questions about Asian Longhorned Beetle, Emerald Ash Borer and the Smoky-Winged Beetle Bandit at the Annual Summer Meeting of the Connecticut Tree Protective Association in Farmington, CT *July 15, 2011*
- With Rose Hiskes and Katherine Dugas, staffed an insect identification table at the CTPA Summer Meeting held at the Farmington Club in Farmington *July 21*
- Presented the table "*Cerceris fumipennis*: the beetle hunting wasp" at Plant Science Day, Hamden, CT *August 3, 2011*
- Gave the talk "Emerald Ash Borer Update" at the Nursery and Landscape Research Tour held at the Valley Lab in Windsor (20 attendees) *September 13*
- Staffed a display table on Emerald ash borer and Asian longhorned beetle at the East Rock Street Festival in New Haven (5,000 visitors) *September 17*

- Staffed the CAES booth and answered questions about the Emerald ash borer and the Asian longhorned beetle at the Big E in West Springfield, MA *September 27*
- Presented a poster titled "Scent of a Buprestid: How the Smokey-winged Beetle Bandit recognizes her prey" at the Emerald Ash Borer research and Technology meeting in Wooster, OH (250 attendees) *October 12-13*
- Taught "Insects that attack trees" for Arboriculture 101 in Jones Auditorium, New Haven, CT *October 19*
- Organized, moderaetd, and presented two talks "Cuticular hydrocarbons used for prey recognition by *Cerceris fumipennis*" and "Degree day modeling for *Cerceris fumipennis*" at a symposium titled "Biosurveillance: Using a native wasp *Cerceris fumipennis* to find Emerald Ash Borer and other species of Buprestidae" at the Annual Meeting of the Entomological Society of America held in Reno, NV (40 attendees) *November 16*
- Gave the talk "Emerald Ash Borer Update" at the NOFA Annual Winter Meeting held at the University of Connecticut in Storrs (175 attendees) *December 5*
- Gave the talk "Biosurveillance, Using a Native Wasp to Find Invasive Beetles" for the Department of Biology Seminar Series at Oberlin College in Oberlin, OH (30 attendees) *December 9*
- Staffed a CAES information table and answered questions on Emerald ash borer and *Cerceris fumipennis* at the Connecticut Tree Protective Association Annual Meeting held at Aqua Turf in Plantsville (840 attendees) *January 19, 2012*
- Taught a class on Insects Attacking Trees and Shrubs for Arboriculture 101 held in Jones Auditorium (50 attendees) *February 15*
- Taught a class on Insects Attacking Trees and shrubs at Bartlett Arboretum in Stamford (20 attendees) *February 16*
- Presented the talk "An update on the Emerald ash borer" at the Forest Health Monitoring Workshop in Jones Auditorium (60 attendees) *March 6*
- Staffed the "hands-on" table with forest pests for Arboriculture 101 in Jones Auditorium *March 7*
- Presented the talk "An Update on the Emerald Ash Borer" at the Forest Health Workshop in Jones Auditorium, New Haven, CT *March 8*
- Presented the talk "*Cerceris fumipennis*, the beetle-hunting wasp" to a Master Gardeners Class at Edgerton Park, New Haven, CT *March 15*
- Manned a table with a display on *Cerceris fumipennis* for "Bug's World" at the Eastern Branch of the Entomological Society's annual meeting in Hartford (250 youth attendees) *March 17*
- Taught a class called "Beetle detectives: On the trail of the Emerald ash borer" at Minds in Motion sponsored by Connecticut Association for the Gifted in Prospect (6 student attendees) *March 31*
- Spoke about insects with a pre-K 4's at King-Robinson School in New Haven (19 student attendees) April 25
- Presented an "Update on Emerald Ash Borer, Asian longhorned Beetle, Brown Marmorated Stink Bug, and Spotted Wing Drosophila" to a Master Gardeners' Hot Topics class in West Hartford (86 attendees) *April 26*

- Held a workshop for Wasp Watcher volunteers at White Memorial Conservation Center in Litchfield (13 adult and 3 youth attendees) *June 28*

SCHULTES, NEIL P.

- Gave a talk at the Botany 2011 Annual Meeting in St. Louis, MO (150 attendees) *July 9-13, 2011*
- Participated in a two day workshop on Bioinformatics for the Plants Discovery Environment and API: Integration of Biological Data-sets, Computational Tools, and Analytical Workflows" at the Botany 2011 Annual Meeting in St. Louis, MO *July 9-13*
- Presented a lecture on "Genetically Modified Plants and Bioethics" to a freshman biology class at the University of Hartford (20 attendees) *September 12*
- Presented the talk "The Genetics and Molecular Biology of C4 Photosynthesis in Maize" to the Quinnipiac Sigma Xi Chapter *October 27*
- Presented the talk "The Genetics and Molecular Biology of C4 Photosynthesis in Maize" to the Quinnipiac Sigma Xi Chapter *October 27*
- Served as the Quinnipiac Sigma Xi chapter delegate and presented the poster "A Possible Role for the LHCB7 Gene in Photosynthetic Light Acclimation" detailing research with Dr. Richard Peterson, at the Sigma Xi Annual Meeting and International Research Conference in Raleigh, North Carolina *November 10-13*
- Presented the poster "A Possible Role for the LHCB7 Gene in Photosynthetic Light Acclimation" detailing research with Dr. Richard Peterson *November 18*
- With Dr. Richard Peterson, hosted a visiting speaker at the Yale Bioethics GMO plant series and gave him a tour of the Station *November 18*
- Served as an examiner for a Master's Thesis defense for Julie Crosby at the Department of Biology, Indiana-Perdue University, Ft. Wayne, IN *November 29*
- With Dr. Douglas Dingman presented a lecture for Station staff on "Introduction to Genomics" in Jones Auditorium *January 23, 2012*
- With Dr. Douglas Dingman presented a lecture for Station staff on "Next Generation DNA Sequencing Technologies" in Jones Auditorium *January 30*
- With Dr. Douglas Dingman presented the lecture "Genomics for CAES" to Station staff in Jones Auditorium *February 7*
- Presented a seminar on Nucleobase Transporters to the Irish-Nelson Group at the Department of Molecular, Cellular and Developmental Biology at Yale University *March 9*
- Along with Dr. Donald Aylor, spoke with and gave a brief Station tour for Dr. Nicholas Kalaitzandonakes from the Department of Agriculture and Applied Economics at the University of Missouri *March 15*
- Gave lectures on "Genetically Modified Plants in Agriculture" for a Yale course, Sci031 "Current Topics in Science" (18 attendees) *March 23 and 30*
- Delivered a lecture about "Genetically Modified Plants in Agriculture" to a Yale University Course Sci031 "Current Topics in Science" (18 attendees) *April 6*
- Along with Dr. Richard Peterson and Dr. Philip Armstrong, helped plan and served as judges for the Sigma Xi sponsored Quinnipiac University First Annual Student Research Conference *April 19*

SHEPARD, JOHN J.

- Was interviewed about mosquitoes and West Nile virus by Mara Lavitt from the New Haven Register at Plant Science Day *August 3, 2011*
- Was interviewed about mosquitoes and West Nile virus by Martin Waters from WQUN at Plant Science Day *August 3*
- Presented the invited talk "The Status of Invasive Mosquito Species in Connecticut" to the Kiwanis Club of Wilton (60 attendees) *November 16*
- Presented the invited talk "Arbovirus Activity in Connecticut, 2011" at the 57th Annual Meeting of the Northeastern Mosquito Control Association, held in Plymouth, MA (190 attendees) *December 5-7*
- Participated in a Board of Directors meeting of the Northeastern Mosquito Control Association in Northboro, MA (12 attendees) *January 29, 2012*
- Participated in a Board of Directors meeting of the Northeastern Mosquito Control Association in Plymouth, MA (11 attendees) *March 9*
- Participated in the Annual Meeting of Multi-State Research Project NE-1043, Biology, Ecology & Management of Emerging Disease Vectors held at CAES *March 13*
- Presented a hands-on display about mosquitoes and the Station's Mosquito Trapping and Testing Program for West Nile Virus and Eastern Equine Encephalitis at Biodiversity Day at the Peabody Museum (1,280 museum visitors) *April 19*
- Presented information about mosquito biology and demonstrated various laboratory and field collection techniques to Connecticut teachers participating in the Yale-Peabody Fellows Program (12 attendees) *April 26*
- Participated in a Board of Directors meeting of the Northeastern Mosquito Control Association in Northboro, MA (10 attendees *May 3*
- Spoke to a group of Talented and Gifted students from Worthington Hooker School about mosquito biology and the state Mosquito Trapping and Testing Program (25 attendees) *May 18*

SHORT, MICHAEL R.

- Demonstrated safe use of invasive control equipment (DR Mower, clearing saw) at Lyman Memorial High School, Lebanon (18 students) *October 13, 2011*
- Discussed mechanical control of Japanese Barberry using brush saw and field and brush mower at an NRCS Barberry Control Workshop at White Memorial Conservation Center (26 attendees) *November 15*
- Prepared and administered the General Knowledge and Forest Equipment Exam for the 2011 Connecticut Future Farmers of America Forestry Career Development Event at UConn, Storrs (35 students) *November 21*
- Explained techniques of mechanically controlling Japanese barberry at the Invasive Shrub Control Workshop in Guilford in cooperation with Guilford Land Trust and University of Connecticut Cooperative Extension (17 attendees) *December 4*

SMITH, VICTORIA L.

- Participated in the Connecticut Nursery and Landscape Association Summer Meeting, held at Veterans Park in Watertown (200 participants) *July 13, 2011*

- Participated in the Connecticut Pomological Society Meeting, held at Dzen Brothers Farm in South Windsor, with information on peach disease surveys (60 participants) *July 14*
- Participated in a joint meeting of the National Plant Board's Board of Directors and USDA-APHIS-Plant Protection and Quarantine Leadership Team, Denver, CO (30 participants) *August 7*
- As Eastern Plant Board President and representative from Connecticut, participated in the annual meeting of the National Plant Board, Denver,CO (200 participants) *August 8-10*
- As Eastern Plant Board President, participated in a meeting of the National Plant Board's Board of Directors, Denver, CO (15 participants) *August 11*
- Presented the talk "Progress in Regulation: *Phytophthora ramorum* and Chrysanthemum White Rust" at the Nursery and Landscape Research Tour held at the Valley Lab in Windsor (20 participants) *September 13*
- Participated in a meeting of the Yale University Biosafety Committee in New Haven (25 participants) *September 15*
- Certified cold storage and controlled atmosphere storage facilities at Blue Hills Orchard for exportation of apples to Israel, in cooperation with USDA-APHIS-PPQ *September 26*
- Participated in a meeting of the Board of Directors of the National Plant Board as Eastern Plant Board President, held at the Hotel Nikko in Mexico City, Mexico (9 participants) *October 16-17*
- Participated in the 36th annual meeting of the North American Plant Protection Organization , as President of the Eastern Plant Board, held in Merida, Mexico (150 participants) *October 18-21*
- Participated in a meeting of the US Forest Service Northeastern Area Cooperators, held at the Urban Forestry Center in Portsmouth, New Hampshire, with discussions on aerial survey, new and established pests, and general forest health conditions (30 participants) *November 2-3*
- With Drs. Kirby C. Stafford, III and Louis A. Magnarelli, met with Patricia Douglass and Eric Chamberlain, USDA-APHIS-PPQ, and William Hyatt and Christopher Martin, CT Department of Energy and Environmental Protection in Wallingford to discuss Emerald Ash Borer *December 28*
- Participated in the CT Tree Protective Association winter meeting, with a table on boxwood blight (840 participants) *January 19, 2012*
- Participated in a workshop titled "Chrysanthemum White Rust: Exploring the Issues" held at the USDA Center at Riverside in Riverdale, MD (60 participants) *January 31-February 2*
- Participated in a meeting of the Yale Biosafety Committee in New Haven (16 participants) *February 16*
- Participated in the National Plant Board Systems Approach to Nursery Certification held at USDA Center in Riverdale, MD (60 participants) *March 5*
- Participated, as President, in the National Plant Board's Board of Directors meeting, held at the USDA Center in Riverdale, MD (15 participants) *March 6*
- Participated in a joint meeting of the National Plant Board's Board of Directors and the USDA APHIS-PPQ Leadership Team, held at USDA Center in Riverdale, MD (45 participants) *March 7-8*

- Participated in a meeting of the Yale Biosafety Committee in New Haven (20 participants) *March 15*
- With Dr. Sharon M. Douglas, was a guest on the Wayne Norman morning show on WILI Radio to discuss boxwood blight *March 19*
- With Dr. Sharon M. Douglas and Vickie Bomba-Lewandoski, manned the Experiment Station booth at Agriculture Day at the Capitol, Hartford *March 21*
- With Peter Trenchard, hosted visitors from USDA at Imperial Nurseries, Granby, to evaluate best management practices for *Phytophthora ramorum April 12*
- Participated in an Emerald Ash Borer Response meeting at the Valley Laboratory in Windsor (15 participants) *May 3*
- With Peter Trenchard, met with officials from the USDA-APHIS-Plant Protection and quarantine Export Services at Imperial Nursery in Granby, to discuss compliance agreements for shipping barberry to Canada and to observe Best Management Practices in the nursery *May 17*
- Gave a report on survey activities at the spring meeting of the CT Cooperative Agricultural Pest Survey Committee held in Jones Auditorium (20 participants) *June 8*
- Organized and participated in a webinar presented by USAPlants on a system of record-keeping for public outreach and registration offices, held at the Station (12 participants) *June 20*
- Gave a brief presentation on survey activities and pest conditions at the spring Twilight Meeting of the CT Pomological Society held at Rogers Orchards in Southington (60 participants) *June 20*

STAFFORD, KIRBY C., III

- 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 10-12, 2011*
- Was interviewed about insect and tick repellents by William Weir of the Hartford Courant *July 14*
- With Dr. Sharon M. Douglas, Dr. Theodore G. Andreadis, and Mr. Michael P. Last, met with architects from FLAD on planning for the Jenkins-Waggoner Laboratory renovations *July 20*
- With Dr. Sharon M. Douglas met with architects from FLAD on planning for the Jenkins-Waggoner Laboratory renovations *July 27*
- Was interviewed about ticks and Lyme disease for a video on barberry control and its impact on ticks by Steven Sadlowski *August 2*
- Was interviewed about ticks and Lyme disease by Mara Lavitt for the New Haven Register *August 3*
- Conducted Diversity Training for seasonal and new full-time employees *August 15*
- Was interviewed about ticks and Lyme disease by George Krinsky of the Republican-American *August 24*
- Was interviewed about the impact of Tropical Storm Irene on insects by Judy Benson of The Day *September 7*
- Participated in a meeting with USDA Undersecretary Edward Avalos at the Valley Laboratory in Windsor *September 15*

- Was interviewed about the new disease described by Yale in Emerging Infectious Diseases that may be caused by *Borrelia miyamotoa* by Judy Benson of The Day *September 19*
- Attended the Open House and seminars at the USDA Forest Service to celebrate new green construction of the Forest Service facility in Hamden *September 21*
- With Dr. Theodore G. Andreadis, participated in a meeting of the Advisory Council for the Peabody Fellows Biodiversity and Human Health Program on a new Yale Science Education Partnership Award grant from NIH *September 28*
- Spoke about beekeeping and answered questions at a meeting of the North Haven Planning and Zoning Commission about revision of the ordinance on the keeping of honey bees in North Haven *October 3*
- Was interviewed about the spotted wing drosophila by Bob Miller of the Danbury News Times *October 11*
- Participated in a meeting of the architects on the plans for the Jenkins-Waggoner Laboratory *October 13*
- Participated in an emerald ash borer regulatory working group meeting at the USDA-APHIS office in Wallingford *October 19*
- Participated in a meeting of the Cooperative Agricultural Pest Survey committee at the Valley Laboratory in Windsor *October 17*
- Attended a meeting of the Station's Board of Control at the Valley Laboratory in Windsor *October 18*
- Participated in a meeting at the Connecticut Farm Bureau at the request of Agricultural Commissioner Steven Reviczky to discuss proposed and potential agricultural legislation (13 participants) *October 25*
- Participated in a meeting of the architects on the plans for the Jenkins-Waggoner Laboratory *November 16*
- Represented the Station at the annual meeting luncheon of the Connecticut Farm Bureau in South Windsor *November 18*
- Participated in a meeting of the Connecticut Coalition Against Bed Bugs in the Slate Building (4 attendees) *November 22*
- With Rose Hiskes and Katherine Dugas, participated in a conference call of the Forest Pest Outreach and Survey Project (27 participants) *November 30*
- Participated in a meeting of the architects on the plans for the Jenkins-Waggoner Laboratory *December 7*
- With Dr. Sharon M. Douglas, participated in a meeting of the architects on the plans for the Jenkins-Waggoner Laboratory *December 19 and 20*
- With Drs. Victoria L. Smith and Louis A. Magnarelli, met with Patricia Douglass and Eric Chamberlain, USDA-APHIS-PPQ, and William Hyatt and Christopher Martin, CT Department of Energy and Environmental Protection, in Wallingford to discuss emerald ash borer *December 28*
- Participated as Administrative Advisor at a meeting of the multi-state collaborative potato breeding project in Orlando, FL (NE-1031) (16 attendees) *January 6-7, 2012*
- With Dr. Sharon M. Douglas, participated in a meeting with architects from FLAD on the plans for the Jenkins-Waggoner Laboratory *January 11*

- Participated in a legislative meeting of CT agricultural organizations at the CT Farm Bureau in Windsor *January 19*
- With Dr. Louis A. Magnarelli, Michael Last, and Dr. Sharon M. Douglas, participated in a meeting with the architect and interior designer from FLAD on the plans for the Jenkins-Waggoner Laboratory *January 27*
- With Dr. Louis A. Magnarelli, Dr. Victoria Smith, Peter Trenchard, Stephen Sandrey, and Dr. Sharon M. Douglas, participated in a meeting with nursery industry representatives about boxwood blight *January 30*
- Was interviewed about ticks and Lyme disease by Abram Katz *January 30*
- Participated in a NIFA webinar on the new USDA REEport project reporting system *February 9*
- Was interviewed about the CDC grant proposal on tick management by Sue Walsh of the Redding Pilot *February 14*
- Spoke on invasive insects and forest pests at the Regional Agricultural Science and Technology Center at the Middletown High School (16 attendees) *February 16*
- Spoke on tick and Lyme disease management at the NOFA Organic Land Care Course in Jones Auditorium (46 attendees) *February 21*
- Participated on a Forest Pest Outreach and Survey project conference call *February 22*
- Was interviewed about the winter impact on ticks by Fred Bruer of Northeast Public Radio *February 22*
- Participated in a Farm Bill conference call for plant regulatory officials *February 23*
- Participated in the first of introductory webinars for state plant regulatory officials on the new USDA plant pest reporting system, IPHIS *February 29*
- Spoke on landscape and natural control of ticks at a Lyme disease and tick control forum held in Taunton, MA (88 attendees) *March 1*
- Participated in Part 1 of a USDA webinar on the IPHIS web reporting system for pest survey *March 2*
- Was interviewed about Novozymes and the fungus Metarhizium for tick control by Tom Porter of Maine Public Radio *March 5*
- Moderated the Forest Health Monitoring Workshop in Jones Auditorium (60 attendees) *March 6*
- With Drs. Louis A. Magnarelli, Sharon M. Douglas, and Mr. Michael P. Last, met with architects from FLAD to discuss the Jenkins-Waggoner Laboratory plans (9 attendees) *March 7*
- Participated in Part 2 of a USDA webinar on the IPHIS web reporting system for pest survey *March 7*
- 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 attendees) *March 13*
- With Drs. Kimberly A. Stoner, Douglas W. Dingman, and Brian D. Eitzer, provided a tour of the Station with research updates for beekeepers Ted and Becky Jones and the American Honey Princess, Danielle Dale *March 16*
- Participated in a meeting of the Northeast Area Experiment Station Directors (NERA) and the Multistate Activities Committee in Baltimore, MD *March 19-21*

- Was interviewed about the fungus Metarhizium for tick control by Laura Landro of the Wall Street Journal *March 22*
- Was interviewed about spring tick activity by Alissa Smith of the Daily Wilton *March 22*
- Spoke about ticks and Lyme disease at the Gales Ferry Community Center (5 attendees) *April 4*
- Was interviewed about tick activity related to the recent warm weather by Amanda Cuda of the Connecticut Post *April 10*
- Was interviewed about ticks, Brown marmorated stink bug, and spotted wing drosophila by Sam Gingerella of WTIC-Radio *April 11*
- Presented a talk on ticks and tick management at the Earthplace Nature Center in Westport, organized by the Westport Weston Health Department (45 attendees) *April 11*
- Was interviewed about the fungus Metarhizium for tick control by Susan Chaney of www.bestinshowdaly.com *April 13*
- Spoke on Lyme disease and tick-bite prevention for Department of Energy and Environment Safety Committee members at Sessions Woods Education Center in Burlington (22 attendees) *April 18*
- Was interviewed about the emerald ash borer discovered on the east side of the Hudson River by Craig Lemoult of WSHU-Public Radio *April 18*
- With Heidi Stuber, presented a display on ticks and Lyme disease for Biodiversity Day at the Yale Peabody Museum in New Haven (1,280 attendees) *April 19*
- Presented a talk on ticks and Lyme disease at the annual meeting of the Old Saybrook Land Trust in Old Saybrook (21 attendees) *April 24*
- Was interviewed for a video about ticks and Lyme disease for General Electric in Fairfield by Brian Russell of Red Shoe Film *April 30*
- Was interviewed about honey bees and the bee inspector position by Erin Logan of WTNH-TV *May 9*
- With Dr. Jeffrey S. Ward, was a guest on the Faith Middleton Show at WNPR and discussed barberry, ticks, and Lyme disease *May 10*
- Was interviewed about honey bee swarms by Jodie Mozdzer of the Valley Independent Sentinel, Ansonia *May 11*
- Was interviewed about tick bite prevention and tick control by Jenny Everett for Martha Stewart Living Magazine *May 17*
- Was interviewed about honey bees and colony collapse disorder by Tracy O'Shaughnessy of the Republican American *June 7*
- Represented CAES at a reception at Jones Family Farms in Shelton *June 7*
- Participated in a meeting of the Cooperative Agricultural Pest Survey Committee in New Haven *June 8*
- Participated in a conference call of the National Research Support Project Review Committee *June 18*
- Participated in a webinar to review the USA Plants software being considered by the Station *June 20*
- Chaired a conference call of the Multi-State Activities committee of the Northeast Area Experiment Station Directors to review multi-state project proposals *June 28*

STONER, KIMBERLY A.

- With Dr. Brian D. Eitzer, hosted Dr. Thomas Steeger of the Environmental Fate and Effects Division of the Environmental Protection Agency and Thomas Moriarty, Risk Manager in the Office of Pesticide Programs at EPA and Chair of EPA's Pollinator Protection Team, who came to discuss current and planned research on pesticides and pollinators and how the EPA can use Experiment Station research in making decisions about pesticide use and labeling *July 6-7, 2011*
- Led a workshop in the field and a discussion of "Insects on the Farm" at Boulder Knoll, including presenting data on the 50 species of bees caught in bee traps at Boulder Knoll Farm in 2009 (12 attendees) *July 16*
- Hosted Roberta Glatz, a visiting researcher on squash bees, and visited Fort Hill Farm in New Milford and Riverbank Farm in Roxbury looking for squash bee nesting sites *July 25*
- Gave a presentation on "Bees and Pollination" and led a workshop collecting bees on the wildflower plantings at the Aududbon Center in Greenwich (36 adult and 6 youth attendees) *July 30*
- Visited Bauer Farm, a community farm on town-owned land in Madison, to consult about planting for pollinators, choosing cover crops, and resources for community farms in Connecticut *October 16*
- Spoke at the Farm-to-Chef Annual Meeting in Shelton as a member of a panel addressing the question "What's the Difference Between Organic and IPM?" (69 attendees) *November 7*
- Participated in the annual meeting of the Connecticut Vegetable and Small Fruit Growers at the Tolland Extension Center and made an announcement about the research project on pollination of squash and pumpkins and talked with growers about participating in the project *January 19, 2012*
- Taught a section on "Principles and Procedures" in the Organic Land Care Course sponsored by CT NOFA in Jones Auditorium (45 participants) *February 15*
- Spoke on "Pollination Security, Honey Bees, and Wild Bees" at the monthly meeting of the Connecticut Entomological Society at the University of Connecticut in Storrs (25 participants) *February 17*
- Taught the section "Pest Management Overview" in the Organic Land Care Course sponsored by CT NOFA in Jones Auditorium (45 participants) *February 21*
- Presented a talk on "Pollination, Wild Bees, and Honey Bees" at the CT NOFA Winter Conference at Manchester Community College (60 attendees) *March 3*
- Presented a talk on "Pollination, Wild Bees, and Honey Bees" at the Clinton Garden Club at the Clinton Public Library (25 attendees) *March 8*
- With Drs. Kirby C. Stafford, Douglas W. Dingman, and Brian D. Eitzer, gave a tour focusing on bee research to the American Honey Princess, Danielle Dale, and to Ted and Becky Jones, President and Treasurer of the CT Beekeeping Association *March 16*
- Presented a display on bee research and a brief talk before a showing of the film "The Vanishing of the Bees" sponsored by Audubon Connecticut, at the Wallingford Public Library (26 adult and 4 youth attendees) *March 21*
- Participated in a meeting at the University of Massachusetts to launch the project "Pollination Security for Fruits and Vegetables in the Northeast" funded by the Specialty Crops Research Initiative of the US Department of Agriculture. Dr. Brian D. Eitzer and

Tracy Zarrillo also participated (14 scientists, graduate students, and other researchers participated) *March 26*

- Participated in the National Forum of Beyond Pesticides at the Yale School of Forestry and Environmental Sciences *March 30-31*
- Presented a talk on "Pollination, honey bees, and wild bees" as part of Science Day at the Housatonic Valley Regional High School in Falls Village (180 students and 20 adults attendees) *April 5*
- Taught three modules of the Connecticut Pollinator Conservation Short Course, sponsored by the Northeast SARE program, at the Tolland County Extension Center in Vernon. Dr. Stoner also assisted with other aspects of the course, providing specimens and responding to questions during the open laboratory (45 attendees) *April 12*

THOMAS, MICHAEL C.

- Participated in a botanical survey of Bell Cedar Swamp in North Stonington, and, along with Dr. Goudarz Molaei, discussed ongoing research on the ecology and epidemiology of Eastern Equine Encephalitis virus with members of the Connecticut Botanical Society, Avalonia Land Conservancy, and Stonington Land Trust (13 attendees) *July 9, 2011*
- Co-led the Farmington Valley Butterfly Count sponsored by the North American Butterfly Association (10 attendees) *July 23*
- Participated in the Annual Meeting of Multi-State Research Project NE-1043, Biology, Ecology & Management of Emerging Disease Vectors held at CAES *March 13, 2012*
- Presented a hands-on display about mosquitoes and the Station's Mosquito Trapping and testing program for West Nile virus and Eastern Equine Encephalitis at Biodiversity Day at the Peabody Museum (1,280 museum visitors) April 19
- Presented information about mosquito biology and demonstrated varuious laboratory and field collection techniques to Connecicut teachers participating in the Yale-Peabody Fellows Program (12 attendees) April 26

VOSSBRINCK, CHARLES R.

- Met with an official from the Sligan Plastics Corporation, Deep River, CT, which makes bottles for use in the medical industry, when a shipment was rejected when a single tenebrionid beetle was discovered in the shipment. Possible means of monitoring insects at the plant and preventing this contamination were discussed *July 26, 2011*
- Presented a talk and laboratory exercise on "Phylogeny" to a biology class at Gateway Community College in New Haven *November 31*
- Participated in 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 the molecular phylogeny of viruses and microsporidia *March 13*, 2012
- Served as a judge for the Biotechnology Section at the Connecticut Science Fair held at Quinnipiac University in Hamden *March 16-17*
- Presented the invited talk "Phylogenetic Methods" at the University of Southwest China, Chongqing, China and met with students and faculty at the Institute of Sericulture and Systems Biology to discuss planned cooperative research on the silkworm pathogen *Nosema bombycis May 6-12*

WARD, JEFFREY S.

- With local officials, visited property in Rivertown for determining its potential as a preserve for Audubon Connecticut (12 attendees) *July 9, 2011*
- Along with Dr. Scott Williams, hosted a meeting of the Connecticut Urban Forest Council at the Station *July 14*
- Visited sites in Woodbury infested with *Phyllostachys aurea* with Karyn Rickel *July 15*
- Was interviewed about sycamores by John Burgeson of the Connecticut Post *July 15*
- Visited Veteran's Park in Bridgeport to advise officials on the invasive control on a new Frisbee golf course (3 attendees) *July 20*
- Was an invited guest on WTIC AM-1080 radio talk show "Garden Talk" to offer advice on tree care (30,000 listeners) *July 23*
- Along with Dr. Scott C. Williams, discussed invasive control with James Wolf at his property in Coventry *July 27*
- Was interviewed about growing subtropical plants by Carrie MacMillan of the Waterbury Republican American *July 29*
- Spoke on invasive plant control for Vermont to NOFA in Brattleboro, VT (7 attendees) *July 30*
- Advised Green River Association officials on invasive control in Guilford, VT (2 attendees) *July 31*
- Was interviewed about protecting trees from hurricane damage by Ann DeMatteo of the New Haven Register *August 26*
- Was interviewed about impact of hurricanes on trees by Judy Benson of the New London Day *September 7*
- Participated in a Connecticut Urban Forest Council Meeting in New Haven *September 9*
- Spoke on homeowner tree care to the Garden Club of Madison (41 attendees) *September 13*
- Administered practical and oral examinations to arborist candidates for the Connecticut Tree Protection Examining Board *September 14*
- Spoke on pruning trees and shrubs for the Long Hill Garden Club in Trumbull (53 attendees) *September 26*
- Gave the invited talk "The ups and downs of final harvest" at the Pulling-the-Trigger Even-aged Silvicultural Workshop sponsored by University of New Hampshire Cooperative Extension in Hillsborough, NH (80 attendees) *October 13*
- Organized and moderated "Tree Preservation – What To Do To Save Large Trees" at the 23rd annual Connecticut Urban Forest Council Conference in Wallingford (100 attendees) *October 20*
- Taught "Introduction to Forest Ecology" for Coop High School, New Haven (20 students, 3 teachers) *October 28*
- Spoke on Japanese barberry at the Invasive Shrub Control Workshop in Norfolk, in cooperation with the University of Connecticut Cooperative Extension (21 attendees) *October 29*
- Was interviewed about tree care after storm damage by John Burgeson of the Connecticut Post *November 1*

- Was interviewed about long-term effects of storm damage by Bob Miller of the Danbury News Times *November 4*
- Participated in a review of forestry research in Connecticut sponsored by CT DEEP-Forestry *November 7*
- Spoke on golden bamboo at the Invasive Plants Council Meeting in Hartford (10 attendees) *November 8*
- Spoke of methods of reducing deer browse damage in managed landscapes to the Advanced Connecticut Master Gardener Class at the University of Connecticut's College of Agriculture and Natural Resources Extension Center in Bethel (52 attendees) *November 10*
- Spoke on Japanese barberry growth and control at the Invasive Shrub Control Workshop in Litchfield in cooperation with White Memorial Foundation and University of Connecticut Cooperative Extension (26 attendees) *November 15*
- Was interviewed about predicting storm damage to trees by Bob Cox of CBS Radio *November 17*
- Was interviewed about inspecting trees for storm damage by Dana Whalen of WTIC-1080 Radio *November 17*
- Spoke on "Measuring Sustainability" at the 2011 Connecticut Forest Conservation and Research Forum in New Haven (120 attendees) *November 22*
- Was interviewed about spring plants flowering in fall by Mary O'Leary of the New Haven Register *November 28*
- Participated in a CTPA review of the written arborist examination *November 29*
- Was interviewed about composition of the urban forest by Bob Miller of the Danbury News Times *November 29*
- Was interviewed about risk of damage to the urban forest by Will Rowlands of the Connecticut Gardener *November 30*
- Was interviewed about replacement choices for storm damaged trees by Judy Benson of the New London Day *November 30*
- Was interviewed about composition of the urban forest and storm damaged trees by Stephen Singer of the Associated Press *December 1*
- Participated in a meeting of the Audubon Connecticut Science Committee in Southbury *December 2*
- Spoke on Japanese barberry growth and control at the Invasive Shrub Control Workshop in Guilford in cooperation with Guilford Land Trust and University of Connecticut Cooperative Extension (17 attendees) *December 4*
- Spoke on how having a second language is useful professionally and personally at the World Language Career Day at Newtown High School (140 student, 10 teacher attendees) *December 7*
- Spoke on "History of the Connecticut Forest" at the annual meeting of the Oxford Land Trust (14 attendees) *December 8*
- Administered a practical and oral examination to arborist candidates for the Connecticut Tree Protection Examining Board *December 14*
- Was interviewed about growth and spread of yellow groove bamboo by Phyllis Swebilius of the New Haven Register *December 23*

- Spoke on Japanese barberry growth and control at the Invasive Shrub Control Workshop in Mansfield in cooperation with University of Connecticut Cooperative Extension (18 attendees) *December 30*
- Met with teacher Chris Sagnella to assist with tree identification for his classes at Alice Peck School in Hamden *January 4, 2012*
- Was interviewed about replacement choices for storm-damaged trees by Debbie Roberts of the Connecticut Gardener *January 12*
- Participated in the 90th Annual Meeting of the Connecticut Tree Protective Association in Plainville, CT *January 19*
- Was interviewed about controlling invasive species by Sheila Foran of UConn Today *January 20*
- Spoke on "Storms, trees and you" to the Fairfield Forestry Committee in Fairfield (26 attendees) *January 23*
- Spoke on "Homeowner tree care" at the Middletown Regional Agricultural Science and Technology Center Continuing Education Program (18 attendees) *January 24*
- Was interviewed about effect of warm winter on trees by John Burgeson of the Connecticut Post *January 31*
- Spoke on "Trees and changes" at Lincoln Middle School in Meriden, CT (80 students, 5 teachers) *February 1*
- With J. P. Barsky, met with MDC foresters to discuss strategies to regenerate forests in areas of high deer density in West Hartford *February 9*
- Was interviewed about the relationship between blacklegged ticks and Japanese barberry by Greg Hladky of the Advocate newspaper *February 17*
- Spoke on Japanese barberry growth and control to reduce the risk of Lyme disease exposure to the Norfolk Land Trust (45 attendees) *February 18*
- Spoke about "Impacts of invasive species on our forests – and How to control them" to the Naugatuck Valley Audubon Society in Derby (23 attendees) *February 21*
- Spoke on forest management and proposed research to the Guilford Conservation Commission (7 attendees) *February 22*
- Along with Joseph P. Barsky, spoke with officials from the Winchester Land Trust about forest management (4 attendees) *February 22*
- Hosted a meeting to discuss small trees appropriate for planting near utility lines with nursery and landscape owners and the CT-DEP at Lockwood Farm *February 29*
- Spoke on "The Dynamic History of the Connecticut Forest" at 2012 CT-NOFA Winter Conference in Manchester (45 attendees) *March 3*
- Spoke on "Homeowner tree care" for the Cheshire Garden Club (23 attendees) *March 5*
- Participated in the Audubon Connecticut Science Committee Meeting *March 6*
- Spoke on "At the halfway point – 80 years of forest change" at the 17th annual Forest Health Workshop in Jones Auditorium (40 attendees) *March 6*
- Administered practical and oral examinations to arborist candidates for the Connecticut Tree Protection Examining Board *March 7*
- Spoke on "Recovery of forests from disturbance" at the 2012 CT Conference on Natural Resources, Storrs (75 attendees) *March 12*

- Spoke on reducing deer browse damage for the Nichol's Garden Club, Trumbull (26 attendees) *March 13*
- Was interviewed about controlling Japanese barberry by Laura Landro of the Wall Street Journal *March 19*
- Spoke on "Influence of disturbance on stand development during forest succession" and "Treating Japanese barberry during the dormant season" at the 18th Central Hardwood Forest Conference in Morgantown, WV (112 attendees) *March 27*
- Invited Dr. Gary W. Miller to give a Lockwood Lecture on "SILVA- a stand analysis and prescription protocol" *April 2-3*
- Served as Program Chair and session moderator at the 2012 New England Society of American Forester's annual meeting in Amherst, MA *April 4-6*
- Was interviewed about running bamboo by Christina Rose of the Bethel Patch *April 16*
- Spoke on invasive plant control to reduce risk of exposure to Lyme disease at the Goodwin Forest Conservation Education Center in Hampton (31 attendees) *April 21*
- Participated in the CT Statewide Vegetation Management Task Force in Rocky Hill *April 24*
- Was interviewed about controlling invasives to reduce the risk of exposure to Lyme disease by John Charlton of Fox-61 News *April 25*
- Along with Drs. James LaMondia, Carole Cheah, Walter Krol, and Abigail Maynard, hosted an exhibition innovative research by the Station in the Capitol Corridor in Hartford (83 attendees) *April 26*
- Spoke on growing plants for visiting students from the Hamden Collaborative Learning Center (6 student and 2 teacher attendees) *April 27*
- Participated in the CT Statewide Vegetation Management Task Force in Rocky Hill *May 8*
- Was interviewed about controlling Japanese barberry to reduce risk of Lyme disease exposure by Faith Middleton of Connecticut Public Broadcasting Network *May 10*
- Spoke on using propane torches to control invasive shrubs at Vermont National Guard Camp, Johnson in Colchester, VT (22 attendees) *May 15*
- Was interviewed about tree longevity by Will Rowlands of the Connecticut Gardener *May 16*
- Spoke with employees of Rebekah's Hill Forest in Norfolk to advise them about forest management options *May 17*
- Participated in the CT Statewide Vegetation Management Task Force in Middlefield *May 22*
- Gave five talks on "Fruits of the Forests" to 4th grade students at the Southington School Nature Day (118 students, 18 adults) *May 31*
- Participated in the CT Statewide Vegetation Management Task Force in Middlefield *June 5*
- Administered practical and oral examination to arborist candidates for the Connecticut Tree Protection Examining Board *June 6*
- Spoke on "How to prune trees" at the Manson Youth Institute in Cheshire (9 student, 1 teacher participants) *June 7*
- Spoke on "The Changing Environment and Trees" at the Connecticut Tree Warden Association Spring Workshop in New Haven (52 attendees) *June 12*
- Spoke on "Cutting methods study – 30 years of growth and yield" at the Connecticut Chapter – Society of American Foresters Summer Meeting in Litchfield (42 attendees) *June 13*
- Chaired Technical Standards Committee of the CT Statewide Vegetation Management Task Force *June 14 and 18*

- Participated in the 26th Annual Connecticut Urban Forest Conference planning meeting, Middlefield, CT *June 21*
- Spoke on "Dating vegetation at crime scenes" at the Clandestine Grave Workshop at the University of New Haven in West Haven (14 attendees) *June 25*

WHITE, JASON C.

- Participated in a conference call with officials from the Connecticut Department of Consumer Protection regarding findings of pesticide violations in imported herb samples *July 1, 2011*
- Gave a tour of the Department laboratory and programs to a reporter from the Connecticut Mirror *July 5*
- Participated in an FDA FERN-wide hotwash call on recently completed mycotoxin proficiency test *July 6*
- Participated in an FDA FERN CAP Chemistry conference call for LC-MS Exactive users *July 7*
- Gave a tour of the Department laboratories and programs to Will Rowland of The Connecticut Gardener *July 8*
- Participated with the FBI Weapons of Mass Destruction Coordinator and the Connecticut Department of Public Health Bioterrorism Coordinator in a summer camp for 7-12th grade students at St. Vincent's College on Disaster and Terrorism Response and presented the lecture "The Connecticut Agricultural Experiment Station Department of Analytical Chemistry – Food Safety and Emergency Response" (55 attendees) *July 12*
- Participated with Department staff in an FDA FERN Chemistry Cooperative Agreement (cCAP) Laboratory conference call *July 14*
- Participated in a US FDA food safety contract conference focused on funding state laboratory accreditation *July 14*
- Hosted Professor Elisha Tel-Or of the Hebrew University of Jerusalem (Rehovot) and discussed future collaborative research *July 15*
- Participated with the FBI Weapons of Mass Destruction Coordinator and the Connecticut Department of Public Health Bioterrorism Coordinator in a summer camp for 7-12th grade students at St. Vincent's College on Disaster and Terrorism Response and presented the lecture "The Connecticut Agricultural Experiment Station Department of Analytical Chemistry – Food Safety and Emergency Response" (50 attendees) *July 19*
- Participated in an FDA/USDA FSIS Tabletop Exercise in Manchester, New Hampshire (12 attendees) *July 27*
- Presented a poster entitled "Nanomaterial contamination of agricultural crops" at the USDA NIFA Food Safety Project Directors Meeting in Milwaukee, Wisconsin (50 attendees) *July 30*
- Gave the lecture "Nanomaterial contamination by agricultural crops" at the 43rd IUPAC World Chemistry Conference where he was an invited keynote speaker in the session on interactions of nanoparticles with the environment, San Juan, Puerto Rico (40 attendees) *August 1-4*
- Hosted a tour of department laboratories and programs for State Senator Rob Kane *August 8*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cCAP) Laboratory Conference Call *August 11*

- Participated in a conference call of the Organizing Committee for the 8th International Phytotechnologies Conference which will be held September 13-16 in Portland, Oregon *August 19*
- Gave the platform presentation "Simultaneous surveillance of food products for chemical and microbial contamination" at the annual FDA FERN Chemistry Cooperative Agreement (cCAP) Technical Meeting in Madison, WI (75 attendees) *August 23-25*
- Participated in the monthly Laboratory Preparedness Network meeting at the Department of Public Health in Hartford *September 12, 2011*
- Presented the two lectures "Nanomaterial contamination of agricultural crops" (190 attendees) and "Persistent organic pollutant contaminated soil – Is phytoremediation possible" (25 attendees) at the 8th International Phytotechnologies Conference in Portland, OR *September 13-17*
- Presided over the annual Editorial Board Meeting of the International Journal of Phytoremediation (26 attendees) *September 15*
- Hosted Dr. Nicolai Jablonowski of the German Research Institute Forschungszentrum Juelich GmbH *September 26-27*
- Participated in the monthly Laboratory Preparedness Network meeting at the Department of Public Health in Hartford *October 3*
- Participated in a conference call with members of the FCC (FERN) regarding the comparison of DART and LC/MS as they pertain to pesticide residues in herb samples *October 12*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cDAP) laboratory conference call *October 13*
- Presented a plenary luncheon lecture entitled "Evaluation of seafood safety in response to the Deepwater Horizon oil spill" at the 27th Annual International Conference on Soils, Sediments, Water and Energy at the University of Massachusetts, Amherst (100 attendees) *October 18*
- Co-chaired a session entitled "Plant interactions with contaminants of concern" and presented a lecture entitled "Nanomaterial contamination of agricultural crops" at the 27th Annual International Conference on Soils, Sediments, Water, and Energy at the University of Massachusetts, Amherst (20 attendees), *October 20*
- Organized an event entitled "How scientists and law enforcement work together in disaster response" at the Region 16 Long River Middle School with the FBI WMD Coordinator (New Haven Field Office), and the Department of Public health Bioterrorism Coordinator, the Department of Energy and Environmental Protection Mobile Laboratory, and the 14th Civil Support Team Mobile Laboratory, and presented a lecture entitled "The CT Agricultural Experiment Station Department of Analytical Chemistry-Food Safety and Emergency Response" (400 attendees) *October 21*
- Participated in the monthly Laboratory Preparedness Network meeting at the Department of Public Health in Hartford *November 7*
- Presented the lecture "Role of the CT Agricultural Experiment Station and the Food Emergency Response Network in the Deepwater Horizon Oil Spill Response" at the Quinnipiac University Sigma Xi Seminar Series (25 attendees) *November 7*
- Hosted Boy Scout Troop 51 of Cheshire and gave them a tour of the Analytical Chemistry labs and explained the programs to fulfill their Chemistry Merit Badge requirements (10 attendees) *November 8*

- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory Conference Call *November 10*
- Presented the lecture "Nanomaterial Contamination of Agricultural Crops" at the 32nd Annual Meeting of the Society for Environmental Toxicology and Chemistry in Boston, MA (50 attendees) *November 15-16*
- Hosted a New Haven Public School Talented and Gifted class and gave them a tour of the Analytical Chemistry Department laboratories and programs (12 attendees) *November 29*
- Participated in an FDA Office of Regulatory Affairs Conference Call on an upcoming surveillance exercise for arsenic in fruit juices *November 30*
- Participated in an FDA FERN conference call on an upcoming surveillance exercise for arsenic in fruit juices *December 1*
- Participated in the monthly Laboratory Preparedness Network meeting at the Department of Public Health in Hartford *December 5*
- Presented the lecture "CAES Market Basket Survey: Pesticide Contamination of Fresh and Dried Herbs" at the CT Department of Public Health (15 attendees) *December 5*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *December 8*
- Participated in a USDA FSIS FERN Hotwash call on the recent "Capacity and Capability" exercise that Analytical Chemistry took part in *December 14*
- Participated in an Association of Public Health Laboratories teleconference call entitled "Quality Control … But Why?" *December 15*
- Participated in an FDA FERN conference call on an ongoing surveillance exercise for arsenic in fruit juices *January 4, 2012*
- Participated in the monthly Laboratory Preparedness Network meeting at the Department of Public Health in Hartford *January 9*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cCAP) Laboratory conference call *January 12*
- Participated in a conference call on ISO/IEC 17025:2005 accreditation with Hitelia Castellanos of the US FDA *January 30*
- Gave the presentation "Nanomaterial contamination of agricultural crops" at the USDA NIFA Nanotechnology Grantees Annual Conference in Orlando, Florida (25 attendees) *February 1-4*
- Participated in the monthly Laboratory Preparedness Network meeting at the Department of Public Health in Hartford *February 6*
- Participated in an FDA FERN Chemistry Cooperative Agreement (cCAP) Laboratory conference call *February 9*
- Participated in an FDA FERN Northeast Regional conference call *February 14*
- Hosted professors from Hasselt University (Belgium) to plan and conduct collaborative experiments on nanotoxicology *February 16-17*
- Hosted a principal investigator conference call for a USDA NIFA nanotechnology grant *February 28*
- Participated in an FDA FERN conference call on an ongoing surveillance exercise for arsenic in fruit juices *February 29*

- Participated in an FDA FERN conference call on an ongoing surveillance exercise for arsenic in fruit juices *March 1*
- Participated in the monthly Laboratory Preparedness Network meeting at the Department of Public Health in Hartford *March 5*
- Participated with Department staff in two FDA conference calls discussing potential funding for laboratory accreditation *March 7,8*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *March 8*
- Participated in a conference call with the CT Department of Public Health and the CT Department of Consumer Protection regarding the recent increase in consumer complaint samples concerning powdered infant formula *March 8*
- Presented an invited lecture entitled "Nanomaterial contamination of agricultural crops" at the University of Parma, Parma, Italy (175 attendees) *March 11-15*
- Participated in an International Phytotechnology Society conference call among society officers discussing website re-design *March 21*
- Participated in an EPA-sponsored conference call on the potential use of phytoremediation at a PCB-contaminated site in Virginia *March 26*
- Presented the invited lecture ""Phytotechnologies: Fundamentals and Mechanisms" by WebEx to a graduate school class in the Harvard University Department of Landscape Architecture (10 attendees) *March 27*
- Participated in the annual Department of Public Health Bioterrorism/FBI Weapons of Mass Destruction First Responder Training Course in Rocky Hill *March 28*
- Participated in the monthly Laboratory Preparedness Network meeting at the Department of Public Health in Hartford *April 2*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *April 12*
- Was interviewed by Robert Pollack for a CT Academy of Science and Engineering Research Update on the Department's USDA-funded nanotoxicology research project *April 13*
- Met with students and teachers from Middletown High School and presented the Department's food and safety programs (35 attendees) *April 20*
- Gave a tour of the Analytical Chemistry Department's laboratories to Professor Erica Taylor of Wesleyan University *April 23*
- Presented the lecture "Food safety research in the Department of Analytical Chemistry – Surveillance of fresh and manufactured foods for chemical contamination" at the CAES Spring 2012 Open House (9 attendees) *April 25*
- Participated in a teleconference with the Arkansas Department of Public Health regarding ISO accreditation *April 25*
- Met with Jessie Young of Congressman Chris Murphy's office and described key department programs and research *May 2*
- Participated in the monthly Laboratory Preparedness Network Meeting at the Department of Public Health in Hartford *May 7*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *May 10*

- Hosted a group of students from the Hooker School and provided a tour and description of the department laboratories and programs (20 students) *May 18*
- Participated in the first meeting of the CT Environmental Nanotechnology Working Group at the University of Connecticut Center for Environmental Sciences and Engineering by giving a presentation entitled "Nanomaterial contamination of agricultural crops" (15 attendees) *May 23*
- Participated with department staff in an FDA/USDA FERN-wide conference call *May 24*
- Presented an invited lecture at the Yale University Occupational and Evironmental Medicine Program (Yale OEMP) entitled "Nanomaterial contamination of agricultural crop species" (18 attendees) *May 29*
- Participated in the monthly Laboratory Preparedness Network meeting at the CT Department of Public Health in Hartford and gave a presentation entitled "FDA Food Emergency Response Network (FERN) Ricin Drill and Glovebox Exercise" (15 attendees) *June 4*
- Discussed collaborative research on the detection of nanoparticles in agricultural crops with staff of the CT Department of Public Health Electron Microscopy Laboratory *June 8*
- Participated in an FDA FERN Chemistry Cooperative Agreement Laboratory conference call *June 14*
- Hosted a tour of the department laboratories and programs for a group of biology students from Central CT State University (20 attendees) *June 13*

WILLIAMS, SCOTT C.

- Participated in a Connecticut Urban Forest Council Meeting in New Haven *September 9, 2011*
- Was interviewed about the relationship between blacklegged ticks and Japanese barberry by Ben Holbrook of the Darien News *September 21*
- Gave a talk about wildlife in Connecticut to incarcerated youth at the Manson Youth Institution, Cheshire (18 youth attendees, 2 adults) *September 21*
- With Joseph P. Barsky and Michael Short, collected and provided seed from *Berberis x ottawensis* to Massachusetts State Botanist Bryan Connolly *September 23*
- Along with Michael Short, made a field visit to a Guilford Land Conservation Trust property *October 11*
- Gave an invited presentation to students on relationship of invasives and Lyme disease at Lyman Memorial High School in Lebanon (18 students) *October 13*
- As a member of the Executive Committee of the Connecticut Urban Forest Council, hosted the 23rd Annual Conference on Urban and Community Forestry in Connecticut, Wallingford *October 20*
- Co-hosted a Guilford Land Conservation Trust interpretive hike on the Cockaponset State Forest block of Guilford's Westwoods with DEEP Forester Emery Gluck and spoke about the association of blacklegged ticks and Japanese barberry and of deer as dispersers of exotic plant seeds (22 attendees) *October 23*
- Spoke on "Overabundant White-tailed Deer as Seed Dispersal Agents" and "Japanese Barberry Infestations Harbor Increased Abundances of Blacklegged Ticks" to the Advanced Connecticut Master Gardner Class at the University of Connecticut's College of Agriculture and Natural Resources Extension Center in Bethel (52 attendees) *November 10*

- Spoke on the relationship between Japanese barberry and blacklegged ticks at the Invasive Shrub Control Workshop in Litchfield in cooperation with White Memorial Foundation and the University of Connecticut Cooperative Extension (26 attendees) *November 15*
- Participated in a public hearing regarding the impact of deer overabundance on lands owned by the Town of Guilford *November 16*
- Supervised the forest pest/disorders portion of the Connecticut Chapter of the Future Farmers of America Forestry Career Development Event, Storrs (57 students) *November 21*
- Participated in the Executive Board Meeting of the Connecticut Urban Forest Council, Middlefield *November 29*
- Spoke about the relationship between blacklegged tick abundance and Japanese barberry prevalence at a CAES invasion control workshop in cooperation with the University of Connecticut Department of Extension and the Guilford Land Conservation Trust (17 attendees) *December 4*
- With Michael R. Short, met with officials from Bobbex, Inc. regarding a rabbit repellent evaluation trial *December 21*
- Spoke about the relationship between blacklegged tick abundance and Japanese barberry prevalence at a CAES invasive control workshop in cooperation with the University of Connecticut Department of Extension in Storrs (18 attendees) *December 30*
- Gave the invited lecture "The Ecological perfect Storm: Deer Ticks in Japanese Barberry" hosted by the Menunkatuck Chapter of Audubon Connecticut at Blackstone memorial Library, Branford, CT (57 attendees*) January 11, 2012*
- Was interviewed about the relationship between increased abundances of blacklegged ticks and Japanese barberry infestations by Sheila Foran of the UConn Daily Campus January 20
- Participated in an Executive Committee meeting of the Connecticut Urban Forest Council Conference Call *January 24*
- Gave invited comments on the East River Preserve management plan at the Town of Guilford Special Selectmen's Meeting (100 attendees) *January 25*
- Spoke on "Wildlife Laws and Deer Damage Avoidance" at the Northeast Organic Farming Association's Organic Land Care Accreditation course, New Haven (48 attendees) *February 21*
- Participated in an executive ad-hoc subcommittee meeting of the Connecticut Urban Forest Council, Middlefield *March 1*
- Gave two invited lectures "Overabundant White-Tailed Deer as Seed Dispersal Agents" and "Ecological Interconnectedness Between a Native Ectoparasite, an Alien Invasive Shrub, a Native Rodent, and a Native Invasive Mammal and Potential Impacts to Humans" to members of the Quinnipiac River Watershed Association, Meriden (17 attendees) *March 7*
- With Michael Short, hosted a CAES informational table at Van Wilgens Nursery's Escape to Spring Flower Show Expo, North Branford *March 9*
- Discussed collaborative research funding opportunities with colleagues at the University of Connecticut at the 5th annual Connecticut Conference on Natural Resources in Storrs *March 12*
- With J. P. Barsky and Michael Short, discussed careers in wildlife biology with students from Lyman Hall High School Regional Vocational Agricultural Education Center, New Haven (10 student and 1 teacher attendees) *March 14*

- Was interviewed about the effectiveness of deer repellents by Vickie Mattern of Mother Earth News Magazine *March 14*
- Was interviewed about the relationship between Japanese barberry, blacklegged ticks, and *Borrelia burgdorferi* by Laura Landro of the Wall Street Journal *March 19*
- With J. P. Barsky, spoke to a biology class from Hebron High School about invasive forest pests and control techniques for invasive plant species, New Haven (28 students and 2 teacher attendees) *March 23*
- Participated in a meeting of the Executive Board of the Connecticut Urban Forest Council, Middlefield *March 27*
- With Michael Short, spoke about research projects and employment at the Agricultural Experiment Station to a high school class at North Branford High School's Agricultural Career Development Day (150 student attendees) *April 12*
- Presented the research paper "Survival and Dispersal of Rehabilitated White-Tailed Deer Fawns in Connecticut, Year 2" at the 68th Annual Northeast Fish and Wildlife Conference, Charleston, WV (67 attendees) *April 15-17*
- Gave a guided tour of the Town of Guilford's East River Preserve and spoke about overabundant deer impacts to students, at the Yale School of Forestry and Environmental Studies (11 students) *April 19*
- Along with Joseph P. Barsky and Michael Short, conducted a natural resources inventory at the request of the Guilford Land Conservation Trust on a 13 acre property in Guilford *May 9*
- Participated in the Executive Board Meeting of the Connecticut Urban Forest Council in Bridgeport, CT *May 31*
- Spoke on the relationship between invasive plant species, blacklegged ticks, and Lyme disease at the Connecticut Chapter – Society of American Foresters summer meeting in Litchfield (42 attendees) *June 13*
- Participated in the 26th Annual Connecticut Urban Forest Conference planning meeting, Middlefield, CT *June 21*

ZARRILLO, TRACY

- Hosted a visit from officials from the Rhode Island Natural Resources Conservation Services to demonstrate protocols for bee observation and capture techniques *September 21, 2011*
- Visited the USGS Patuxent Wildlife Research Center in Beltsville, Maryland to further her understanding of bee taxonomy *November 8-11*
- Attended a *Lasioglossum (Dialictus)* Identification Workshop held at the University of Massachusetts *March 22-25*
- Accompanied Dr. Kimberly A. Stoner and Dr. Brian D. Eitzer to a meeting held at the University of Massachusetts regarding pollinator security in specialty crops. She also met with officials from the White Foundation and the Stewart B. McKinney Wildlife Refuge to help set up bee monitoring sites within their preserves *March 26*
- Demonstrated how to make bee trap nests and answered questions regarding bees and pollinator plantings at the Xerces Pollinator Conservation Planning Short Course held at UConn's Tolland County Extension Center in Vernon (45 attendees) *April 12*

ADVANCES IN KNOWLEDGE

DEPARTMENT OF ANALYTICAL CHEMISTRY

The format adopted in the previous year's Record will be continued in order to focus on the work of the Department of Analytical Chemistry from July 1, 2011 through June 30, 2012. 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 Record's readers.

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 (DoAg) 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 in 1875.
- Products for household pets and commercial agricultural operations are included.
- Samples are collected by inspectors from the DoAg. Analytical results are reported to DoAg, who in turn report findings to the product dealer and/or manufacturer.
- From July 1, 2011 to June 30, 2012, we completed analysis of 18 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 12 (66.7%). 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 DoAg. Analytical results are reported to DoAg, who in turn reports findings to the product dealer and product manufacturer.
- From July 1, 2011 to June 30, 2012, we completed analysis of 25 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 9 (36.0%). Analytical findings were turned over to the CT Department of Agriculture for regulatory response.

c. Analysis of seafood samples associated with the March 2012 Norwalk Fire

- Analysts: William Berger, Walter Krol, Brian Eitzer
- Summary: On March 28, 2012, an industrial fire occurred in Norwalk at a scrap metal recycling facility. Nearly 300,000 gallons of water was used to put out the burning diesel engines, electrical parts, and multiple other components present in the material. Contaminated water, sediment and the ash from the fire was transported directly into the storm water system that ultimately discharges into Long Island Sound. DoAg Aquaculture Bureau Staff took pictures of a heavy gray sediment covering the oysters along the shoreline in that location the following day. The Bureau closed all shellfishing in Norwalk and the adjacent towns and requested organic contaminant analysis of the seafood by Department staff. Over the course of several weeks, collected seafood samples were analyzed for both polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs).

Impact: Results from the Analytical Chemistry Department's analyses were used to demonstrate a return to pre-fire levels of key organic contaminants and were used to facilitate the re-opening of closed shellfish beds.

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, Kittipath Prapayotin-Riveros

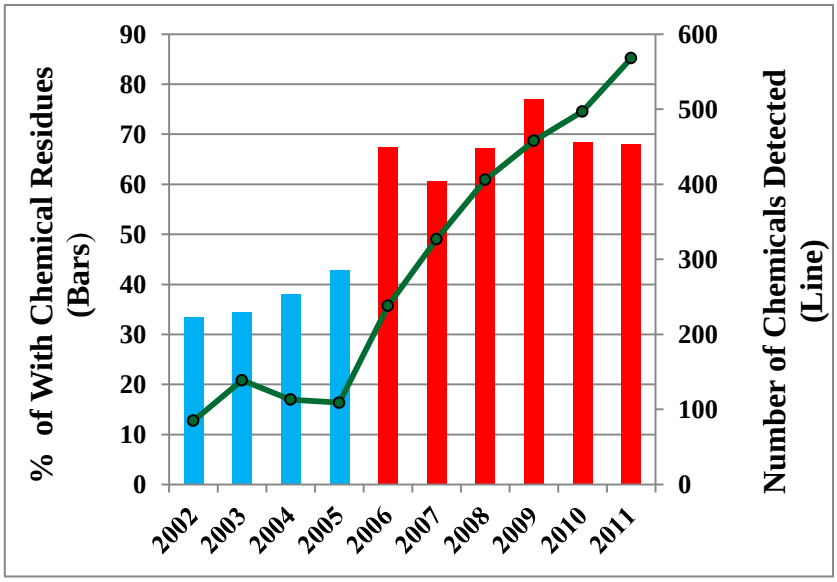
- Goal: To determine concentrations of agrochemicals in fresh and processed foods from local, domestic, and imported sources offered for sale in CT and to assure compliance with established tolerances.

• 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, 2011 through June 30, 2012, 255 samples of fresh (151; 59.2%) and processed (104; 40.8%) 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 (see figure). Please see past Records of the Year and Station bulletins for details.

• Of the 255 samples analyzed, 194 (76.1%) contained a total of 568 residues. There were 87 different pesticide active ingredients found. The three most commonly detected residues were the fungicide thiophanate methyl and its metabolite carbendazim (83: 11.0%), the insecticide imidacloprid (51; 6.8%) and the fungicide boscalid (50; 6.6%). The average residue found was 0.192 ppm, and the average number of pesticide residues per sample containing residues was 3.88. The impact on our program of fully implementing QuEChERS is shown graphically below. 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.



• Our collaborative project with the CT Department of Public Health (DPH) to simultaneously test food in the marketplace for both pesticide residues and potentially harmful pathogens continued, although at a reduced scale. Utilizing the collection and regulatory arm of the CT DCP, 5 of the aforementioned food samples were split at collection to undergo concurrent chemical and microbial analysis. No microbial pathogens were observed; however, two of the samples were found to contain violative pesticide residues. The first was a sample of fresh mint which contained residues of imidacloprid (0.007 ppm) and the second was chopped lettuce which was found to contain residues of pendimethalin (0.003 ppm). Neither pesticide is allowed on these commodities, thus resulting in no tolerance violations.

Impact: The Department of Analytical Chemistry's Market-basket program serves as the sole surveillance and monitoring effort in the state, assuring that the food supply within CT is safe and free from adulteration.

b. Miscellaneous samples

- Analyst: John Ranciato
- Summary: From July 1, 2011 to June 30, 2012, 110 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.

c. Infant formula samples

- Analyst: Brian Eitzer, Terri Arsenault, John Ranciato
- Summary: In early 2012, 20+ consumer complaints were received at the **W**omen, **I**nfants, and **C**hildren (WIC) Program concerning Nutramigen-based products. The complaints included off-color or appearance but most infants that consumed the formula experienced projectile vomiting and diarrhea. Both liquid and powdered samples were delivered to the Department for chemical analysis. Samples were extracted and analyzed for over 850 pesticides, poisons, and toxins. Since the samples appeared to have large globular fat-like material in the solution, total fat content was measured. All samples were found to be free of chemical contamination and the fat content matched the label claim. A final determination was made that the emulsification of the fats in the formula was compromised and this phenomena may have been exacerbated by exposure to low temperature. In consultation with Department scientists, CT DPH laboratory personnel, and DCP officials, this product was removed from the CT State WIC nutrition program.

Impact: Results from the Analytical Chemistry Department's analyses were used to identify the source of product deficiency and to justify product removal from the WIC program, thereby protecting a sensitive population of CT citizens.

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

a. Beverages/products for ethanol content

- Analyst: Terri Arsenault
- Goal: To provide % ethanol content for label registration and taxation purposes.
- Summary: We analyzed 34 products such as beers, wines, and liquors for ethanol content. The average % ethanol content for beers, wines and liquors were 6.07, 12.6, and 38.7%, respectively.

b. Beverage authenticity

- Analyst: Brian Eitzer, Terri Arsenault
- Goal: To determine if products offered to customers at CT establishments are authentic as to brand.
- Summary: 32 alcoholic products were examined for authenticity; 4 samples were found to not match the chromatographic profile of

comparison authentic samples. These results are returned to the Division of Liquor Control, who determines appropriate regulatory action. A research project has been initiated to investigate the potential use of conductivity measurements, which can be made with field portable probes, to screen samples for adulteration and authenticity.

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, 2011 to June 30, 2012, 51 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, William Berger
- 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 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, 2011 to June 30, 2012, 101 samples were analyzed under this program.

Impact: Groundwater samples are screened for atrazine, imidacloprid, alachlor, and 2,4-dichlorophenoxyacetic acid (2,4-D) by an enzyme-linked immunosorbent assay (ELISA). Positive samples are then confirmed by chromatography (gas [GC] and liquid [LC]) with mass spectrometry. 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 ELISA, which overestimates the presence of atrazine in the environment.

6. Analyses on behalf of Municipal and Federal Agencies

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

- Analysts: Terri Arsenault, William Berger, Brian Eitzer, Craig Musante, Christina Robb, Walter Krol, Kittipath Prapayotin-Riveros
- 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 assignments for pesticides, toxins, metals and other contaminants

on several different analytical instruments. The Department is currently participating in an exercise involving the analysis of food samples related to the upcoming National Political Conventions.

b. Analysis of samples for municipalities

- Analysts: Terri Arsenault, William Berger, Brian Eitzer, Walter Krol, Craig Musante, John Ranciato
- Summary: From July 1, 2011 through June 30, 2012, Department staff analyzed 41 samples for municipalities. After removal of the Occupy New Haven protesters from the city green, several soil samples were analyzed for both heavy metal and organic chemical contamination. The soils were found to be equivalent to samples from control locations on the green. In addition, the Connecticut Agricultural Education Foundation (CTAEF) requested analysis of several soil samples taken from different elementary school grounds.

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 DPH and the CT DEEP for data review.

c. Analysis of candy for lead (Pb) content

- Analysts: Craig Musante, John Ranciato
- Summary: The New Haven Health Department has been concerned that the blood lead levels of certain ethnic groups in the city have not been declining as anticipated given current abatement efforts. As a result, approximately 30 samples of candy imported from Mexico and Central America were collected New Haven Health Inspectors and were analyzed by Department staff for Pb content. The level of concern for Pb in candy is 100 parts per billion (ppb). Of the samples analyzed, 8 were found to exceed this limit (210-470 ppb).

Impact: In response to our findings, New Haven Health Inspectors pulled certain products from store shelves. In addition, the Health Inspectors have amended their interview protocol for school age children to include questions about candy consumption. The Department is currently supporting both the state and city in an ongoing surveillance of these products.

d. Analysis of samples for the Federal Bureau of Investigation (FBI)

- Analysts: Terri Arsenault, Brian Eitzer
- Summary: The Analytical Chemistry department works with the Federal Bureau of Investigation (FBI) Weapons of Mass Destruction

Coordinator (WMD) out of the New Haven Field Office on issues related to chemical terrorism and the food supply. If requested, the department will provide chemical analysis on select samples. During the current reporting period, a sample consisting of an unknown liquid was found on the grounds of the FBI office in New Haven. After initial field screening, the sample was brought to the Analytical Chemistry department to rule out specific chemical agents of concern. The sample was found to contain nothing hazardous.

7. ANALYSES ON BEHALF OF OTHER STATION DEPARTMENTS

a. Analyses related to pollinator decline- Department of Entomology

- Analyst: Brian Eitzer
- Summary: Upon request from Dr. Kimberly 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.

b. Analysis of Pesticides in Tobacco Leaves- Valley Laboratory

- Analysts: Walter Krol
- Summary: The Department received approximately 10 samples of tobacco leaves from Dr. James Lamondia at the Valley Laboratory. 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, CT DPH, as well as annual proficiency testing samples related to our FDA FERN work, and the AAPCO Check Sample program (pesticide formulations) 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*

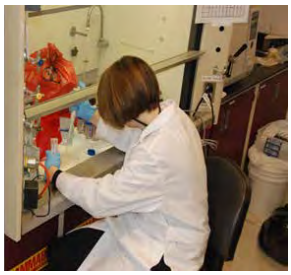
- Investigators: Walter Krol, Terri Arsenault, Brian Eitzer
- Summary: The implementation and validation of more sensitive extraction methods for pesticides in food more accurately reflects the residues present in food commodities. This

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 of up to ten-times lower than previously used methods. A peer review manuscript describing these findings has been conditionally accepted for publication.

Project 2: *Validation of FERN Methods: The Ricin Capacity and Capability Exercise*

- Investigators: Christina Robb, William Berger, Terri Arsenault
- Summary: Integral to our Cooperative Agreement with the FDA is the 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. In conjunction with the CT DPH, a USDA FSIS FERN microbiology or mCAP laboratory, the Department participated in the November 2011 Ricin Capacity and Capability exercise. A total of 200 unhomogenized meat samples were sent to CT DPH but on the notice given, the capacity of DPH laboratory was 50 samples. The samples included ground meat, hot dogs, roast meats, jerky, quiche, breaded chicken nuggets, pigs-in-a-blanket and hams. In support of CT DPH, CAES agreed to participate in the exercise using the ELISA-16 method and accepted 80 samples into the laboratory. At CAES, three analysts and three hoods were dedicated to this exercise for 5 days. Meat samples were homogenized in a fume hood with a Robot Coupe food processor; hardware decontamination between samples was of significant concern during this exercise. By day 5, all 80 samples had been homogenized, extracted, and analyzed (in duplicate); for the 13 positive samples, the amount of ricin was estimated. Results were emailed to CT DPH on a daily basis; our laboratory had 100% accuracy using the ELISA-16 method.





- Impact: The Department demonstrated our ability to work under simulated emergency response conditions, processing and analyzing a large number of samples with 100% accuracy. This capability serves to protect both the food supply of both the state of CT and of the nation.

Project 3: *Validation of FERN Methods - Comparison of the DART to GC-MS/ LC-MS for the detection of pesticide residues in herbs*

- Investigators: Walter Krol, Brian Eitzer
- Summary: As part of a Market-basket program, the CT DCP brings fresh and manufactured food samples to our laboratory for pesticide residues analysis. After finding large numbers of violative residues in fresh and dried herbs (18 out of 24

dried samples, 14 out of 15 fresh samples) in 2011, CAES began a study with

the Forensic Chemistry Center (FCC) on a direct comparison of the DART (Direct Analysis in Real Time) with our in house QuEChERS GC-MS and LC-MS/MS techniques. The DART is a mass spectrometer that is being considered for deployment with Customs and Border Patrol (CBP) to test imported food for chemical contamination in real time before entry into the United States. The results of this comparison, where the DART performed remarkably well, was presented by FCC staff (Dr. Sara Robinson) at the American Society for Mass Spectrometry (ASMS) meeting in Vancouver (May 2012).

Impact: By assisting in the validation of a powerful new screening tool for use by the FDA and CBP, the Department continues to contribute to the overall safety of the nation's food supply.

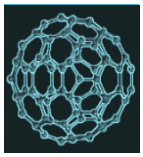
2. ENVIRONMENTAL MONITORING/REMEDIATION

Project 1: *Nanoparticle contamination of agricultural crops*

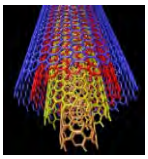
- Investigators: Craig Musante, Roberto De La Torre Roche, Jason C. White
- Summary: Nanomaterials (NM) have at least one dimension less than 100 nm and this small size results in unique properties not observed with equivalent bulk particles. Current nanomaterial use is ubiquitous; over 1300 NM-containing 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 a significant uncharacterized pathway of human exposure. Two new USDA competitive grants are funding research to define the impact of NMs on food crops, with a focus on the risk posed to humans from exposure to these contaminated plants. Co-investigators on this grant include professors at the University of Massachusetts, State University of New York College of Environmental Science and Forestry (SUNY ESF), and Southern Illinois University-Carbondale. Another concern being investigated in this research is the impact of nanomaterials on the fate and effects of other chemicals present in agricultural systems.

In a separate collaboration with Dr. Jason Kelsey of Muhlenberg College (Allentown, PA), the impact of carbon nanomaterials on both plants and worms in single and multispecies exposure scenarios is being investigated. Preliminary results have shown that although carbon

nanomaterials may impact plant health and the fate of co-contaminants in model systems (hydroponics, vermiculite), the effect in soil-based systems may be significantly less.







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. The results also suggest that nanomaterials may alter the fate and effects of other agricultural chemicals. 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.
- Previous work has demonstrated 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 ongoing field trials in CT and in collaboration with Professor Mehmet Isleyen (Sakarya University) in Turkey, previously created hybrid F1, F1 backcross, and hybrid F2 cultivars are being evaluated for the contaminant accumulation potential. In addition, grafting techniques are being applied to both contaminant accumulating and non-accumulating cultivars to investigate the mechanisms of phytoremediation.

- Separate laboratory based hydroponic investigations are continuing to investigate 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 and hydrogen peroxide is known to temporarily close aquaporin channels. Previous hydroponic studies have shown that this closure corresponds to decreased chlordane uptake by zucchini. Current investigations are focusing on the effect of a range of peroxide concentrations on the uptake of another persistent organic pollutant, DDE, by a number of different zucchini and squash cultivars.

Impact: The ability to accumulate and translocate weathered POPs is a unique ability restricted to zucchini. Mechanistic and inheritance studies will enable characterization 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.

Project 3: Investigating the organic contaminant burden of the Mill and Quinnipiac River watersheds

- Investigators: Terri Arsenault, Jason C. White, Professor Harry Pylypiw
- Summary: In collaborative studies with Professor Harry Pylypiw of Quinnipiac University, the presence of pesticides, phthalates and polycyclic aromatic hydrocarbons (PAHs) in river sediments and water throughout south-central CT is being investigated.

Impact: Research of this nature will not only allow a characterization of the current state of watershed contamination but will also provide baseline data for future monitoring activities.

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 from its hive as it collects pollen 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. We have been 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. During the past year we have started to incorporate the use of high resolution mass spectrometry into our pesticide screening techniques allowing us to determine a larger number of pesticides and pesticide metabolites.
- 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: 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 and 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. We have found that the talc dust can contain very high concentrations of these pesticides. All of the samples are being analyzed using the QuEChERs extraction protocol and LC/MS/MS. We are currently examining dosimeters placed next to fields during planting to examine how the dust moves off site.


The above photos of are of treated corn seed and dust from planters (courtesy of Purdue Department of Entomology).

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

PUBLIC OUTREACH

Telephone/internet inquiries: We receive 400-500 calls from the public each year requesting information on issues such as pesticides in food and the environment, heavy metals in paint, food, soils, and consumer products. In some instances, we refer the caller to a more appropriate CAES Department or State agency.

DEPARTMENT OF BIOCHEMISTRY AND GENETICS

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*). He has extended his investigations to include the pathogens *Nosema apis* and *Nosema ceranae*.

- In FY 2011-2012, 12 apiaries were visited for conducting the multi-year survey of AFB prevalence in Connecticut.
- The level of AFB (sub-clinical and clinical infections) in Connecticut for FY 2011-2012 was 50% of the apiaries tested. However, the overall percentage of hives infected was near 15%.
- Testing of *P. larvae* isolates for resistance to oxytetracycline-hydrochloride (i.e., Terramycin used by beekeepers to control AFB), via culturing and PCR techniques, did not identify any new apiaries as containing tetracycline resistant *P. larvae*. Since the beginning of the AFB investigation in 2007, only six different apiaries in Connecticut have been identified as containing antibiotic-resistant *P. larvae*.
- The genomic RFLP analysis investigation of *P. larvae* isolates is nearing completion and isolates collected outside of the United States are being compared to isolates collected in Connecticut for production of a geographic distribution profile.
- Long-term infection profiles for two apiaries are being performed for AFB and nosemosis. These profiles will be useful for time-line comparative analysis of sanitation/treatment procedures.
- Database entry of all registered beekeepers in Connecticut for the years 2007-2010 has been completed. Apiary registrations for 2011 are being added to the database. Due to inadequate support, survey results obtained for all the AFB isolates will be linked to this database for future GIS mapping analysis as time permits.
- Starting August 2010, honey bee samples collected in Connecticut were examined for presence of the microsporidia *Nosema apis* and *Nosema ceranae* using a PCR diagnostic test. For 30 different Connecticut apiaries, comprising 120 hives, 57% of the apiaries tested positive for *N. ceranae* (35% of the hives). No hives tested positive for *N. apis*.
- Microscopic analysis of hives testing positive for *N. ceranae* is being performed to estimate how many exceed the economic threshold (i.e., a population infection rate $\geq$ 30%).
- Workshops to train Connecticut beekeepers on microscopic analysis of honey bees for nosema presence and estimation of the infection rate within a bee hive are beginning in collaboration with Mr. Mark Creighton (CT State bee inspector).
- Work with Mr. Mark Cooper (Director of Health, Westport/Weston Health District), Michael Pascucilla (Director of Health, East Shore District Health Department), Timothy Callahan (Director of Health, Norwalk Health Department), Dr. Adalgisa Caccone (Yale Institute for Biospheric Studies), and Lauren Brooks (Research Assistant, Yale Institute for Biospheric Studies) relating to microbial source tracking awaits pending funding

approval by Long Island Sound Futures Fund (US EPA, National Fish & Wildlife Foundation) for the cooperatively-submitted implementation grant.

Impact

American foulbrood and nosemosis diseases of honey bees cause significant economic losses to beekeepers and agriculture, worldwide. *Nosema ceranae*, the major cause of nosemosis in Connecticut, is implicated in Colony Collapse Disorder and has been suggested as the cause of increased deaths during overwintering. This investigation continues to show a high presence of AFB within Connecticut beehives and is demonstrating an equally high prevalence of nosemosis in Connecticut apiaries. Beekeepers, being informed of the prevalence of these two diseases, are able to make informed decisions on control and treatment of diseased hives. Beekeepers are being trained to monitor hives for nosemosis as a first step in providing better methods of control. Advancing the molecular knowledge pertaining to *P. larvae* will provide information on host-pathogen interactions and possibly result in new approaches to lower the impact of the disease.

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. Our work in auxin biology began with the isolation the LAM1 gene in tobacco, which is required for formation of leaf blades. The DNA sequence of LAM1 indicated that it was a member of the WOX super family of homeodomain transcription factors, which control developmental events throughout the plant. To determine when and where LAM1 is expressed, we fused the LAM1 promoter to a β-glucuronidase (GUS) reporter gene and introduced it into wild-type plants. GUS staining revealed that vascular tissue of young leaf primordia was the primary location for LAM1 expression, although residual activity was observed in other tissue types. To determine whether vascular expression alone was sufficient to drive blade formation, we fused a vascular specific promoter from the SUC2 gene in Arabidopsis to the coding region of LAM1 and introduced this synthetic gene into bladeless mutant lam1 plants looking for restoration of blade formation. Similar transgenes employing other vascular promoters to drive LAM1 expression were also constructed and tested in this manner. In all but one case, vascular expression of LAM1 restored blade formation in lam1 mutant plants, demonstrating for the first time that molecular signals governing the lateral outgrowth of leaf blades originate in vascular tissue. Using a similar approach, our collaborator Dr. Million Tadege (Oklahoma State Univ., Ardmore, OK) has analyzed the extent of functional overlap among WOX genes normally expressed in other plant organs, including roots and flowers. When expressed in the appropriate location for LAM1 in leaves, all of these genes can restore blade formation in mutant lam1 plants. Moreover, his work shows that a highly conserved C terminal domain found in all of these WOX genes is essential for this. This domain was initially identified in a WOX gene called WUSCHEL and is critical to

induction of cytokinin signaling, suggesting that blade formation must also hinge largely if not entirely on cytokinin induction.

Impact
Genes controlling patterns of plant development have been used extensively to make agriculturally important alterations in growth habit and time to flowering in a variety of crop plants. Genes like LAM1 can be used to tailor the development of leaf blades, the living solar panels that convert sunlight into energy required for photosynthesis. Our initial publications on the LAM1 gene were a critical cornerstone in the eventual isolation of this gene in the laboratory of Kiran Mysore (Noble Foundation, Ardmore, OK) by Dr. Million Tadege who made this the focus of his postdoctoral work in that lab. Research on LAM1 in alfalfa leaves continues to be the centerpiece of his program at Oklahoma State University where he is an assistant professor. Cloned genes and mutant strains from our program have likewise influenced the direction of investigations in many other research laboratories.

Genetic Regulation of Photosynthesis

Drs. Richard Peterson and Neil Schultes completed work on the role of the *LHCB7* gene in photosynthesis. The nuclear *LHCB7* gene is common in higher plants, encodes a transcript that is well expressed in a subset of leaf mesophyll cells, and is associated with a protein product that is homologous to pigment-binding components of the photosystem (PS) II peripheral antenna complex. We confirmed T-DNA insertion into coding regions of *LCHB7* in two lines of *Arabidopsis thaliana*. Physiological properties of wild type and AtLHCB7-deficient leaves (ecotype Columbia) were compared based on pigment content, CO_2 exchange, *in vivo* transmittance at 810 nm, and chlorophyll fluorescence. The latter two techniques are functional indicators for PSI and PSII, respectively. Key features of the mutant phenotype were confirmed by use of antisense technology and a hemizygous hybrid of the two *AtLHCB7* insertion lines. Loss of *AtLHCB7* expression significantly affected light utilization in PSII as characterized by a shift in the induction of photoprotective nonphotochemical quenching (NPQ) to a lower irradiance threshold. The consequent decline in radiant energy capture by PSII was paralleled by an increase in Q_A reduction in the mutant; mutually reinforcing effects that lower overall PSII quantum yield. This led to an initial hypothesis that AtLHCB7-deficiency is associated with an increase in resistance to plastoquinol oxidation by cytochrome b_6f caused, in turn, by a decrease in the lumenal pH (photosynthetic control). However, the latter was ruled out due to an absence of effects of *AtLHCB7* genotype on: 1) the kinetics of the light-dark decline in the 810-nm signal, and 2) xanthophyll de-epoxidation state. We conclude that the pH-dependence of the conformational change prerequisite to NPQ formation in the PSII antenna complex is shifted upscale when AtLHCB7 is absent. Furthermore, this conformational change is directly linked to an increased resistance to electron transfer from Q_A^- to the mobile plastoquinone Q_B.

The well documented superior photosynthetic and growth capacities of monocots possessing the C4 pathway of carbon assimilation has spurred efforts to introduce these characteristics into crop species that rely on the less efficient C3 mechanism. Recently, the third leaf of the 9-day-old B73 maize leaf seedling was chosen as the C4 “model” system and characterized through a multidisciplinary systems approach including anatomic, transcriptomic, proteomic, and metabolomic analysis (Li et al. Nature Genetics 42, 1060-1067). We are compiling

physiological profiles of the B73 system to overlay on the above molecular information to aid in the elucidation of the complex program of gene expression culminating in the C4 syndrome. A key question that could aid in interpretation of molecular profiles is whether an observable transition from C3 to C4 photosynthesis occurs during leaf development. A prominent attribute of C3 photosynthesis is Rubisco-catalyzed oxygenation of ribulose bisphosphate leading ultimately to production of glycolate. Metabolic processing of glycolate is obligatorily associated with liberation of CO_2 coincident with assimilatory CO_2 fixation in the light (photorespiration). Thus, photorespiration raises the equilibrium atmospheric CO_2 concentration attained in a closed system when photosynthesis is balanced by CO_2 evolution (O_2/CO_2 compensation point, Γ). We employ a closed system approach for measurement of Γ using transparent plastic syringes and an infrared gas analyzer configured to integrate signals recorded after injection of gas samples into a flowing stream of N_2. Results indicate that above 3 cm from the base of the emerged portion of leaf 3 no effects of O_2 on Γ can be detected consistent with negligible photorespiration. However, a modest O_2-dependent increase in Γ is observed below this 3-cm boundary and is augmented as the more recently emerged base of the leaf is approached. This gradient suggests that C3 photosynthetic capacity may be highest in very young sink tissue shaded by the sheath at the base of leaf 3 (2-4 cm above soil level). Dark respiration dominates metabolism in this barely pigmented region which complicates measurement of Γ. Nevertheless, we have observed substantial and highly O_2-dependent excursions in CO_2 levels in sink tissue using the closed system method. Use of a Rubisco partitioning model suggests that, to the small extent that photosynthesis occurs, it is highly C3 in nature. Surprisingly, illumination results in a transition to C4-like photosynthesis within the several-hour time frame of the experiment. This result could define a narrow zone in the developing leaf wherein light and/or accumulation of photorespiratory metabolites influence expression of critical regulatory genes leading to implementation of the C4 pathway.

Impact

The main impact of this work will be development of crop plants with higher photosynthetic capacity and able to withstand environmental stress. When water supply is limiting, for example, the photosynthetic apparatus can be damaged irreparably by continuous exposure to sunlight. Genes under investigation here contribute to protection from photodamage. Our work has had a direct influence on the course of related ongoing work in the labs of Dr. Agu Laisk, Department of Cell and Molecular Biology, University of Tartu, Estonia; Dr. Harry Frank of the Department of Chemistry, University of Connecticut; 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 an 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. In our work 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 (*Saccharomyces cerevisiae*) – to produce individual nucleobase transporters and test transport characteristics. To assay the function of each individual nucleobase transporter, we clone the distinct nucleobase genes into yeast, produce the corresponding transporter and assay both radio-labeled uptake and toxic analogue grow. During the past year, we published a manuscript establishing that the Arabidopsis NCS1 transporter facilitates the movement of guanine, adenine and uracil – but not cytosine – across biological membranes. This is in contrast to the transport profiles of the canonical *Saccharomyces cerevisiae* NCS1 transporters – FUR4 and FCY2 - that transport uracil **or** adenine, guanine and cytosine respectively. To determine if plant NCS1 transporter function in general diverged during evolution from the yeast NCS1 transport function, we isolated NCS1 transporter genes from species spanning the diversity of plant taxa. NCS1 transporter genes from algae (*Chlamydomonas reinhardtii*); moss (*Physcomitrella patens*); gymnosperm (*Picea glauca*); monocots (*Zea mays* and *Setaria viridis*) and dicots (*Nicotiana sylvestris*) were obtained and cloned into yeast expression vectors. Current experiments are underway to determine the solute transport specificities of these diverse NCS1 transporters. In a separate series of experiments, we are investigating the function of the Arabidopsis NAT3 (*AtNAT3*) gene through heterologous complementation in yeast using a ^{3}H-xanthine uptake assay. Our initial results show that AtNAT3 functions as an efficient transporter of xanthine. Currently, we are assaying the transport profiles for the Arabidopsis NAT 1-8 transporters by a similar manner. In addition, we have investigated the function of the three maize AZG transporter genes. Initial results show that these genes encode for guanine and adenine transporters.

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

The Department of Entomology is involved in a variety of service, research, pest surveillance, and regulatory activities. The primary service activities are provided through the 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.

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 staff conducts 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.

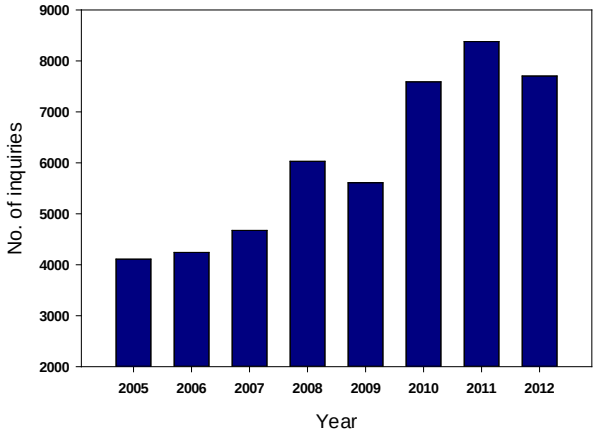
The staff of the Department of Entomology also takes a lead in providing extensive outreach activities for the Experiment Station by providing information to both children and adults about the Experiment Station's research at public events, health and agricultural fairs, such as the Eastern States Exposition (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

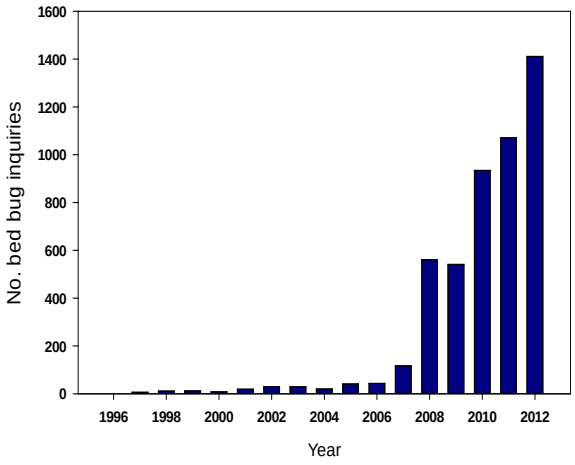
Insect Inquiry Office: **Dr. Gale Ridge** and **Rose Hiskes**, with the assistance of **Katherine Dugas** on Forest Health and CAPS**,** answered questions from the public. The insect inquiry office in its present form has provided services for over 40 years. Insect identification services

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.

Between July 1, 2011 and June 30, 2012 the insect inquiry office handled at least 7,703 recorded inquiries. There were 658 categories of inquiry including insects, arachnids, animals, use of pesticides, insect damage, general entomology, and horticultural issues. Of these 3583 (46%) were related to man and medical issues, 101 undetermined/general inquiries (2%), 3831 (48%) as natural resources, and 258 (4%) food related. Bed bug/bat bug inquiries remain the leading inquiry for the office with 1,411 (18.3%) of the identifications performed by the office. The bed bug webpage additionally had the highest level of activity. 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.



Number of inquiries from FY 2005/2006 to FY 2011/2012.



Number of inquiries from 1996-2012

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. Their exhibit, Invasion of the Bloodsuckers, Bed Bugs and Beyond which closed in November 2011 used bed bugs from Dr. Ridge's colonies.

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. Most maintenance and improvements to the garden are done by farm manager **Richard Cecarelli** and his staff. 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 12 different butterfly species, 1 species of moth, 13 species of birds, and 2 other animals around the garden on Plant Science Day August 3, 2011.

Butterflies	*Birds*	*Other*
Spicebush Swallowtail	American Crow	Green Frog
Eastern Tiger Swallowtail	American Goldfinch	White-footed Mouse
Cabbage White	Red-shouldered Hawk	Hummingbird Clearwing Moth
Monarch	Song Sparrow	
Pearl Crescent	Northern Mockingbird	
Tawny-edged Skipper	Mourning Dove	
Peck's Skipper	Downy Woodpecker	
European Skipper	Red-tailed Hawk	
Common Buckeye	House Sparrow	
Orange Sulphur	Canada Goose	
Silver-spotted Skipper	Ruby-throated Hummingbird	
Eastern Tailed-Blue	American Robin	
Spicebush Swallowtail	Tree Swallow	
Eastern Tiger Swallowtail	American Crow	
Cabbage White	American Goldfinch	
Monarch	Red-shouldered Hawk	
Pearl Crescent	Song Sparrow	
	Northern Mockingbird	
	Mourning Dove	

Sponsored Meetings and Conferences: A Forest Health Workshop, organized annually by **Dr. Victoria Smith**, was held March 6, 2012 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 Energy and Environmental Protection, USDA-APHIS-PPQ, and the forest health community. A sixth bed bug forum, organized by **Dr. Gale E. Ridge**, was held on October 6th, 2012 at the Station. It had guest speakers from Cornell University and Boston. They focused on the human side of the bed bug equation. Hoarding intervention and community approaches to bed bug management were subjects addressed during the forum.

Tick Testing: Ticks, primarily the blacklegged tick *Ixodes scapularis*, had the highest number of specimens submitted for identification. Ticks are processed in the Tick Testing Laboratory at the Experiment Station by **Elizabeth Alves** and **Bonnie Hamid**. A total of 3,240 ticks feeding on humans were submitted for identification in 2011, of which 2,903 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 2011, 1,513 (52.1%) were tested for the presence of *Borrelia burgdorferi*, the causal organism for Lyme disease, and 340 (22%) were found to carry this organism.

RESEARCH ACTIVITIES

Natural Products for Tick Control: **Dr. Kirby C. Stafford III** and postdoctoral scientist **Dr. Anuja Bharadwaj** began studies on evaluation of natural products for tick control with a grant from the Centers for Disease Control and Prevention in 2008. Experiments were continued and completed in 2012 with the assistance of **Heidi Stuber**. Previously, we reported 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. Tick populations were low at participating properties in Fairfield County in 2012 and an additional trial with garlic could not be conducted.

A decline in the activity of *I. scapularis* nymphs was also noted in our long-term monitoring sites in the towns of Old Lyme, Lyme, and E. Haddam, CT. In wooded plots, there were 1.1, 0.8, and 0.3 nymphs per 100 m^2 sampled in 2010, 2011, and 2012, respectively. A similar trend was evident on lawns (0.2, 0.08, and 0.06 per 100 m^2). With 31 human Lyme disease cases for the three towns in 2010 and 17 cases in 2011, it is likely even fewer cases will be reported in 2012.

Ticks and Tick-Associated Diseases: **Dr. Louis A. Magnarelli, Dr. Scott C. Williams,** Dr. Steven J. Norris (University of Texas), and Dr. Erol Fikrig (Yale University), assisted by **Tia Blevins**, tested sera from 557 recaptured white-footed mice (*Peromyscus leucopus*) for antibodies to *Borrelia burgdorferi, Anaplasma phagocytophilum*, and *Babesia microti*. Mice were captured and released in six tick-infested sites in Fairfield, New Haven, and Tolland Counties during 2007 through 2010. There was an overall recapture rate of 40%, but only four tagged mice were caught in two or more years. Seropositivity rates were highly variable for *B. burgdorferi* (56% to 98%), *A. phagocytophilum* (11% to 85%), and *B. microti* (11% to 84%), depending on the site and time of sampling; 206 (45%) of 463 seropositive mice had antibodies to all three pathogens. There were notable changes in antibody status for some mice from negative to positive (117 seroconversions) or from positive to negative (55 reversions).

Impact: White-footed mice, reservoirs for all three pathogens, serve to infect immature *Ixodes scapularis* ticks that feed on these rodents. These mice are ideal for monitoring infections in selected foci as a part of ecological and epidemiological studies. Knowledge of serologic reversions is important because white-footed mice may be able to eliminate certain pathogens, such as *A. phagocytophilum*, or mouse immune systems may cease to produce antibodies despite patent infections. These new findings will help interpret prevalence of antibodies to tick-borne pathogens in white-footed mice.

Bed bugs fungal pathogen treatments and reproductive studies: **Drs. Gale E. Ridge, Kirby C. Stafford III**, and **Dr. Anuja Bhardwaj** conducted several experiments on the use of entomopathogenic fungi as a control on the Common bed bug, *Cimex lectularius* L. More specifically, *Metarhizium brunneum* strain F52 was used and proven effective against *C. lectularius* in the laboratory. Dr. Ridge additionally ran a study on *C. lectularius* fecundity, reproductive strategies, and viability using two populations, a laboratory strain (the Harlan line) and a New Haven "wild" strain (the Ridge line). Results revealed here-to-fore unobserved behaviors and fecundity traits.

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. Dr. Kimberly Stoner, with assistance from Tracy Zarrillo,

Morgan Lowry, Krystian Madrid, Benjamin Gluck, Christine Bell, Meaghan Stucke, and Ghada Hafez, is studying several aspects of pollination, bee health, and diversity of bee species.

Pollination of Pumpkins and Winter Squash: Pumpkins and winter squash (*Cucurbita* spp.) require insect pollination in order to set fruit, and fruit size is also closely related to the amount of pollen deposited on the female flowers. Dr. Stoner is beginning a 5-year project to evaluate pollination of pumpkins and winter squash on 20 farms in Connecticut. This collaborative project comprising research on pollination of four commodities in four states, is funded by the Specialty Crops Research Initiative of the U.S. Department of Agriculture. The first year of the study begins with counts of bees on pumpkins and winter squash in farmers' fields and collection of stigmas to determine the level of pollen deposited. Many factors that could affect the health and abundance of pollinators are also being monitored: concentrations of pesticides in the nectar and pollen of the plants, presence or absence of a range of pathogens in the three bee species most important in pollination, and habitat and floral resources for the bees in the surrounding landscape.

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. Stoner and her team observed and collected bees on 105 species at 10 private farms, including cut flowers, herbs, cover crops and weeds. This project is funded by the Natural Resources Conservation Service of the U.S. Department of Agriculture. Her team is 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. The total number of bees observed is the product of the bees observed per minute of observation, and the number of minutes – which depends partly on how many farms grew the plants and partly on how long the plants bloomed. The plants with the greatest total numbers of bees observed were sunflowers and lavender. Both of these had high numbers of bees observed per minute, were grown on multiple farms, and bloomed and attracted bees for 2-3 months. The plant with the greatest number of bees observed per minute was buckwheat with 39.5 bees per minute, followed by common motherwort with 33.7 and catnip with 31.7. Each of these plants were grown on only one of the private farms and bloomed only briefly, so we had only 1-2 samples for each species.

Summer assistants Ben Gluck and Christy Bell sweep marjoram for bees.

In addition, the same measurements were made on replicated field plots with 7 perennial and 7 annual species of herbs and cut flowers, and 5 species of cover crops. At Lockwood Farm, anise

hyssop had the greatest number of total bees observed and also the highest number of bees per minute. Following behind were basil and the annual sunflower 'Soraya.'

Surveys for Invasive Insects: Dr. Maier, assisted by Morgan Lowry and Tracy Zarrillo, continued to investigate the distribution of the brown marmorated stink bug (*Halyomorpha halys*). This Asian stink bug has an exceptionally broad host range, with the adults and nymphs often feeding on the same host plants. New distributional records usually were obtained from citizens who found adults in their homes during the fall and winter months. In 2011 and 2012, this invasive stink bug was detected in many new locations throughout Connecticut. Currently, it is known from 60 towns distributed in the 8 counties of the state. Fortunately, it has not yet damaged agricultural crops in Connecticut.

In August 2011, the non-native spotted wing drosophila (*Drosophila suzukii*) was found at several locations in Connecticut for the first time. This Asian vinegar fly poses a threat to agricultural crops, particularly small fruits. During the past few years, larvae of this fly have caused millions of dollars of damage in other states. Between September and December 2011, Dr. Maier and his assistants found it in 86 (51%) of 169 municipalities distributed throughout the 8 counties of Connecticut. New distributional records were based primarily on capturing adults in vinegar-baited traps and on rearing them from infested fruit. During the survey, adults of the spotted wing drosophila were reared from the infested fruits of wild plants of American pokeweed (*Phytolacca americana*), autumn olive (*Elaeagnus umbellata*), climbing nightshade (*Solanum dulcamara*), and fox grape (*Vitis labrusca*), It also was reared from the fruits of the cultivated plants of Amur peppervine (*Ampelopsis brevipedunculata*), blackberry (*Rubus allegheniensis*), beach plum (*Prunus maritima*), highbush blueberry (*Vaccinium corymbosum*), Japanese yew (*Taxus cuspidata*), kousa dogwood (*Cornus kousa),* persimmon (*Diospyros virginiana)*, red raspberry (*Rubus idaeus*), and wine grape (*Vitis vinifera*). Wild hosts of the spotted wing drosophila may contribute to the buildup of populations that later injure agricultural crops.

Lily Leaf Beetle: The lily leaf beetle (*Lilioceris lilii*) is a highly destructive pest of Asiatic and Oriental lilies that are grown in many flower gardens in Connecticut. Both the larvae and adults of this European beetle feed upon the foliage and flowers of lilies, sometimes causing the death of plants. Although this invasive beetle seems to prefer Asiatic true lilies, it has spread into the wild where it now injures two native lilies—the Canada lily (*Lilium canadense*) and the Turk's-cap lily (*L. superbum*). Based on the high abundance of these non-native beetles, they soon may pose a threat to our populations of native lilies.

In 2012, Dr. Maier and his assistants began a new project to determine the impact on the lily leaf beetle on wild lilies. They found immatures or adults of the lily leaf beetle in 75% of the wild lily populations examined in spring and early summer. Experiments in future years will focus on how different densities of beetles affect wild lilies and how many generations the beetles have.

Improved Use of Lindgren Funnels: Dr. Maier and his assistants have concluded a 4-year USDA-funded project on how baited Lindgren funnels, traps that imitate the form and sometimes the odor of a tree trunk, can be modified to increase their efficiency in capturing adults of wood-boring insects and their natural enemies. In 2011, a final experiment was conducted in a broad-leaved forest in Meshomasic State Forest, East Hampton. In this experiment, the catches of beetles in collection cups with the killing agents of 70% ethyl alcohol, soapy water, propylene

glycol, and vapona were compared. Collection cups with alcohol caught the greatest number of longhorned, predatory checkered, and bark beetles.

Based on all experiments conducted between 2008 and 2011, Dr. Maier has concluded that (1) the killing agent used in Lindgren funnels can affect trap catch, (2) increasing the lid size of funnels decreases the amount of water and debris in the collection cups, and (3) the lid size of traps generally does not influence catch of targeted wood-borers. Notably, the use of 70% ethyl alcohol, the killing agent, in collection cups significantly increases the catch of many economically important beetles in spring. Although alcohol costs more than other killing agents, its use may be justified in detection programs for highly destructive beetles. A benefit of increased lid size, particularly with the use of killing agents such as ethanol and propylene glycol, is that specimen quality is higher. This occurs because the preservative killing agents do not become diluted by rain accumulating in collection cups. Larger lids, along with improved specimen quality, may even allow the interval between trap inspections to be increased.

Longhorned Beetles of Connecticut: Dr. Maier and his assistants have continued to assess the fauna of longhorned beetles in the state. They have gathered biological information on both native and non-native wood-borers by capturing adults in traps, rearing adults from larvae in wood, collecting adults on flowers, and examining museum collections. They have recorded nearly 200 species of longhorns in Connecticut. In 2011 and 2012, they trapped four species (*Anthophylax viridis*, *Judolia montivagans*, *Neoclytus scutellaris*, and *Pronocera collaris*) that previously had not been reported from Connecticut. To date, they have reared 82 species from dead wood collected in New England; many of the host associations are new to science. They have examined the period of adult activity of over 100 species. They have generated a database, which now has over 8,100 entries. Biological data stored in the database should assist in the development of management plans for borers that are or may become pests.

Agrilus species – The genus *Agrilus* (Coleoptera: Buprestidae) contains several species of economic importance, both native and invasive. Dr. Rutledge is pursuing several lines of research with 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 attack 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, an infestation was found in Rhiencliff NY on the approximately 25 miles from the CT border.

In collaboration with Dr. Melody Keena USDA FS, Dr. Rutledge is pursuing a multi-pronged approach to studying the reproductive behavior of BBB and EAB which encompasses mating behavior, mate choice, and the kinetics of sperm transfer and storage. A study of the impact of mating frequency on fecundity in EAB published this year showed that EAB females need to mate more than one time to ensure fecundity. A similar study with BBB, which has been accepted for publication, showed that BBB females can achieve full fecundity with just one mating. The results of this research are being used to improve laboratory rearing of EAB, as well as to understand the population dynamics of both species.

Finally, surveys are ongoing on the natural enemies of BBB and other species in the Buprestidae. This work has two main goals, the first is to document current natural enemies in advance of the probable release of non-native parasitoid wasps for the control of EAB when it arrives in the state. The second is to search for potential natural enemies that could be used

against EAB here. One technique used in this survey is dissection of *Cerceris fumipennis*-caught buprestid beetles for pathogenic organisms such as nematodes and microsporidia. Another approach is girdling birch trees in a number of habitats throughout the state to make them more attractive to egg-laying BBB. The infested trees are then left in situ and the next fall the trees are collected and any larvae dissected out of the tree, collected and examined for parasitoids and pathogens.

Cerceris fumipennis: Dr. Claire 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.

Moiara Scott and Stone Ng collect beetles from female *Cerceris* wasps returning to their burrows at a ball field.

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. In 2012, we were again joined by the White Memorial Conservation Center in Litchfield. We were also approved as an 'outreach activity' by the University of Connecticut Extension Master Gardeners Program. We had 17 Master Gardeners join the Wasp Watchers for a total of 55 volunteers. The colonies were distributed throughout CT. No invasive buprestid beetles were found in 2010 and 2011. We are still awaiting results from 2012.

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, 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. A synthesized *A. planipennis* contact sex pheromone was shown to be attractive to the wasp in summer 2011. However, merely adding buprestid extract to a non-host beetle did not make that beetle acceptable. A test of the composition of cuticular hydrocarbons of 10 species of Buprestidae showed that their hydrocarbon profile is relatively simple, including only 2 to 3 major classes of hydrocarbons, whereas other beetles tested include up to 8 or 9. We will test the hypothesis that it is the presence of hydrocarbons in classes that do not appear in Buprestidae that cause wasps to reject beetles that are not buprestids.

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**.

NURSERY INSPECTION AND CERTIFICATION. Three-hundred eleven nurseries were certified to conduct intra- and interstate business. There were 721 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 (in order of prevalence) were aphids on various trees and shrubs, Rhododendron leaf miner, mites on various trees and shrubs, Boxwood blight, and thrips.
JAPANESE BEETLE CERTIFICATION. We observed treatments of 1,500 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 2,843 plants to states that quarantine plants from Connecticut.
JAPANESE BEETLE CERTIFICATION TO CANADA. Eight Connecticut nurseries, which met the inspection requirements of the US/Canada Japanese Beetle Harmonization Plan, shipped 249,704 plants to Canada in 2011.
NURSERY DEALER PERMITS. Nursery dealer permits were issued to 175 firms. One-hundred forty five of these companies operate individual outlets. The remaining businesses have more than one outlet each. In total, there were 565 outlets.
PHYTOSANITARY CERTIFICATES. Three-hundred and forty six phytosanitary inspection certificates were issued covering the shipment of the following plant materials to destinations outside the United States:

Product	Number
Apples (Cartons)	10,000
Bulbs & Tubers (Dahlia & Gladiolas)(# Bags)	107
Chinese tree peonies (plants)	65
Greenhouse plants	847
Nursery stock (containers - B & B)	247,708
Orchids (plants)	2,524
Perennials (bare root plants)	2,587

(plants)	500
Seeds (cartons & bags)	203
Tobacco (bales, boxes, bundles & cartons)	144,939
Walnut shells (bags and drums)	180

SPECIAL INSPECTIONS. Six inspections were made for 54 individual plants and bulbs to assist homeowners moving out of state.

One-hundred eleven inspections were made to assist nurseries moving the following plants interstate:

Product	Number
Perennials (plants)	1,500
Nursery stock (containers)	1,209
(bare root plants)	1,500
Greenhouse plants	1,391
Orchids	2,524
Seed (# Bags)	111

There was one Post-Entry Quarantine site approved in CT in 2011.

BIOTECHNOLOGY REGULATORY SERVICES INSPECTION ACTIVITY. In cooperation with officers from the Wallingford USDA-APHIS-PPQ office, three inspections were conducted in 2011 at facilities or laboratories working with recombinant or regulated organisms.

PERMITS TO MOVE LIVE PLANT PESTS, NOXIOUS WEEDS, AND SOIL. In 2011, there were fifty five PPQ 526 Permits (Permit to move live plant pests, noxious weeds, and soil) approved in CT. There were four PPQ 330 Permits (Permit to move soil) approved in CT.

FOREST HEALTH. During the summer of 2011, 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.

ENVIRONMENTAL CONDITIONS. Single rain events in March contributed to a high spring rainfall level for most of CT in 2011, even though most of the year was abnormally dry. Rainfall in the late summer and fall exceeded normal levels.

Hurricane Irene struck CT on August 27, 2011, first as a Category 1 storm, degenerating rapidly to a tropical storm. Many trees were toppled and many more sustained damage to branches and crowns, due to strong winds. Foliage was tattered and damaged by salt spray, especially in coastal areas. In the days that followed, prolonged flooding occurred in areas along streams and rivers, especially along the Housatonic and Connecticut River watersheds. Beach erosion was common, especially in the East Haven area of New Haven County. The effects of this hurricane will be felt in years to come, as damage to trees from breakage and the effects of flooding will be reflected in increased tree mortality and susceptibility to diseases and insect pests.

The Halloween Nor'easter occurred on October 29 and 30, 2011, causing extensive damage to trees and landscapes. Heavy snowfall on trees that had not yet shed leaves resulted in branches breaking under the weight, trees collapsing, and stress on trees that did not break. The northwestern counties of CT were most severely impacted, with many roads blocked by downed trees and power lines. At one point, over 80 % of electric utility customers in CT were without power, in some cases for as long as two weeks. Many of the trees that succumbed were probably weakened by Hurricane/TS Irene. Long-term consequences of these two storms will be seen in the forested areas for years to come.

INSECT AND DISEASE SURVEYS

GYPSY MOTH. There was no observable defoliation due to Gypsy Moth recorded in CT in 2011. During egg mass surveys in winter 2011-2012, very few viable egg masses were found.

In November and December 2011, 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.

ASIAN LONGHORNED BEETLE. We conducted inspections of 38,081 trees in all counties of CT for presence or signs of ALB infestation.

HEMLOCK WOOLLY ADELGID. During 2011, 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 inspectors observed treatments and issued phytosanitary certificates to cover 2,109 plants in these shipments.

RAMORUM LEAF BLIGHT. As part of the *P. ramorum* National Nursery Survey, we inspected 20 nurseries during 2011. During this survey so far, 93,864 plants have been inspected and 236 samples from symptomatic plants were submitted for lab analysis. All samples were cultured and tested by ELISA; DNA from ELISA-positive samples was sent to Beltsville for PCR confirmation. One hundred ninety-five samples, about 83 %, were ELISA-positive, indicating the presence of *Phytophthora* sp. All samples from the nurseries were negative for *P. ramorum*.

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 2011; 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*.

There was one trace-forward action involving *P. ramorum* in CT in 2011. Host material was shipped to ten residences, and associated host material to nine residences, from a retail nursery in Oregon. All were contacted by letter, and all residences receiving host material were visited by inspectors. Samples were taken from symptomatic plants, and one plant, a Rhododendron, was found positive for *P. ramorum*. The Residential Protocol was carried out with the cooperation of the homeowner, and the location will be inspected and monitored for two additional years, as per protocol.

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 2011, we surveyed daylilies in nurseries and garden centers for signs of this rust. Forty-two inspections (20,896 plants) were carried out; no signs of *Puccinia hemerocallidis* were found.
CHRYSANTHEMUM WHITE RUST. In 2011, we inspected 121,943 plants for CWR. One private citizen reported CWR in his 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.

One chrysanthemum grower discovered CWR in his production area, and mitigated the infestation without regulatory interference. Approximately 20,000 plants were bagged and placed in dumpsters. Inspection of the surrounding environment and the remainder of his property revealed no further infestation. The area was treated with disinfectants after plant disposal.

BOXWOOD BLIGHT. In November 2011, boxwood blight, caused by the fungus *Cylindrocladium pseudonaviculatum*, was discovered at a residence in Middlesex County CT. This disease is new to CT and to the US. Trace-back activity was initiated, and infected plants at the property were destroyed. To date, four residences, two wholesale nurseries, and seven retail locations have been confirmed to have boxwood blight. Disposal of affected plants is ongoing; to date, approximately 100,000 plants have been destroyed by burial or dumpster.

FOREST HEALTH SURVEY. During the summer and autumn of 2011, 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.

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 2011, a total of 35.6 acres in Fairfield County, 3,172.1 acres in Hartford County, 2,358.0 acres in Litchfield County, 120.2 acres in New Haven County, 247.1 acres in New London County, 251.0 acres in Tolland County, and 18.2 acres in Windham County were affected by HWA. Statewide, 6,202.2 acres were affected by HWA. 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.
There were no further hemlock or HWA mortality assessments in Connecticut for 2011 due to elimination of federal funding for this work.

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.

HARDWOOD ANTHRACNOSE. Anthracnose diseases of hardwood trees may be caused by several different genera of fungi; for purposes of mapping, any severe discoloration and defoliation of hardwoods is considered to be anthracnose. These diseases are favored by cool wet conditions, similar to those experienced in spring and early summer of 2011. Damage to trees from anthracnose diseases was widespread and general across the state; all forested areas were somewhat affected.

ORANGE-STRIPED OAKWORM. The Orange-striped oakworm, *Anisota senatoria*, is a native moth that ranges from eastern Canada southward to Georgia. It is a common pest of oak species in Connecticut. Occasionally, local infestations occur when oaks have been stressed by other factors such as drought or gypsy moths. Serious defoliation can occur when this happens. The moths lay up to 500 eggs on the undersides of an oak leaves in early summer and are attracted to artificial light. The caterpillars feed on the foliage, and then they burrow into the soil and build an earthen cell, where it pupates and passes the winter. In 2011, 546.1 acres in Fairfield County, 547.7 acres in New London County, and 251.1 acres in Windham County, for a total of 1,344.9 acres statewide were affected by orange-striped oakworm.

RED PINE SCALE. Red pine scale, *Matsucoccus gallicolus*, was described in CT in the 1940's, and causes sporadic damage. In Hartford County, 27.1 acres were affected; in Litchfield County, 5.1 acres were affected, and in Tolland County, 59.5 acres were affected by red pine scale, for a total of 91.7 acres statewide.

APIARY CERTIFICATION

Nine Hundred and Fifty-five beekeepers registered 5,443 colonies in 2011-2012. Our bee inspectors opened and inspected 561 colonies. One case of American foulbrood was detected. *Apis ceranae* was detected in many areas and is an increasing problem. Varroa mite is generally distributed in almost all beehives across the state. A new apiary inspector, Mark H. Creighton joined the Station on May 18, 2012.

Apiary inspector Ira Kettle (pictured at right at the 2011 Hartford Flower and Garden Show) passed away in December 2011 after nearly 19 years of service to Connecticut's beekeepers. He will be missed.

Pest/disease	Positives
Small Hive Beetle	7
American Foulbrood	1
Chalkbrood	7
Die-offs	150
Sacbrood	2
Nosema	7

Mosquito Trapping and Testing Program

Mosquito surveillance for West Nile (WN) virus and Eastern Equine Encephalitis (EEE) is integral to the public health response to these mosquito-transmitted viruses in Connecticut. The objectives of the surveillance program are to provide: 1) early evidence of local virus activity; 2) information on the abundance, distribution, identity and infection rates of potential mosquito vectors and; 3) information that is used to assess the threat of WN virus and EEE to the public and guide the implementation of mosquito control measures. The CAES is responsible for conducting all mosquito trapping and testing activities. The program is conducted by **Dr. Theodore Andreadis** and **Dr. Philip Armstrong**, assisted by **John Shepard**, **Michael Thomas**, and **Shannon Finan**. Mosquito trapping is conducted at 91 permanent trapping stations that are located in 72 municipalities throughout the state.

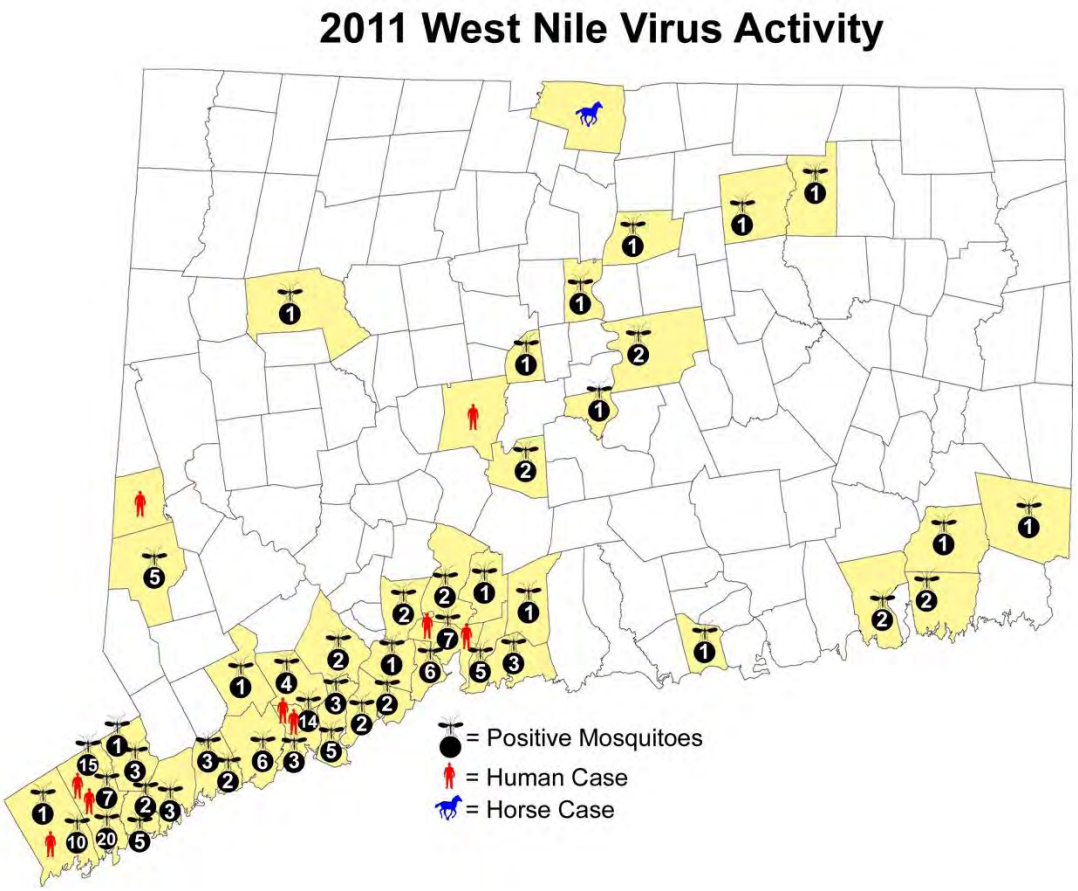
In 2011, mosquito trapping was conducted from May 31 to October 20. Traps were set and attended by CAES staff every 10 days at each site on a regular rotation. Two trap types were used at all trapping stations – a CO2-baited CDC Light Trap, designed to trap host-seeking adult female mosquitoes (all species), and a Gravid Mosquito Trap, designed to trap previously blood-fed adult female mosquitoes (principally *Culex* and container breeding *Ochlerotatus* species). 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 (POT) 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 2011 season, a record total of 334,371 mosquitoes (19,283 pools) representing 37 species were trapped and tested. A total of 166 isolations of WN virus were made from 7 mosquito species: *Culex pipiens* = 117, *Cx. restuans* = 26, *Cx. salinarius* = 12, *Culiseta melanura* = 7, *Coquilletidia perturbans* = 2, *Aedes cinereus* = 1, *Ochlerotatus canadensis* = 1 collected at 46 sites in 37 towns in 7 counties: Fairfield (Bridgeport, Danbury, Darien, Easton, Fairfield, Greenwich, New Canaan, Norwalk, Shelton, Stamford, Stratford, Trumbull, Westport), Hartford (Hartford, Glastonbury, New Britain, South Windsor), Litchfield (Litchfield), Middlesex

(Cromwell, Westbrook), New Haven (Branford, East Haven, Hamden, Meriden, Milford, New Haven, North Branford, North Haven, Orange, West Haven, Woodbridge), and New London (Groton, Ledyard, North Stonington, Waterford), and Tolland (Tolland, Willington) (Figure 1). The first positive mosquitoes were collected on June 21, and the last on October 17. 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 (2 cases), New Haven (2 cases), Greenwich, New Fairfield, Southington, Stamford (2 cases). One equine case was reported from Suffield.

Very little EEE virus activity was detected in 2011. A total of 4 isolations of EEE virus were made from *Culiseta melanura* (n=3) and *Ochlerotatus canadensis* (n=1) mosquitoes collected in North Plainfield and Stonington from September 15 to October 12. There were no human or horse cases of EEE reported.

Other mosquito-borne viruses isolated included: Cache Valley (CV) 43 isolations from 12 species; Highlands J (HJ) = 21 isolations from 3 species (August 25 - October 24); Jamestown Canyon (JC) = 64 isolations from 11 species (June 1 – June 20); Potosi (POT) = 2 isolations from 2 species; Trivittatus (TVT) = 9 isolates from 1 species



Mosquito species trapped and tested for arboviruses in Connecticut, 2011

Mosquito Species	# Mosquitoes	# Pools	Virus						
			CV	EEE	HJ	JC	POT	TVT	WN
Aedes albopictus	12	11							
Ae. cinereus	16,774	1,217	2						1
Ae. vexans	39,509	1,682	8		2	1			
Anopheles barberi	6	6							
An. crucians	42	27							
An. punctipennis	4,338	833	9			5	1		
An. quadrimaculatus	950	316	2						
An. walker	4,603	304							
Coquillettidia perturbans	33,790	1,238	2						2
Culex pipiens	24,920	1,612							117
Cx. restuans	10,743	1,443			1				26
Cx. salinarius	27,415	1,282							12
Cx. territans	215	148							
Culiseta melanura	13,324	895		3	17				7
Cs. minnesotae	132	31							
Cs. morsitans	107	54							
Ochlerotatus abserratus	4,190	200				3			
Oc. atropalpus	1	1							
Oc. aurifer	4,019	213				3			
Oc. canadensis	51,183	1,671	7	1		8	1		1
Oc. cantator	5,465	383	1			10			

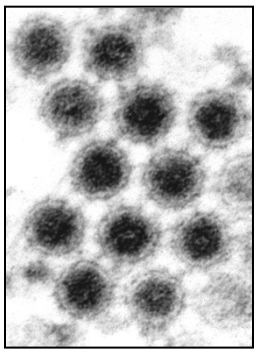
Oc. communis	162	15							
Oc. excrucians	886	109							
Oc. grossbecki	18	13							
Oc. japonicus	1,841	638	1						
Oc. provocans	545	16				7			
Oc. sollicitans	2,258	129							
Oc. sticticus	3,551	298				4			
Oc. stimulans	2,761	300				2			
Oc. taeniorhynchus	17,322	473	2						
Oc. thibaulti	13,383	442							
Oc. triseriatus	1,475	463	1						
Oc. trivittatus	24,771	1,288	7		1	11		9	
Orthopodomyia signifera	5	5							
Psorophora ferox	20,121	1,021	1						
Ps. howardii	1	1							
Uranotaenia sapphirina	3,533	505							
TOTALS	**334,371**	**19,283**	**43**	**4**	**21**	**53**	**2**	**9**	**166**

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

Impact. Mosquitoes were collected at 91 trap sites, located in 72 municipalities, in Connecticut. Following identification, the insects were processed for virus isolations and identified using molecular methods to analyze RNA. During 2011, 334,371 mosquitoes were tested for virus. There were 166 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

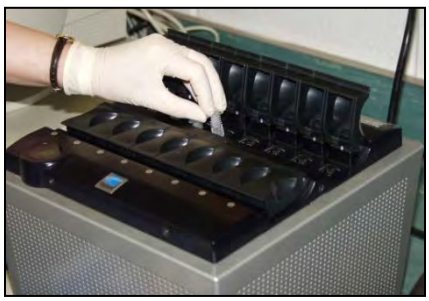
virus activity in the mosquito population which was used to assess risk of human infection, inform the public and health care providers of these risks, guide vector control efforts, and prevent disease outbreaks.

Studies on Mosquitoes and Eastern Equine Encephalitis



Eastern equine encephalitis (EEE) virus (Togaviridae, Alphavirus) is a highly pathogenic mosquito-borne zoonosis that is responsible for outbreaks of severe disease in humans and equines, resulting in high mortality or severe neurological impairment in most survivors. In the northeastern U.S., EEE virus is maintained in an enzootic cycle involving the ornithophilic mosquito, *Culiseta melanura* and passerine birds in freshwater swamp habitats. To evaluate the role of *Cs. melanura* and *Culiseta morsitans* in recent episodes of EEE virus activity in Massachusetts, **Drs. Goudarz Molaei, Theodore Andreadis, Philip Armstrong and Mr. Michael Thomas** in collaboration with researchers from several Massachusetts Mosquito Control Projects (Central, Northeast, Bristol and Plymouth Counties) and the Massachusetts Department of Health collected blood-fed mosquitoes between June 2007 and October 2008 from virus foci in six counties, and identified the source of blood meals by PCR amplification of mitochondrial cytochrome b gene and sequencing. Analysis of 529 *Cs. melanura* and 25 *Cs. morsitans* revealed that nearly 99% and 96% of mosquitoes, respectively, acquired blood meals solely from avian hosts. American Robin, *Turdus migratorius* was identified as the most common vertebrate host for *Cs. melanura* (21.7%, n = 115), followed by Tufted Titmouse, *Baeolophus bicolor* (8.7%, n = 46); Black-capped Chickadee*, Poecile atricapillus* (8.5%, n = 45); Scarlet Tanager, *Piranga olivacea* (6.8%, n = 36); Field sparrow, *Spizella pusilla* (6.2%, n = 33); Northern Cardinal, *Cardinalis cardinalis* (5.7%, n = 30); and other mostly Passeriformes birds. Mammalian-derived blood meals were identified as white-tailed deer, *Odocoileus virginianus*; domestic cow, *Bos taurus*; and human, *Homo sapiens*. There were four isolations of EEE, West Nile and Highland J viruses from *Cs. melanura*.

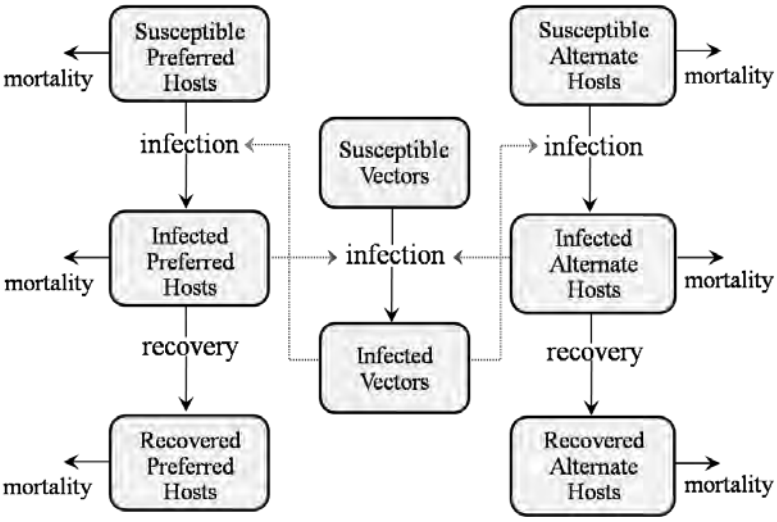
Impact. Our results in conjunction with other lines of evidence including reservoir competency, prevalence of antibody and infection in nature suggest that American Robin, Tufted Titmouse, Black-capped Chickadee and a few other passerine birds may play key roles in supporting EEE virus transmission in Massachusetts. Infrequent blood-feeding of *Cs. melanura* on mammalian hosts, including humans, also indicates that this mosquito may occasionally contribute to epidemic/epizootic transmission of EEE virus in this region.



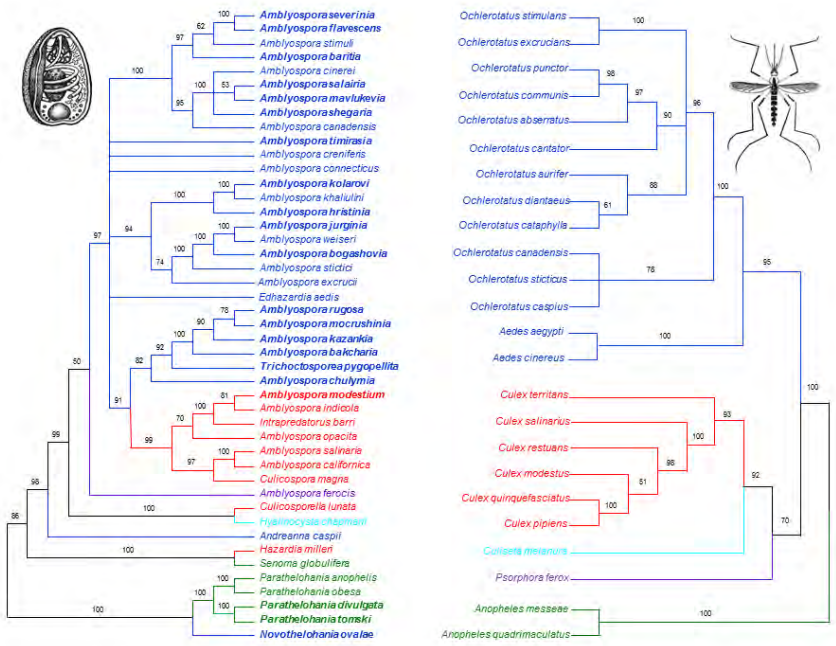
Disease outbreaks caused by EEE virus may be prevented by implementing effective surveillance and intervention strategies directed against the mosquito vector. Methods for EEE virus detection in mosquitoes include a real-time reverse transcriptase PCR technique (TaqMan assay), but **Drs. Philip Armstrong** and **Theodore Andreadis** reported its failure to detect variants isolated in Connecticut in 2011 due to a single base-pair mismatch in the

probe-binding site. To improve the molecular detection of EEE virus, they developed a multi-target TaqMan assay in collaboration with Ms. Nicholanna Prince from the Connecticut Department of Public Health by adding a second primer/probe set to provide redundant targets for EEE virus detection. The multi-target TaqMan assay had similar performance characteristics to the conventional assay but also detected newly evolving strains of EEE virus. The approach increases the reliability of TaqMan assay by creating backup targets for virus detection without sacrificing sensitivity or specificity.

Studies on Mosquitoes and West Nile Virus



Seasonal epizootics of vector-borne pathogens infecting multiple species are ecologically complex and difficult to forecast. Pathogen transmission potential within the host community is determined by the relative abilities of host species to maintain and transmit the pathogen and by ecological factors influencing contact rates between hosts and vectors. Increasing evidence of strong feeding preferences by a number of vectors suggests that the host community experienced by the pathogen may be very different from the local host community. Scientists from Yale University in collaboration with **Drs. Goudarz Molaei, and Theodore Andreadis** developed an empirically informed transmission model for West Nile virus (WNV) in four sites using one vector species (*Culex pipiens*) and preferred and non-preferred avian hosts. They measured strong feeding preferences for American robins (*Turdus migratorius*) by *Cx. pipiens*, quantified as the proportion of *Cx. pipiens* blood meals from robins in relation to their abundance (feeding index). The model accurately predicted WNV prevalence in *Cx. pipiens* at three of four sites. Sensitivity analysis revealed feeding preference was the most influential parameter on intensity and timing of peak WNV infection in *Cx. pipiens* and a threshold feeding index for transmission was identified. Findings indicate host preference- induced contact heterogeneity is a key mediator of vector-borne pathogen epizootics in multi-species host communities, and should be



incorporated into multi-host transmission models.

Studies in Biological Control of Mosquitoes

Drs. Theodore Andreadis and Charles Vossbrinck in collaboration with scientists from Tomsk State University and Institute of Systematic and Ecology of Animals, in Russia conducted a survey of mosquito larvae infected with microsporidia from 2005 to 2008 in the Tomsk, Kemerovo and Novosibirsk regions of western Siberia, Russia. Twenty-one morphologically and genetically unique species of microsporidia were isolated from 9 species of *Anopheles, Aedes, Culex* and *Ochlerotatus* mosquitoes including: (1) 14 proposed new species of *Amblyospora* (*A. bakcharia, A. baritia, A. bogashovia, A. chulymia, A. hristinia, A. jurginia, A. kazankia, A. mavlukevia, A. mocrushinia, A. modestium, A. salairia, A. severinia, A. shegaria,* and *A. timirasia*); (2) a newly proposed genus and species, *Novothelohania ovalae* and; (3) 6 species of *Amblyospora* (*A. flavescens, A. kolarovi, A. rugosa,*), *Parathelohania* (*P. divulgata* and *P. tomski*) and *Trichoctosporea* (*T. pygopellita*) from which gene sequences had not been previously obtained. Detailed ultrastructure of meiospores revealed unique cytological features associated with the length, arrangement and ratio of broad to narrow coils of the polar filament, comparative thickness of the exospore and endospore, and overall size of each species reaffirming their value in distinguishing taxonomic relationships. SSU rDNA sequences obtained from each species of microsporidia were unique when compared with GenBank entries. Phylogenetic trees constructed by Maximum Parsimony, Maximum Likelihood and Neighbor Joining analyses yielded similar topologies with a high degree of congruence between parasite and host at the generic level. Species that parasitize *Aedes/Ochlerotatus* and *Culex* mosquitoes segregate into distinct monophyletic groupings mirroring their host phylogeny, while species from *Anopheles* mosquitoes group as a sister clade basal to the entire group of mosquito-parasitic microsporidia as their *Anopheles* hosts cluster as a sister clade to the entire group of culicine mosquitoes. This provides strong evidence for host-parasite coevolution by descent at the generic level and limited host lineage switching between unrelated taxa. Among parasites of *Aedes/Ochlerotatus* and *Anopheles* mosquitoes, we found several instances where a single mosquito species serves as a host for two or more related species of microsporidia, an observation consistent with host switching and independent parasite speciation. Among the microsporidian parasites of *Culex* mosquitoes, we found only one parasite per host indicating a higher degree of host specificity and less host switching among parasites of this genus. Findings suggest a degree of host-parasite co-speciation with host switching occurring occasionally when the "normal" host is unavailable in the aquatic ecosystem. Frequency of host switching seems to be occurring in proportion to host relatedness and does not cross generic boundaries in this system.

Studies on the Mosquito Culex pipiens

Scientists from Michigan State and the University of Wisconsin in collaboration with **Dr. Theodore Andreadis** and former Postdoctoral Scientist, **Dr. Shoaming Huang** analyzed the molecular genetic diversity in nine marker regions of five genes within the bacteriophage WO region of the *Wolbachia pipentis* strain *w*Pip genome from a population of *Culex pipiens* sampled in metropolitan Chicago, Illinois. From 166 blood fed females, 50 distinct genetic profiles of *w*Pip were identified. Rarefaction analysis suggested a maximum of 110 profiles out of a possible 512 predicted by combinations of the nine markers. A rank-abundance curve showed that few strains were common and most were rare. Multiple regression showed that markers associated with gene

Gp2d, encoding a partial putative capsid protein, were significantly associated with ancestry of individuals to form molestus or form pipiens, as determined by prior microsatellite allele frequency analysis. None of the other eight markers was associated with ancestry to either form nor to ancestry to *Cx. quinquefasciatus*. Logistic regression of host choice (mammal vs. avian) as revealed by previous blood meal analysis revealed that significantly fewer individuals that had fed on mammals had the Gp9a genetic marker (58.5%) compared to avian-fed individuals (88.1%). These data suggest that certain wPip molecular genetic types are associated with genetic substructuring in the *Cx. pipiens* complex of metropolitan Chicago, Illinois, and that the association extends to phenotypic variation related to host preference.

Studies on Insects of Economic Importance

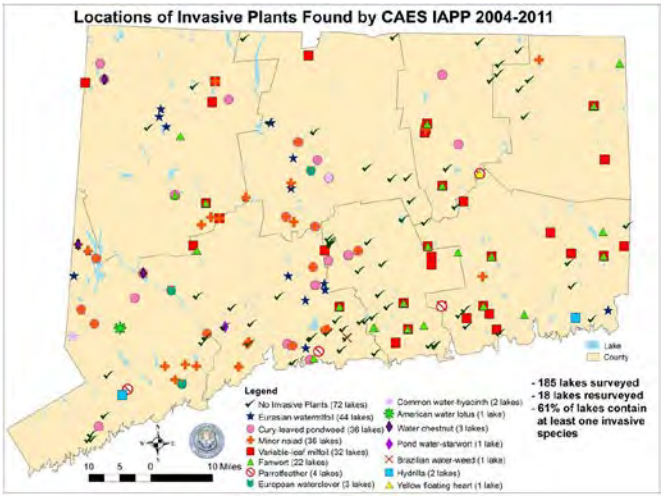
Severe losses are seen world-wide in the silk industry due to insect pathogens. **Dr. Charles Vossbrinck** has been working with members of the sericulture institute in Chongqing China to understand the source of Pébrine disease of the silk moth, *Bombyx mori*. A primitive, microscopic, protozoan-like organism, *Nosema bombycis*, is the causative agent of a disease that results in millions of dollars of losses in China. Population analysis is showing us that there are several sources of this disease and that the disease is incubating in other moth species in the environment and then infecting this highly domesticated insect. With further analysis we hope that the transmission of this disease to the silk moth can be better understood and that additional preventative measure can be taken. *Nosema bombycis* is a close relative of *Nosema ceranae*, thought to be involved in sudden hive collapse in honey bees in the United States and, therefore, another parasite of a domesticated insect causing millions of dollars in agricultural losses each year.

Invasive Aquatic Plant Program

Surveillance and Monitoring Program We are quantifying the locations of invasive aquatic plants in Connecticut's lakes and ponds, determining their effects on native plant communities, establishing baseline data to track their spread and providing information that is critical for developing control strategies.

In 2011, **Greg Bugbee, Mark June-Wells and Jordan Gibbons** mapped native and invasive aquatic vegetation in 15 new and nine previously surveyed water bodies. We now have complete aquatic vegetation surveys of 185 Connecticut lakes and ponds. To begin to discern how invasive plants are affecting plant community's overtime, we resurveyed six lakes that we did at least five years ago. In addition, Lake Candlewood, Connecticut's largest lake, was surveyed for the fifth consecutive year to determine the effects of alternate year deep and shallow winter drawdown on Eurasian watermilfoil (*Myriophyllum spicatum*), minor naiad (*Najas minor*), and curly leaf pondweed (*Potamogeton crispus*). Lake Lillinonah, Connecticut's third largest lake, was surveyed for the second time to track changes in the population of invasive species. We established transects in each water body, using global positioning systems to quantify changes in native and invasive aquatic species abundance and distribution. We

collected water samples from all water bodies and analyzed them 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. We archive dry specimens of all plant species in the CAES herbarium for future reference. We designed our Invasive Aquatic Plant Program to utilize the latest digital technology to rapidly and comprehensively report our findings to the public. Lake survey maps and other data are published online within days of their completion (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 Eurasian watermilfoil, Variable water milfoil (*M. heterophyllum)*, minor naiad*,* curly leaf pondweed *and fanwort (Cabomba caroliniana*). Less common invasive plants are water hyacinth (*Eichhornia crassipes*), water shamrock (*Marsilea quadrifolia*), hydrilla (*Hydrilla verticillata*) and water chestnut (*Trapa natans*). Our 2009 survey of Fence Rock Lake discovered Connecticut's first infestation of Brazilian waterweed (*Egeria densa*) and our resurveys in 2010 and 2011 found the population expanding (Figure 2). Our 2011 resurvey of Lake Lillinonah found a pioneer infestation of water chestnut (Figure 3). *This plant produces reproductive "nutlike" structures that have sharp spikes capable of piecing bare feet. A hand removal program is in place for 2012.* We are working with the local lake association and the Connecticut Department of Energy and Environmental Protection (CT DEEP) to provide control options.

Figure 2. Yearly progression of Brazilian waterweed in Fence Rock Lake, Guilford

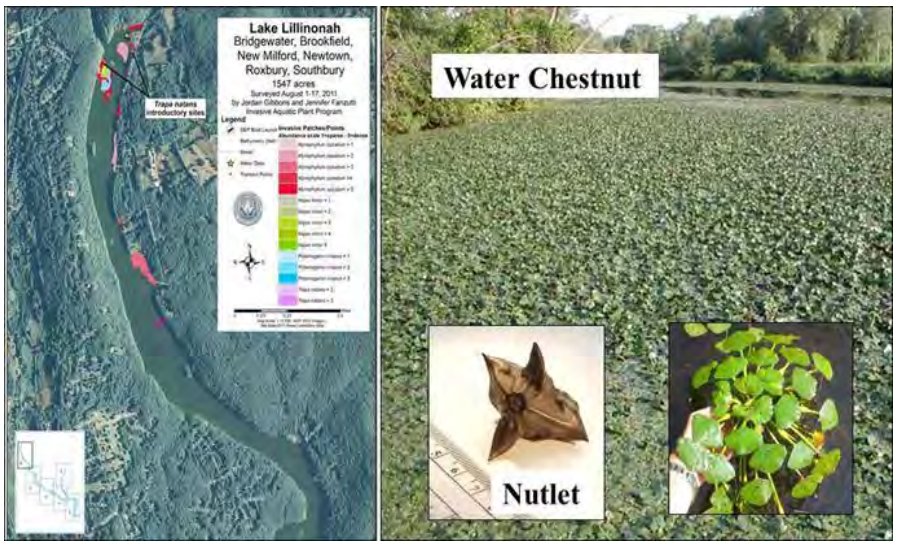


Figure 3. Locations of water chestnut found by CAES IAPP in Lake Lillinonah

Impact. Our surveys provide one of the most complete aquatic plant and water chemistry databases available. Using water chemistry and plant presence/absence data from 92 Connecticut lakes with invasive species, allowed us to developed risk assessment ranges for use by local resource managers and policy makers. Our multivariate statistical approach elucidated strong correlations among our five most abundant non-native aquatic plant species and the lake water chemistry. This approach allowed us to group lakes by species presence. We found invasive aquatic plants occurred in two distinct groups: 1) fanwort and variable watermilfoil and 2) curly leaf pondweed, minor naiad, and Eurasian watermilfoil. We then compared whether the occurrence of each group was based on water chemistry. Our analysis detected highly significant differences among groups. The fanwort and variable watermilfoil group preferred lakes with lower conductivity, alkalinity, and pH than the curly leaf pondweed, minor naiad, and Eurasian watermilfoil group. Finally, we developed a mathematical model based on lake water chemistry that can predict which lakes will contain the five invasive species with nearly 80 percent accuracy.

To prevent the spread of invasive species, Connecticut has enacted laws banning the sale and transport of 20 invasive aquatic plants. CAES IAPP evaluated aquarium retailer compliance with these laws. In 2008 and 2010, we visited 75 aquarium aquatic plant dealers. We purchased plants that looked like a banned species and brought them back to the lab for positive identification. Because we could not conclusively identify many specimens, we obtained their genetic sequences and compared them to known sequences in the GENBANK NCBI database. We found that 30% of the stores were selling banned aquatic species and that fanwort was the most common banned species being sold (Table 1). Moreover, Brazilian waterweed and various watermilfoil species were mislabeled by the retailer more than 50% of the time. We believe that this noncompliance to State law is primarily due to difficulties in identifying aquatic plant species and ignorance of state statutes. In 2011, CAES IAPP followed up and revisited the 75 retailers and provided information on state laws, copies of the CAES IAPP Invasive Aquatic Plant Identification Guide and offered education seminars. In addition, our work has provided

valuable information to the CT Department of Agriculture and the CT Department of Energy andEnvironmental Protection, who are charged with inspecting aquarium retailers and enforcing the State laws.

Table 1. Connecticut pet stores selling banned invasive aquatic macrophytes in 2008 and 2010.

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

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.

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

Bashan Lake – East Haddam, CT - We are in the 12th year of research involving the use of spot applications of the herbicide 2, 4-D to control variable milfoil in Bashan Lake. We have largely restored the lake to preinfestation conditions; however, regrowth requires yearly surveys and modest retreatments. 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 variable watermilfoil.

Crystal Lake- Middletown, CT. Crystal Lake has extensive growth of curly leaf pondweed and Eurasian watermilfoil. From 2006-2011, we tested the effectiveness of single year and consecutive year applications of the applications of the herbicide diquat dibromide. Because of the presence of the State threatened plant species Vasey's pondweed (Potamogeton vaseyi), certain areas of the lake needed to be protected with limnobarriers. In late April 2007, the first

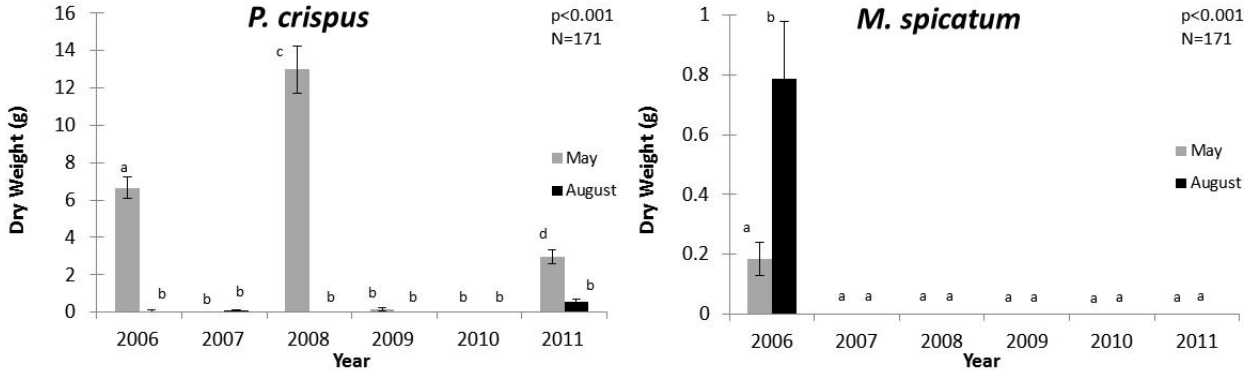


Figure 4. Response of Curly leaf pondweed (left) and Eurasian watermilfoil (right) to Diquat in Crystal Lake.

treatment with diquat dibromide was applied. After several weeks, the unwanted vegetation was controlled. By late summer, re-growth of curly leaf pondweed had begun but Eurasian milfoil did not return. This trend continued in the non-treatment year of 2008 with re-growth of the curly leaf pondweed to pretreatment levels but no re-growth of the Eurasian watermilfoil (Figure 4). This near complete elimination of Eurasian watermilfoil by the April diquat treatment may be a new tool for controlling this plant but further study is needed. In 2008, a survey for Vasey's pondweed by CT DEEP found that the plant was growing well. Eight species of native plants were found the year after treatment compared to only four the year prior to treatment. 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 requires reducing its bank of reproductive structures in the sediment called turions through treatments in consecutive years. We made early season diquat applications in 2009 and 2010 to test this theory. Again, limnobarriers were installed and plant populations were monitored. Two consecutive years of Diquat treatment in 2009 and 2010 provide better control of curly leaf pondweed one year later (2011) than only one year treatment in 2007. Unfortunately, a substantial amount of curly leaf pondweed remained and rapid reinfestation to pretreatment levels can be expected in coming years. This research suggests that curly leaf pondweed is a very tenacious plant and reducing its population to acceptable levels for more than one year will require more than two consecutive years of treatment.

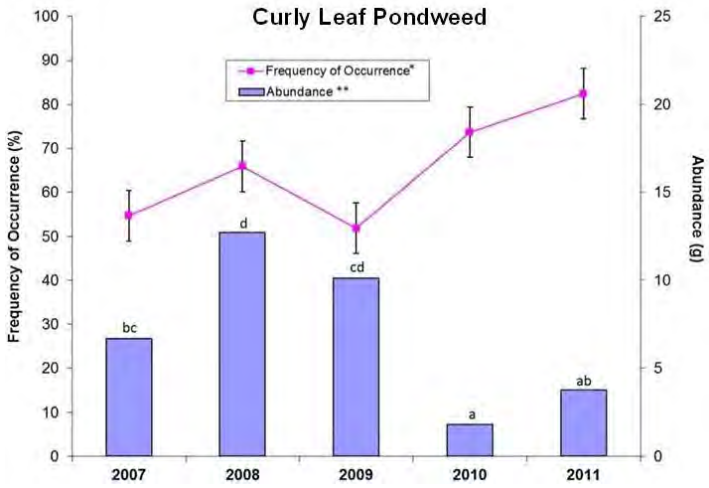


Figure 5. Effects of grass carp on the abundance and frequency of curly leaf pondweed in Grannis Lake.

Biological control **-** Our biological control program has now been in progress for four years. This year's efforts followed two lines of investigation.

<u>*Grannis Lake- East Haven, CT*</u>. 2011 was our seventh year of study at Grannis Lake, East Haven which has problems with Eurasian water milfoil, curly leaf pondweed and minor naiad. After many years of unsuccessful attempts to control the invasive species with herbicides, we introduced plant-eating fish called grass carp (*Ctenopharyngodon idella*) in 2007. A total of 200 sterile (triploid) fish averaging 25 cm (10 inch) in length were introduced into the 20-acre lake. We monitored more than 200 georeferenced sites in the lake to determine 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 5). Interestingly, the frequency of occurrence has not yet been reduced and suggesting that the fish are consuming the suspended vegetation without any appreciable reduction in basal plant parts. In 2011, the abundance of curly leaf pond weed and other invasive species began to rise again probably due to the aging and natural mortality

of the grass carp population. We expect to restock Grannis Lake, in 2012, in conformance with CT DEEP guidelines.

Candlewood Lake - Brookfield, New Fairfield, New Milford, Sherman, CT. We have continued research on controlling Eurasian watermilfoil with milfoil weevils (*Euhrychiopsis lecontei*). This insect has controlled Eurasian watermilfoil in other states and is native in Connecticut. Unfortunately, weevil populations in CT are rarely high enough to cause a significant reduction in milfoil. Our research, in collaboration with Western Connecticut State University (WSCU), the Candlewood Lake Authority and EnviroScience, Inc., is determining if augmenting milfoil weevil populations might lead to suppression of Eurasian watermilfoil. Although Candlewood Lake contains over 350 acres of Eurasian watermilfoil, milfoil weevils are nearly nonexistent. In June 2010, 5,000 weevils were stocked into site F (Figure 6) and 11,000 weevils were stocked in site G. Site F had received a preliminary weevil introduction in 2008. In June 2011, 9,000 weevils were restocked into site G. Weevils and damage were monitored in the sites each August. We found no evidence the weevil populations are increasing but realize this may take many years.

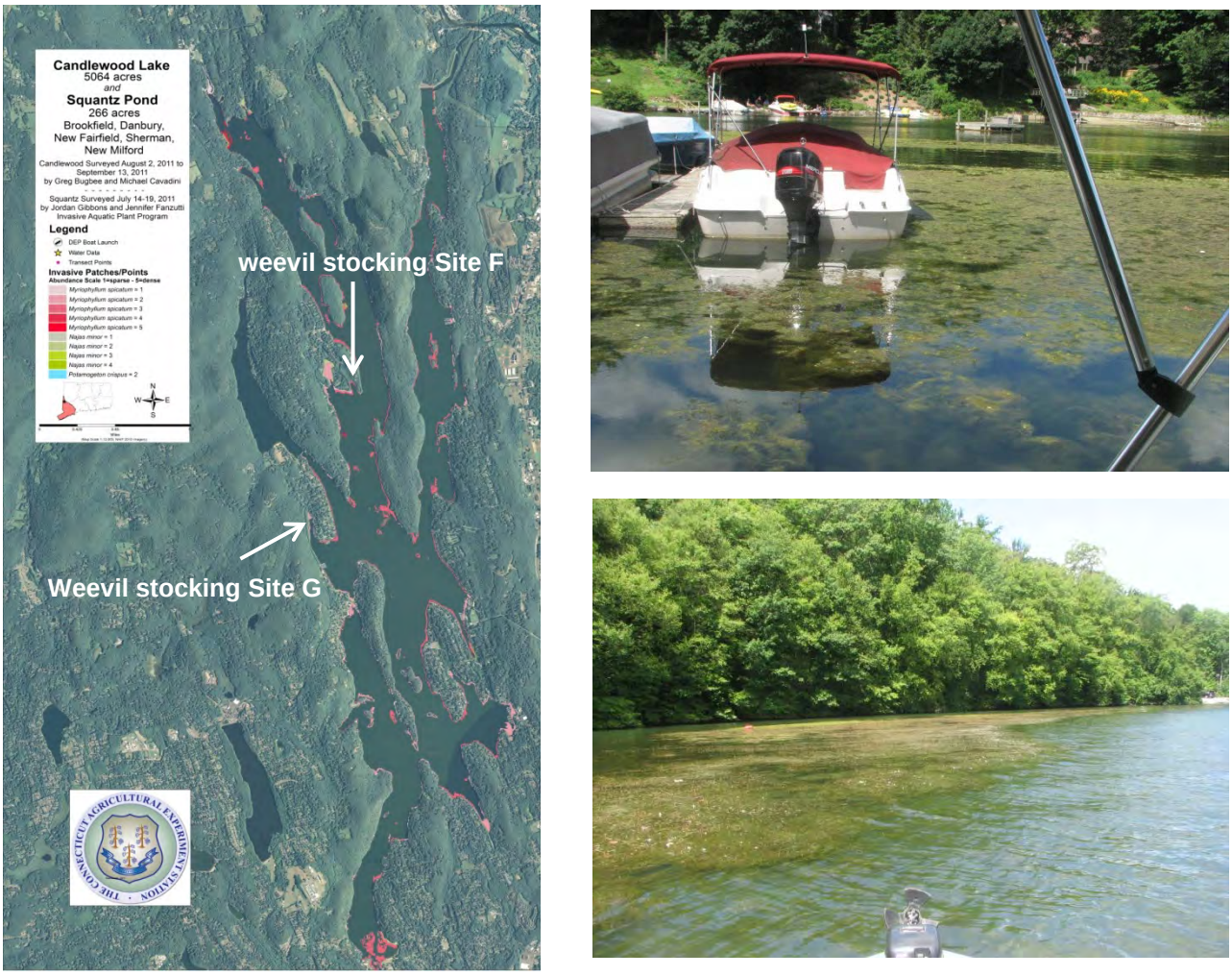


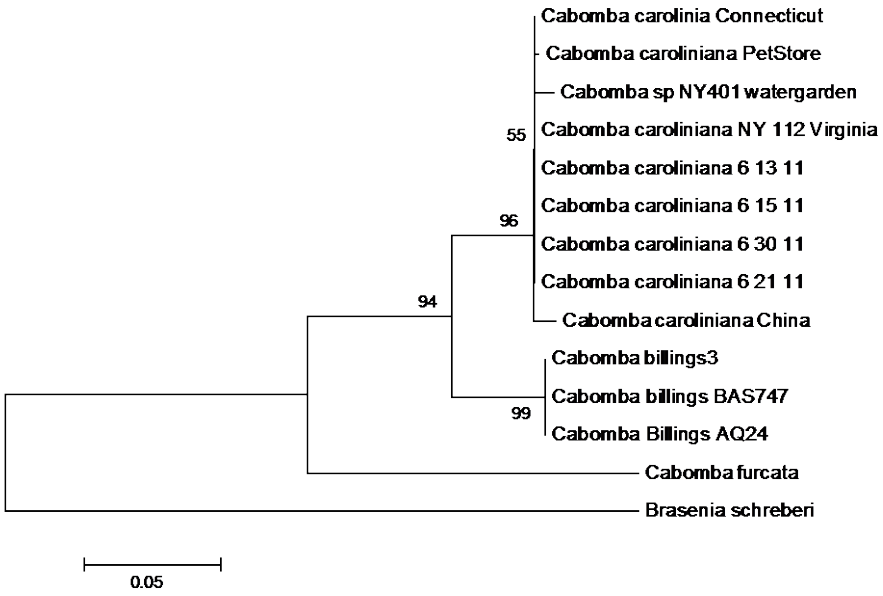
Figure 6. Stocking sites for milfoil weevils in Candlewood Lake (left). Eurasian milfoil problem in Candlewood Lake (top right). Milfoil weevil stocking site G in Candlewood Lake (bottom right).

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 or electronic copy via our website (http://www.ct.gov/caes/IAPP). Included are all our digitized interactive lake maps and our complete herbarium. We also gave 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.

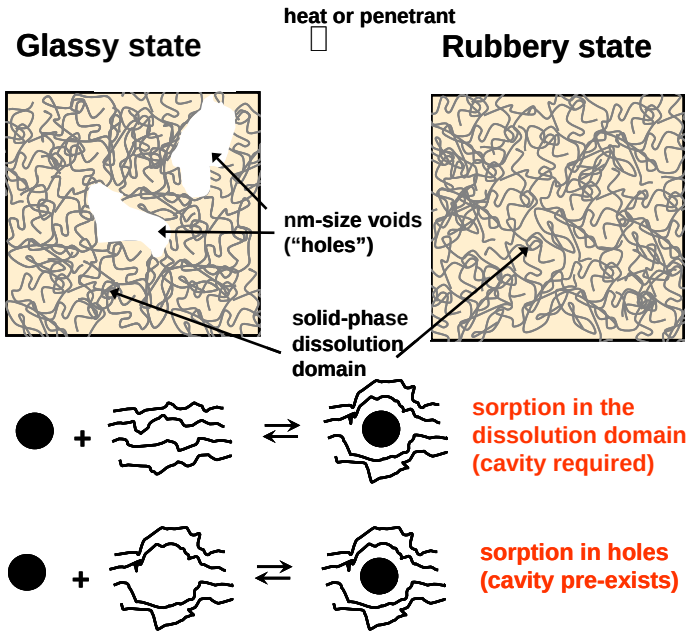
Molecular Identification of Invasive Aquatic Plants.

The molecular database for aquatic plants in Connecticut has yielded some important results. DNA sequencing by **Dr. Charles Vossbrinck** and **Kittipath Prapayotin-Riveros** gives researchers a much more detailed view of aquatic plant life. As a result, we were able to see that a separate form of the invasive *Cabomba caroliniana* (Fanwort) is indeed a separate source of invasion in Connecticut and is the predominant form in Billings Lake, Connecticut. A phylogenetic analysis of the DNA sequence data shows these samples to be different genetically and unlike the isolates generally found in the Eastern US. Being able to see life forms using "molecular glasses" allows us to follow changes in our environment that are hard to imagine until we see these detailed results.



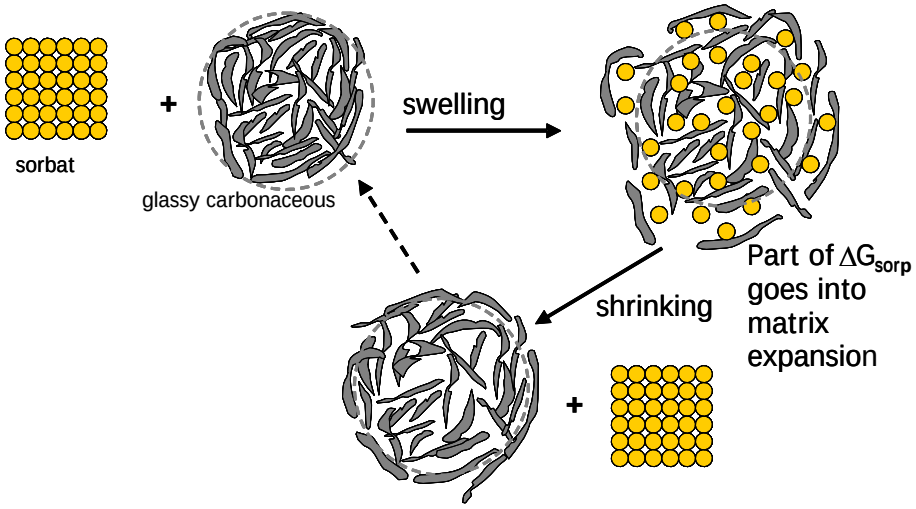
Dynamic interactions of natural organic matter and organic compounds.

Due to the importance of natural organic matter (NOM) to the fate of organic compounds, their adsorptive interactions with NOM have been studied extensively over the past few decades. Quantitative relationships have been probed between the intensity of sorption and both the molecular structure of the sorbate and the bulk physical-chemical properties of the sorbent. However, studies addressing the molecular-level nature of sorptive interactions of organic compounds with NOM have been far fewer in number due to the intrinsic difficulties of detecting and sorting out the interactions in such a heterogeneous material. Historically, NOM has been regarded as a passive sorbent, accepting molecules from the liquid and gaseous phases without undergoing change. So far, little attention has been paid to the



Depiction of glassy and rubbery states showing the holes in the glassy phase and depiction of sorption in the dissolution domain, where a cavity has to open up, and sorption in the hole domain where the cavity preexists.

matrix dynamics of the solid phase during sorption. **Dr. Joseph Pignatello** has shown that sorption is a dynamic process, both for the sorbing compound, which transfers from the fluid state to a solid state, and for the sorbent itself, which undergoes physical changes upon sorption. In this sense, sorbate and sorbent co-evolve during the process of sorption. NOM can be regarded as a polymer-like phase that responds to the input of organic compounds in ways analogous to synthetic polymers. Sorption selectivity of organic compounds is shown to result in part from the three-dimensional microstructure of NOM related to its glassy character. Sorption to NOM conforms to polymer theory by exhibiting isotherm shape and irreversible behaviors characteristic of the glassy organic physical state. The glassy state is a metastable state characterized by the presence of excess free volume (holes). In polymers and NOM, incoming molecules preferentially occupy holes due to the absence of a cavitation penalty. Incoming molecules can enlarge existing holes and create new holes. The physical changes in NOM induced by sorption result in hysteresis in the isotherm that persists indefinitely at ambient temperature. Sorption selectivity and hysteresis have important implications for the fate and bioavailability of contaminants.



Drawing showing the conditioning effect of a sorbing compound ("sorbate") on a glassy macromolecular solid, such as natural organic matter. The solid swells and then shrinks as the sorbate enters and then leaves the solid. The dashed line indicates the dimensions of the volume element of the original solid. The component of the sorption free energy that is invested in swelling expansion is not fully recovered upon desorption. The swelling-shrinking process would be fully reversible if the solid was initially rubbery.

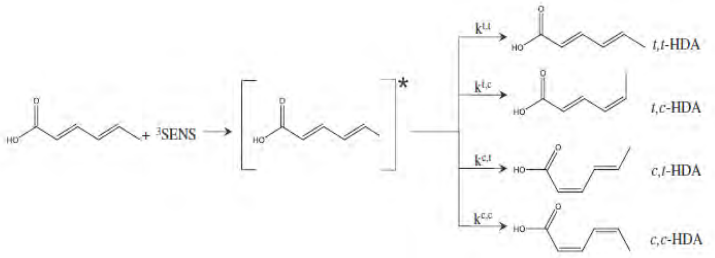
Advanced Solid-state NMR Characterization of Marine Dissolved Organic Matter Isolated Using the Coupled Reverse Osmosis/Electrodialysis Method

The marine organic carbon pool is one of the largest dynamic reservoirs of organic carbon on earth, comparable in size to that of atmospheric carbon. Dissolved organic matter (DOM) comprises most of marine organic carbon. Although significant progress has been made in understanding the origin,

composition, and cycling of marine DOM, a large fraction of it is still poorly characterized. Progress in the understanding of the chemical structures of DOM has been impeded by (1) the lack of a suitable method for its isolation, and (2) its intrinsic chemical complexity. The recently-developed coupled reverse osmosis/electrodialysis (RO/ED) method shows great promise as a solution to the problem of representativeness because this method can collect 70-85% of total dissolved organic carbon from seawater. Advanced ^{13}C solid-state techniques were employed to investigate the major structural characteristics of two surface-seawater dissolved organic matter (DOM) samples isolated using the novel RO/ED method. The NMR techniques included quantitative ^{13}C direct polarization/magic angle spinning (DP/MAS) and DP/MAS with recoupled dipolar dephasing, ^{13}C cross polarization/total sideband suppression (CP/TOSS), ^{13}C chemical shift anisotropy filter, CH, CH_2, and CH_n selection, two-dimensional ^{1}H-^{13}C heteronuclear correlation NMR (2D HETCOR), 2D HETCOR combined with dipolar dephasing, and ^{15}N cross polarization/magic angle spinning (CP/MAS). The two samples (Coastal and Marine DOM) were collected at the mouth of the Ogeechee River and in the Gulf Stream, respectively. The NMR results indicated that they were structurally distinct. Coastal DOM contained significantly more aromatic and carbonyl carbons, whereas Marine DOM was markedly enriched in alkoxy carbon (e.g., carbohydrate-like moieties). Both samples contained significant amide N, but Coastal DOM had nitrogen bonded to aromatic carbons. Our dipolar-dephased spectra indicated that a large fraction of alkoxy carbons were not protonated. The major structural units of Coastal DOM were carbohydrate-like moieties, residues of lignin and peptides; those of Marine DOM were primarily carbohydrate-like moieties and peptides. In addition, both samples contained significant amounts of nonpolar alkyl groups. The potential sources of the major structural units of DOM were discussed in detail.

Sorbic acid as a quantitative probe for the formation, scavenging and steady-state concentrations of the triplet-excited state of organic compounds

Dissolved natural organic matter (NOM) in both fresh and saline waters acts as a photosensitizer for sunlight-driven photochemical reactions of chemical contaminants, as well NOM itself. Photon absorption by a photosensitizer produces an excited singlet state (S_1) that can relax to the ground state or undergo intersystem crossing (isc) to an excited triplet state (T_1). The T_1 state can relax to the ground state, undergo reaction with other molecules, or generate secondary photo-oxidants—typically, reactive oxygen species such as hydroxyl radical or singlet oxygen—that may subsequently react with other molecules. Methods that can determine T_1 steady-state concentrations and reaction rate constants with organic compounds are unavailable. In this study, 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 T_1 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 sorbic acid probe

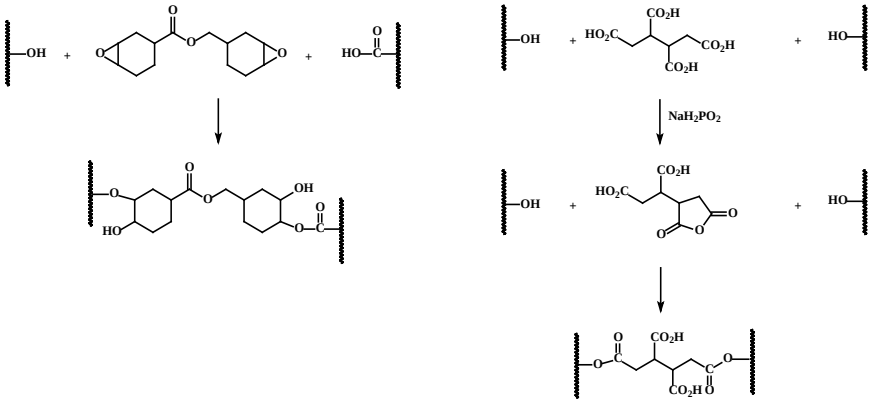


Products of interaction between triplet-excited state organic photosensitizer and sorbic acid

method does not require knowledge of the optical properties of T_1 states to monitor their quenching. Moreover, it permits simultaneous quantification of triplet formation, quenching and steady-state concentrations during illumination of complex chromophore mixtures, such as NOM, with polychromatic light above 315 nm. Application of the method to de-aerated Suwannee River NOM illuminated with polychromatic light (315-430 nm) resulted in a triplet quantum yield of 0.062.

Preparation and Characterization of Humic Acid Cross-linked with Organic Bridging Groups

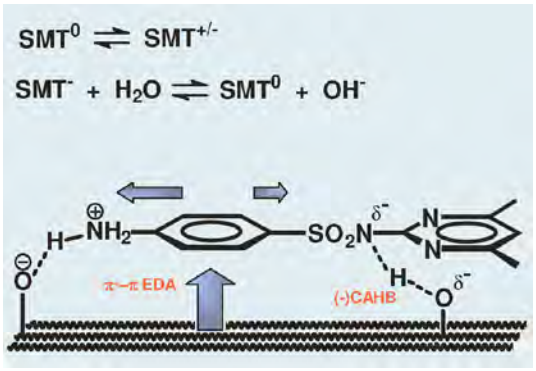
Cross-links are bonds that connect strands of different molecules in a macromolecular or supramolecular solid. Cross-linking is believed to play a role in the humification of soil/sediment organic matter (SOM) and the diagenesis of organic geopolymers. Experience with synthetic polymers shows that cross-linking increases molecular weight, creates network structures, reduces solubility, inhibits biodegradation, increases matrix rigidity, decreases free volume, and influences the sorbent properties of the solid towards organic. Such changes may be important to the ecological function of humic substances, yet the role of crosslinking in these substances has been poorly investigated. Model cross-linked humic substances were prepared by cross-linking Amherst soil humic acid by a diepoxide and a polycarboxylic acid, 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 and the physic-chemical properties and ecological function of organic matter in geosolids.



Cross-linking by (left) the diepoxide DE, and (right) the polycarboxylic acid BTCA mediated by phosphite. The -OH and -CO_2H groups are attached to neighboring strands of humic molecules in the solid state. As an example of a dehydration intermediate, the anhydride of BTCA is shown.

Speciation of the Ionizable Antibiotic Sulfamethazine on Black Carbon (Biochar)

Interaction of sulfamethazine (SMT) with the black carbon surface

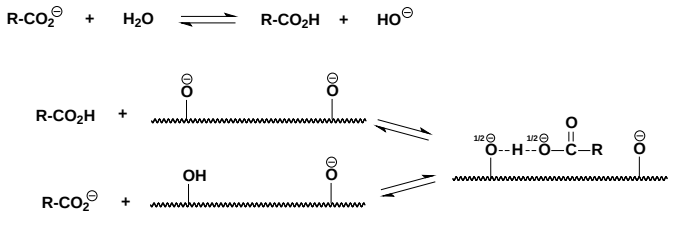


Sulfonamide antibiotics are widely used in veterinary medicine to promote growth and control infectious diseases. Since they are poorly metabolized, a large fraction is deposited onto soils from grazing and manure application. At field concentrations, antibiotics impact soil microbial communities and functions, and may contribute to the proliferation of antibiotic resistant bacterial pathogens. Sorption is a critical process controlling the mobility and bioavailability of sulfonamide antibiotics in soil. The subject of our report is sulfamethazine (SMT; 4-amino-N-[4,6-dimethyl-2-pyrimidinyl]-benzenesulfonamide), a sulfonamide antibiotic, a heavily used swine antibiotic in the U.S. and European Union. Sorption of sulfonamides by whole soils, soil minerals, and dissolved organic matter has been studied, but reports are absent on sorption of these compounds to black carbon, an important component of the soil carbon pool and a form of which (biochar) is proposed as a soil amendment. Adsorption by black carbon of ionizable compounds, a class that includes sulfamethazine, is poorly characterized in general. Adsorption of the veterinary antibiotic sulfamethazine (SMT; a.k.a., sulfadimidine; 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^{-1}, up to 10^4 times greater than literature-reported 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 dissolved state.

Adsorption of Aromatic Carboxylate Ions to Charcoal Black Carbon is Accompanied by Proton Exchange with Water

The carboxylic acid functional group is abundant in natural soil organic matter and is present in the molecular structures of many natural and synthetic compounds released to soil, including plant exudates,

natural signaling chemicals between rhizosphere species, pesticides, and environmental contaminants. Charcoal black carbon is a component of the soil carbon pool as a result of forest fires and deliberate burning practices. In addition, interest has emerged in the application of engineered charcoal from biomass waste, known as biochar, to agricultural and forest lands for its potential benefits to soil quality and for its carbon sequestration value. The effects of natural or added charcoal on chemical and biological processes in the rhizosphere are mostly uncharacterized. A potentially critical property of charcoal with respect to these processes is its surface activity as an adsorbent. The adsorbent strength of charcoal towards organic compounds is a function of the biomass precursor, charring conditions (time and temperature profile, oxygen concentration), degree of post-charring weathering, and other factors that dictate specific surface area, microporosity, and surface chemistry of the final material. Depending on these factors and abundance in soil, charcoal may contribute substantially to sorption, and therefore reduce the physical mobility and biological availability of contaminants, as well as the above-mentioned natural compound classes. **Dr. Joseph Pignatello** examined the adsorption of the allelopathic aromatic acids (AA), cinnamic and coumaric, to different charcoals (biochars) as part of a study on bioavailability of natural signaling chemicals in soil. Sorption 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 sorption 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. Sorption 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, we suggest AA engages in a type of hydrogen bond recognized to be of unusual strength with a surface carboxylate or phenolate group having a comparable pK_a. This bond is depicted as $[RCO_2\cdots H\cdots O\text{-surf}]^-$. 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.



Proposed mechanism for interaction of organic acid anions with carboxyl or phenoxyl functional groups on the surfaces of black carbon

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 suggestions made by staff members at 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.

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. These savings are passed on to the consumer.

The development of a network of farmers' markets in Connecticut's major urban centers and densely populated suburbs is an important segment of direct sales of vegetables to consumers. All produce sold at farmers' markets must be "Connecticut Grown". Farm fresh produce is offered at reasonable prices to urbanites who cannot travel to the farms. Niche crops valued by diverse ethnic groups are generally sold at these markets. According to the Connecticut Department of Agriculture, there were 125 farmers' markets in 2011, attended by over 400 farmers compared to 87 markets in 2007, a 52% 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 2011, 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 23.2 T/A compared to 19.4 T/A at Lockwood Farm (loamy upland soil).

Impact: Joi Choi (32.2 T/A) and Win Win Choi (28.6 T/A) had the greatest yields. At a retail price of $0.99/lb, there is a potential crop value of $63,756/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. 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 currently include pak choi in at their farms.

Sweet Potato Trials: A 1998 Connecticut Department of Agriculture survey showed that sweet potato is one of the most popular specialty vegetables. In the South, the sweet potato is also called yam, but both are identical species. In the United States, North Carolina and Louisiana are the leading producers, but we have found that they can easily be grown in Connecticut. This crop has both a high market value and an expanding market. In addition, it is very nutritious, with high values of beta carotene (vitamin A) and vitamin C. In 2011, Dr. Maynard evaluated 6 cultivars that have short maturities (90 days) at Windsor and Lockwood Farm.

Impact: Beauregard and O'Henry averaged the greatest yields (3.8 lbs/plant) with Jewels averaging 3.5 lbs/plant. At a retail price of $0.79/lb, there is a potential crop value of $43,589/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 healthy food item. In 2011, Dr. Maynard evaluated 11cultivars of edamame for yield and quality at Windsor and Lockwood Farm.

Impact: The cultivar Sunrise had the greatest yield (1.3 lbs pods/plant) with Mojo Green averaging 1.2 lbs pods/plant . At a retail price of $2.49/lb, there is potential crop value of over $47,000/acre. By growing the cultivar Sunrise instead of the cultivar Beer Friend, the grower can potentially produce almost 13,000 more pounds per acre or gross almost $32,000 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 typical predominant market for pumpkins is for jack-o'-lantern types (12 lbs to 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 2011, Dr. Maynard evaluated the yield and quality of 12 varieties of specialty pumpkins at Windsor and Lockwood Farm.

Impact: Apprentice (9.1 fruit/plant), Jack Be Little (7.2 fruit/plant), Gooligan (6.7 fruit/plant), and Baby Bear (6.5 fruit/plant) had the greatest yields. At a retail price of $1.00/pumpkin, there is a potential crop value of $33,033/acre. By growing the cultivar Apprentice instead of the cultivar Wee-B-Little, the grower can potentially produce almost 30,000 more pumpkins per acre or gross almost $30,000 more per 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 groups based on fruit shape and color. The first group, and 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 group 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 2011, Dr. Maynard evaluated 10 varieties of specialty eggplants on yield and quality at Windsor and Lockwood Farm.

Impact: Hansel (19 lbs/plant), Calliope (16 lbs/plant), and Fairy Tale (15 lbs/plant) had the greatest yields. At a retail price of $1.49/lb, there is a potential crop value of $102,765/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 $95,000/acre. Forty-six percent of Connecticut vegetable farmers responding to our survey are now growing some of these specialty eggplant cultivars. 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.

Specialty Pepper Trials: Specialty peppers include both hot and sweet varieties of unusual shape, size, or color. Colored peppers have extra flavor, nutrition, and aesthetic appeal, and therefore command a higher market price. Most colored peppers are obtained by leaving the fruits on the bush until they reach mature color (e.g., red, yellow, orange). Others, such as banana pepper, are pale yellow even when immature. Green bell peppers are high in vitamin C (one medium green bell pepper contains 177 percent of the RDA for vitamin C). As they mature and sweeten (turn color), the vitamin A content rises 9-fold while the vitamin C content doubles. In 2011, Dr. Maynard evaluated 10 varieties of specialty peppers on yield and quality at Windsor and Lockwood Farm.

Impact: Early Sunsation (yellow) had the greatest yields (8.8 lbs/plant) followed by Chablis Hybrid (red) (8.4 lbs/plant) and Lilac Hybrid (Lavender) (7.7 lbs/plant). At a retail price of $2.49/lb, there is a potential crop value of $119,311/acre. The long-term benefits of growing specialty peppers include an additional product and revenue for growers who attend farmers markets or have their own roadside stands. In addition, there may be health benefits for those who consume colored bell peppers. Sixty-eight percent of Connecticut vegetable farmers responding to our survey are now growing specialty peppers.

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 1994-2010 and incorporated into the soil by rototilling. In 2011, 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. Lettuce yields from plots amended with maple leaves had the greatest yields (1.6 lbs/head) compared to yields from the plots amended with oak leaves (1.1 lbs/head) and the unamended control plots (1.0 lbs/head). The greatest eggplant yields were from plots amended with oak leaves (15.5 lbs/plant) followed by plots amended with maple leaves (15.1 lbs/plant) and the unamended control plots (14.3 lbs/plant). The greatest onion yields were from the plots amended with oak leaves (8.6 lbs/10 ft row)

followed by the control plots (7.9 lbs/10 ft row) and plots amended with maple leaves (6.6 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.

REDUCING ANIMAL DAMAGE

Rabbit Repellent Trial: 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. 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. Then in 2012, a repellent manufacturing company sponsored an eastern cottontail (*Sylvilagus floridanus*) repellent trial. A captive cottontail population was established and 8 different commercially available repellents are actively being tested on various species of lettuce, Johnny jump-ups (*Viola tricolor*), and alfalfa (*Medicago sativa*) against plants receiving no treatment and those protected by a fence. Results will be available at the end of the 2012 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. However, rabbit damage to the growing industry has yet to be quantified, but is likely significant as well as a costly frustration to the recreational gardening public. Formulations to limit rabbit damage are often marketed as limiting deer damage as well and their usage could limit Connecticut 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 for the second and final year of the study. 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. In 2010, 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. In fall 2011, 4 fawns were hard-released and 6 were soft-released. All 4 hard release fawns were dead within 4 days and 2 soft-release fawns are alive nearly 1 year after release. 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 provides too much human contact, imprinting fawns on humans, and ultimately resulting in near full domestication. Releasing them into the wild as domesticated stock incurs a survival rate of nearly 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.

INVASIVE PLANT 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 Infestations Serve as a Refuge for Blacklegged Ticks: In many Connecticut forests with an overabundance of white-tailed deer (*Odocoileus virginianus*), Japanese barberry (*Berberis thunbergii*) has become the dominant understory shrub. This exotic invasive plant 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 1,691 white-footed mice captures. 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 (6.0 larvae/mouse). Adult tick densities in dense barberry (207/acre) were higher than in both controlled barberry (90/acre) and no barberry (43/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 133 *B. burgdorferi*-infected ticks/acre in dense barberry, 55/acre where barberry was controlled, and 22/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, 2011, again in 2012 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 2008-2011 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 2012 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.

RESTORING NATIVE VEGETATION

A crucial first step in restoration of natural areas is eradication or control of invasive species. However, regulations (e.g., drinking water supply watersheds, local ordinances), deeds, or active public opposition can severely limit herbicide application as a management option to control

invasives species on some properties. In the absence of an effective biological control agent, options to control invasives without synthetic herbicides are limited to mechanical methods, fire, and organic herbicides. The paucity of reported research on the efficacy, or lack of efficacy, of options other than synthetic herbicides for many invasive species can result in managers implementing control strategies that are not effective. Investing limited resources in non-effective control efforts can be frustrating and lead to the erroneous conclusion that any control effort is a futile exercise.

Deer Browse Exclosure Study: One method to study the impact of deer on natural ecosystems is to compare growth rates and species diversity of vegetation protected from white-tailed deer (*Odocoileus virginianus*) browse to unprotected plots. **Drs. Williams** and **Ward** are collecting vegetation data within sixteen deer exclosures and sixteen adjacent control plots throughout the state. Deer exclosures prevent deer from accessing vegetation within. Growth rates and species diversity of enclosed vegetation are compared with that of an adjacent control plot, where deer have access to vegetation. The project is a collaborative effort with The Nature Conservancy to maintain and sample twelve deer exclosures (and adjacent control plots), at Burnham Brook Preserve in East Haddam, the Bingham Easement in Salem, and Devil's Den Preserve in Weston. We are also including four of our own exclosures on South Central Connecticut Regional Water Authority property in North Branford. Plots have been sampled for herbaceous species cover in the spring of 2006, 2007, 2008, 2009, 2010, 2011, and 2012. Late summer sampling was conducted in 2005, 2006, 2007, 2008, 2009, 2010, and 2011 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 2012. 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.

Japanese barberry: 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 begun in 2006. This research both evaluated the effectiveness and relative costs among treatment combinations to control Japanese barberry, and by monitoring individual clumps across a range of size classes, assessed whether treatment prescriptions are dependent on clump size. The barberry control study now includes 149 plots at 28 study areas that has examined 55 treatment/timing options. This year, we will highlight a study that examined the long-term effectiveness of treating Japanese barberry and the impact of those treatments on other plant species.

Beginning in 2007, the effectiveness of various alternative treatments to reduce barberry cover, including a two-step process, was examined at eight study areas over 4-5 years. Prescribed burning and mechanical mowing by wood shredder or brush saw were utilized as initial treatments to reduce the above-ground portion of established barberry. All initial treatments were equally effective in reducing barberry cover. However, without a follow-up treatment, barberry had recovered to 56-81% of pretreatment levels 50-62 months after initial treatment. Follow-up treatments in mid-summer to kill new sprouts included foliar application of triclopyr or glyphosate, directed heating, and untreated controls. Relative to untreated controls, areas with follow-up treatments had lower barberry cover 50-62 months after initial treatment, 75% and 17% cover, respectively. All follow-up treatments were equally effective although the labor cost of directed heating was at least four times higher than for foliar herbicide applications. Follow-up treatment type (directed heating vs. herbicide) had minimal impact on species other than barberry. While deer browsing did not have an impact on barberry cover, areas protected from browse damage had higher cover of Oriental bittersweet (Celastrus orbiculatus), multiflora rose (Rosa multiflora), and total non-natives. Areas protected from deer browsing had lower cover of native grasses and ferns. Excellent reduction of Japanese barberry cover can be achieved using either propane torches or herbicides as follow-up treatments in a two-step process, but other invasive plants may become a problem when barberry is removed if deer populations are low.

Japanese stiltgrass: Another species that has become a serious invasive plant in the eastern United States, including southern New England, is Japanese stiltgrass (*Microstegium vimineum* (Trin.) A. Camus). Stiltgrass is an annual grass species native to eastern Asia that is now found in Connecticut and at least twenty-seven other states from Florida to Texas, north to Illinois, and east to Massachusetts. USDA Forest Service lists stiltgrass as one of the worst thirty-three invasive plants of southern forests. Depressed native plant populations associated with stiltgrass infestations may be the result of direct competition for resources or allelopathic effects. Dead stiltgrass stems do not decompose readily and the layer that is left behind after each growing season can form dense thatch that prevents native plant seedlings from emerging. Stiltgrass can also alter soil biota and chemistry. The biotic and abiotic changes caused by stiltgrass have a direct impact on habitat quality for wildlife, birds, and pollinators that are adapted to native plant species. Lastly, stiltgrass alters the aesthetic characteristic of infested forests and may have an impact on public perception and utilization of parks and preserves.

Drs. Jeffrey Ward and Todd Mervosh (Valley Laboratory) compared the efficacy of herbicides and non-chemical options found effective for controlling stiltgrass in earlier studies with organic herbicides and with herbicides used at reduced rates in a wooded floodplain along the lower Connecticut River. They compared the impact of two years of conventional and alternative treatments on cover of other non-native species and on native species. Four blocks of eighteen 3 by 4-m plots were established in May 2008. Treatments included directed heating with a propane torch (June, July), hand-pulling (July), mowing with a string trimmer (July, August), and foliar applications of household vinegar [5% acetic acid] (June, July) and the herbicides imazapic (June), pelargonic acid (June, July), and pelargonic acid plus pendimethalin (June). The following herbicides were applied at labeled doses and at one-fourth labeled doses: fenoxaprop-p-ethyl (July), glufosinate (August), and glyphosate (August). Stiltgrass cover and height were evaluated periodically, and plant samples were collected in autumn of 2008 and 2009 to determine the number of viable seeds produced. Final evaluations were taken in June 2010 after two years of treatment.

Stiltgrass cover averaged 88% on untreated plots in fall of all years. All treatments reduced stiltgrass coverage and seed production. The least effective treatments were hand-pulling, pelargonic acid, and vinegar in July. Direct heating, mowing, and vinegar in June reduced seed production by more than 90%. All treatments containing imazapic, pelargonic acid plus pendimethalin, fenoxaprop-p-ethyl, glufosinate, and glyphosate completely prevented stiltgrass seed production in the second year of treatment. Based on this study, Japanese stiltgrass can be effectively controlled over a two-year period with a variety of herbicides, including at one-fourth labeled dose, and non-chemical treatments. Use of herbicides at low doses might minimize public opposition while providing effective control and reducing environmental impact. Control of Japanese stiltgrass can be achieved without herbicides, but non-chemical methods will require additional time and labor costs.

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. The CT Department of Energy and Environmental Protection, 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 of an invasive 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).

REHABILITATING POORLY STOCKED FORESTS

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.

Poorly stocked stands have too few trees to fully utilize available growing space; resulting in low productivity, including carbon sequestration, compared with fully stocked stands. In addition, poorly stocked oak forests generally have trees of less desired species with lower quality stems and irregular stand structures that are logistically difficult to manage. Poorly stocked stands are a common problem across a broad geographical extent - occupying more than 200,000 acres in Connecticut and 660,000 acres in southern New England. Across a wider region encompassing New England, New York, New Jersey, and Pennsylvania, 3.0 of 18.9 million acres of oak forests are poorly stocked. There are an additional 7.5 million acres of moderately stocked oak forests in

the region that are one harvest away from becoming poorly stocked. Oak forests that are not fully stocked are especially at risk of exploitive and unsustainable timber harvesting that can create poorly stocked forests.

In 2012, **Dr. Jeffrey Ward** began to evaluate the costs and effectiveness of two systems for rehabilitating poorly stocked stands that could be implemented on family forests (small, privately owned forests), whose owners could accomplish much of the treatments. The first system will be a low intensity, minimal or no cost approach that promotes the desired size class by harvesting firewood and, in some cases, removing cull trees and releasing a limited number of saplings. The second system will be a high-intensity approach with the expense of remediation secondary to the emphasis of maximizing development of the desired size class. Results of this study could be used by many of the 1.3 million owners of 10-50 acre forest parcels in the Northeast and Midwest. Depending on market conditions and management objectives, one of these systems could also be utilized by owners with larger holdings such as state agencies, water companies, or private corporations (e.g, forest industry, timber investment management organizations).

Prescription goals are defined as one of four possible desired conditions after treatment: poletimber, sapling, regeneration, or two-aged stands. TARGET trees are defined as pole or sapling stems selected for release from competition using quality tree criteria. This project will conduct four simultaneous, parallel experiments - one for each prescription goal. Rather than repeat design elements common to all experiments, the project will be described as a single experiment. Plot treatment times –

Four study sites have been established in poorly-stocked forests that had had a significant oak component prior to previous harvests. Each study site has nine 0.04 ha plots for each prescription goal and a total of 80 plots have been established. Data have been collected for all trees with diameters greater than 12.5 cm and subplots have been sampled for smaller stems. After data collection is completed in 2012, treatments will be assigned and completed.

IMPACT: Family forest owners will be provided with management tools to bring their forests up to their full productive capacity. This project emphasizes treatment options that could be implemented by non-professionals with minimal training to increase the likelihood of widespread adaption by landowners without a professional forestry background. A very modest gain of 5% productivity across the three million acres of poorly stocked oak forests would be equivalent to adding 150,000 acres of productive forest and would have the additional benefit of increasing value added by concentrating growth of trees of higher quality species with superior stems.

VITICULTURE

Winegrape growers and Farm Wineries in Connecticut face many challenges. Farm Wineries are required to grow a minimum of 25% of the fruit in their total output, but are having trouble meeting this standard. Consecutive very cold winters in 2003 and 2004, as well as in 2009 and 2011 resulted in significant plant loss on less cold hardy cultivars, and drove up prices for purchasing Connecticut fruit. Little information is available to growers regarding cultural information for growing more cold hardy and disease resistant cultivars in the state. Growers of more traditional cultivars require more information on cultural practices and their effects on long-term vine health and fruit quality. Disease management is critical during the growing season due to Connecticut's warm, humid summers. The industry requires increased production

via better management practices in existing vineyards and improved cultivar selection in newly planted vineyards. Innovative practices need to be tested in Connecticut to assess their viticultural and economic appropriateness.

Winegrapes: Studies have been initiated by **Dr. William R. Nail** from 2004-2012 to help determine cultural practices for growing high quality winegrapes profitably in Connecticut. The winegrape industry in Connecticut is one of the most rapidly expanding categories of agriculture in the state. The first Farm Winery opened in 1979, and there are currently 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 the Department of Tourism travel offices.

Cultural practices in Vitis vinifera: **Dr. Nail** established a planting of 288 Pinot Gris vines at Lockwood Farm in summer, 2004. Two different rootstocks were used: 3309C, the most commonly planted rootstock in the state, and 101-14, which may tend to ripen fruit earlier and have better tolerance to severe winter freezes.

Impact: Vines grafted to 101-14 had 32% less mortality due to winter freeze damage than those grafted to 3309C following their first winter. Crown gall in subsequent years continues to be slightly higher in 3309C vines. There were no significant differences in productivity or fruit quality between rootstocks without crown gall through the 2011 growing season. Planting on rootstocks more resistant to winter damage can result in savings of $7.60 for each year of lost production per vine, plus $3.75 replacement cost per vine plus labor involved in removing diseased vines and replanting

Effects of 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.

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 plus labor per acre for each 10% of vine mortality. 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 yield of 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.

Training and spacing effects on vine performance and fruit quality of hybrid cultivars: Grapevines in most older vineyards in Connecticut are planted on six foot spacing and trained to a vertically shoot positioned system. This has generally worked well for most vinifera cultivars and some hybrids. Recently released hybrid cultivars that are rapidly finding favor frequently have different growth habits that make them unsuitable for this traditional spacing and training.

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

To evaluate spacing and training systems for new cultivars, **Dr. Nail** established a new planting of the hybrid cultivars St. Croix and Cayuga White in May, 2005 at a private 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 may involve fundamental issues both before and after planting. Plants of both cultivars were planted at six and eight foot spacings, and were trained to four different training systems beginning in 2009: Vertically Shoot Positioned, Hudson River Umbrella, Geneva Double Curtain, and Scott Henry.

This experiment is part of The Northern Grapes Project, which consists of 35 scientists from 13 states.

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. 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 much more productive in the second through fourth years than the other training systems. There were no differences in fruit quality among training systems. 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. 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. Data on yield and fruit quality parameters were collected beginning in the 2011 harvest season, and will continue for at least three more years. This experiment is also part of The Northern Grapes Project.

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** has 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 whose characteristics have been documented, 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 were made from selected cultivars at the Enology laboratory at the New York Agricultural Experiment Station at Geneva in 2011, and will be evaluated for wine chemistry and sensory qualities beginning in 2012 and continue for several years.

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.

Northern grapes: Many new, very winter-hardy hybrid winegrape cultivars have been developed relatively recently by plant breeders in Wisconsin and Minnesota. Some, such as St. Croix, have found favor with many Connecticut growers. These new cultivars are based on the American species *Vitis riparia*. Riparia-based cultivars typically have much higher acidity than more traditional winegrape cultivars. New, as yet unreleased cultivars are untested in the state. Several new cultivars are being evaluated at Lockwood Farm and the Valley Laboratory. This is in conjunction with the Northern Grapes Project as well as NE-1020. Besides basic fruit quality parameters analyzed at The Connecticut Agricultural Experiment Station, more thorough analyses from all participating states will be conducted at the Midwest Grape and Wine Industry

Institute at Iowa State University. Vegetative, fruit, and yield data were collected beginning in 2011, and will continue for at least four more years.

Impact:Fruit quality from new riparia-based cultivars may pose problems for winemakers using traditional methods. By evaluating the fruit chemistry of these new cultivars, decisions regarding cultivar selection based on fruit acidity as well as standard yield and vegetative parameters will assist growers in selecting appropriate cultivars when they are released commercially.

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

Boxwood blight

In October 2011, samples of boxwood plants with unusual symptoms were submitted to The Plant Disease Information Office for diagnosis. **Dr. Sharon M. Douglas** and **Ms. Mary Inman** observed leaf spots and blights, distinctive black cankers on stems, rapid defoliation, and severe dieback on affected plants (photos). After extensive microscopic examination and a search of the literature, the disease was tentatively identified as boxwood blight, caused by the fungus *Cylindrocladium pseudonaviculatum (*syn. *C. buxicola)*. Since this fungus had not been reported in the U.S., samples of infected plants were sent to national mycologists at the United States Department of Agriculture-Animal Plant Health Inspection Service-Plant Protection and Quarantine (USDA-APHIS-PPQ) for identification. They confirmed the fungus as *C. pseudonaviculatum.* Boxwood blight has been found in commercial and residential landscapes, garden centers, and nurseries in 5 counties in CT, as well as in 10 states in the U.S. including MA, MD, NC, NY, OH, OR, PA, RI, and VA, and two provinces in Canada (BC and ON). This disease was first described in the United Kingdom (UK) in the mid-1990s, and is found in New Zealand and throughout Europe.

Boxwood blight has been reported to occur on all *Buxus* species to date, although some species and cultivars appear to be more susceptible than others. *Buxus sempervirens* (American or common boxwood) and *B. sempervirens* 'Suffruticosa' (English boxwood) appear to be highly susceptible. The complete host range of this pathogen is not known. However, experimental inoculations have demonstrated that other members of the boxwood family (Buxaceae) are susceptible, including *Sarcococca* and more recently, **Dr. James LaMondia** and CAES colleagues determined that *Pachysandra terminalis* and *P. procumbens* are also experimental hosts. In addition, samples of pachysandra from an established planting adjacent to boxwood blight-infected boxwood were confirmed to be infected by *C. pseudonaviculatum.* To our knowledge, this is the first report of a natural infection of pachysandra in the landscape.

The fungus infects all aboveground portions of boxwood plants, but does not appear to infect the roots. Infections result in leaf spots, leaf blights, and stem cankers that lead to defoliation and death of boxwood plants. We have found that the pathogen can be isolated from symptomless plants. Boxwood blight spreads very rapidly under warm, humid conditions, and the disease cycle can be completed in one week. The temperature range is 41-86°F, with an optimum of 77°F. Moisture is necessary for infection, but wounds are not necessary. The fungus readily forms fruiting structures called sporodochia on infected plants. These structures produce abundant spores (conidia) in a slimy matrix on all infected parts of the plant, including leaves and stems. The fungus also forms resting structures called microsclerotia that allow the fungus to survive for at least 5 years. These structures are found in infected plant tissues and in leaf debris.

Boxwood blight spores are splash-dispersed and can be carried by wind or wind-driven rain over short distances. Longer distance spread is thought to occur through human activities (e.g., contaminated boots, clothing, and equipment), animals, and birds, since the spores are sticky. Infected plant material is the primary means for long-distance spread. In many cases, these are apparently "healthy" boxwood—plants that are infected but have no symptoms or plants that are treated with fungicides that suppress, but do not kill or eradicate the fungus—are shipped to nurseries and landscapes. This method of disease transmission is often called the "Trojan horse" or "Typhoid Mary" syndrome.

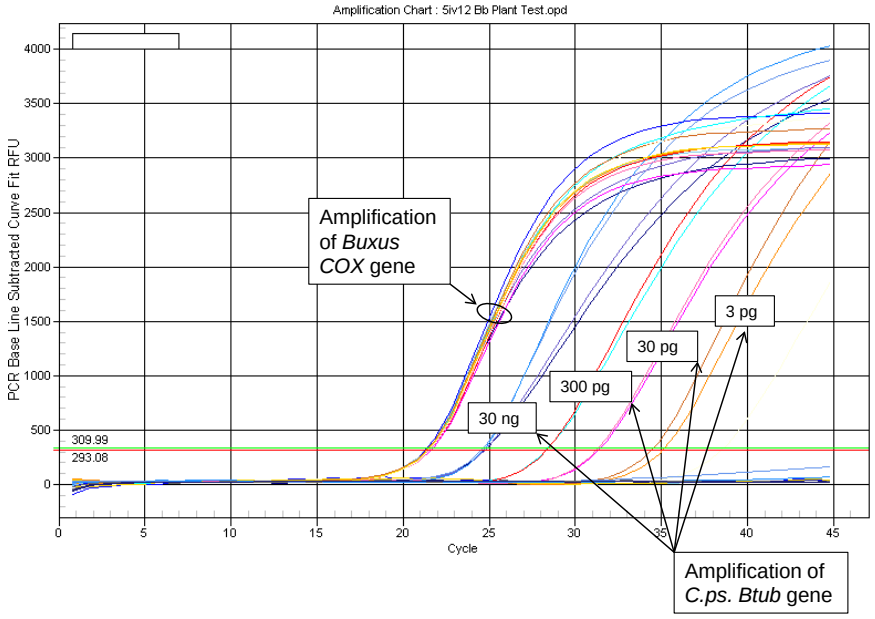
At present, boxwood blight is not federally regulated, but in Connecticut, regulatory actions are under the statutory authority of The Connecticut Agricultural Experiment Station (CAES), Sec. 22-84 and Sec 22-98 of the Connecticut General Statutes. When boxwood blight is detected, a "Stop Sale Notice" is given to the nursery or business. This prevents the sale and movement of infected plants from the quarantined property. Many CT properties have voluntarily disposed of infected plants by burial on the quarantined property or have transported them to incinerators under supervision by CAES inspectors. This has resulted in significant financial losses in the state, which have already exceeded $3 million. CT growers also report additional losses from cancelled orders for non-boxwood hosts, as a result of customer concerns about the uncertainty of the spread and survival of *C. pseudonaviculatum*.

The Experiment Station, led by **Dr. Douglas,** took a prominent role in developing Best Management Practices (BMPs) that provided guidance for nurseries, garden centers, and landscapers for dealing with this disease and offered suggestions to minimize the spread of the disease through commerce and planting of infected material. CAES Best Management Practices served as a template for a number of other states.

Dr. Robert E. Marra has been working with Dr. Jo Anne Crouch of the USDA-ARS in developing a realtime PCR assay for the early detection of the boxwood blight pathogen. In preliminary studies, Dr. Marra and Dr. Crouch have demonstrated fairly high specificity of the realtime assay to *C. pseudonaviculatum*; most closely related sister species show no specificity to the assay, while two species, *C. gracilipes* and *C. indonesiae*, have shown marginal specificity that results in barely measurable amplification in the assay. Drs. Marra and Crouch are refining the assay to eliminate these cross-reacting results. Dr. Marra has also demonstrated that the *C. pseudonaviculatum* primers and probe work well in the presence of *Buxus* sp. DNA, which furthermore does not compromise the sensitivity of the assay (see figure below). In experiments in which increasingly small amounts of fungal DNA were added to *Buxus* DNA, Dr. Marra estimated detection of the pathogen DNA as low as 3 picograms.

Dr. Marra utilized a PCR-RFLP assay developed by Dr. Kurt Heungens (Belgium) to determine that all 16 Connecticut isolates obtained at that point belong to the G1 genotype, and not the G2 genotype. This is an important finding, because Dr. Heungens and his group have demonstrated that the G2 genotype is resistant to certain fungicides.

Dr. Marra sequenced the beta-tubulin gene from two Connecticut isolates of the pathogen, isolated by Dr. LaMondia; these sequences were used to confirm the identity of the pathogen by comparing these sequences against those of the type specimen in the GenBank database. The sequences from these two Connecticut isolates were then deposited in GenBank.



Multiplex realtime PCR results showing amplification of both host and pathogen DNA. DNA from boxwood was spiked with serial 10-fold dilutions of DNA from *C. pseudonaviculatum*, and used as template in realtime PCR reactions containing primers and probes for the universal plant cytochrome oxidase (COX) gene and the C.ps.-specific beta-tubulin (Btub) gene. These results demonstrate the sensitivity and efficiency of the assay, as evidenced by the ~3.3 cycle shift in Ct value with each ten-fold dilution.

Impact: Rapid detection and communication about this important new disease of boxwood and decisive regulatory actions by The Experiment Station helped to minimize the economic impact of boxwood blight on the Connecticut nursery industry. Although significant losses were reported, CAES actions helped to

maintain boxwood as a viable and important component of the Connecticut landscape and nursery industry.

Butternut research

Dr. Sandra L. Anagnostakis planted grafted butternut trees from Dr. Mark Coggeshall (University of MO) at Lockwood Farm in May 2012. These trees are grafts of surviving butternuts from PA, IA, and VT. They will be inoculated with strains of the butternut canker fungus isolated from Connecticut to determine whether they are resistant to this devastating disease.

Chestnut breeding for orchard and timber trees

Dr. Sandra L. Anagnostakis found Asian chestnut gall wasp galls (*Dryocosmus kuriphilus*) on Connecticut chestnut trees this year. This insect was accidently introduced into the U.S. by a chestnut grower in central Georgia in 1974 and has been moved north by tree sales and by flight of the insect. Trees in New Haven, Hamden, Wallingford, and North Haven had galls this spring, but none were found in Windsor or Griswold. The insect can have a serious impact on the health of the trees, as well as reducing nut production. For several years, Dr. Anagnostakis has made crosses of trees known to be resistant to this insect with trees known to be susceptible (photo of gall wasp galls on American chestnut), and a test of the progeny in North Carolina where the wasp was established showed that the resistance can be inherited. This year, many crosses were made using both timber type trees and orchard trees with resistant species. The Chestnut Plantation at Sleeping Giant has all the species and most of the possible hybrids of chestnut, and they will be surveyed to determine which trees have the best resistance.

Sudden vegetation dieback

<u>The role of the purple marsh crab</u>

Sudden vegetation dieback (SVD) of Connecticut salt marshes still continues to occur along Connecticut's Long Island Sound. Many sites showed increased dieback in 2011 and 2012 (photo at right), while other sites showed slight recovery. **Dr. Wade H. Elmer** hypothesized that a major factor in the increased dieback may be grazing pressure by the purple marsh crab, *Sesarma reticulatum*. In addition, a newly described pathogenic species, *Fusarium palustre*, has been found in every SVD site, but there is insufficient evidence to assume the fungus was a primary cause for SVD. Four studies have been conducted on agar amended with NaCl that show that the salt marsh fungus is more tolerant to salinity than genetically similar terrestrial species, 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. We hypothesized that inoculation of *Spartina alterniflora* (SA) with *F. palustre* (FP), and/or drought may increase herbivory. SA were exposed to different irrigation regimes and inoculated with FP or left un-inoculated. Pairwise combinations of SA plants were placed in bins with marsh crabs and photographed over a 1-2 day period for visual estimates of loss due to consumption. Herbivory was greatest on drought-stressed plants and/or plants that were inoculated with FP. Plants exposed to the same treatments and transplanted into a crab-infested SVD site were similarly consumed. In other published studies, it was shown that stressed SA plants had higher levels of dimethylsulfoxide (DMSO) than healthy plants. To determine if DMSO was an attractant for the marsh crab, we drenched healthy SA and other grass species with DMSO (200 micromoles) to determine if it increased herbivory when compared to untreated plants. Consumption of SA was significantly greater in the first 4 hr. on DMSO-treated SA plants than on controls, but did not increase herbivory on other grass species. These findings suggest that plant stress, whether by disease or drought, may increase the attractiveness of SA to herbivory by marsh crabs and that DMSO might function as a chemo-attractant in SA.

Genetic variation and dispersal dynamics in *Fusarium palustre* 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** performed a genetic analysis of 90 isolates collected from marshes ranging from Louisiana to Maine. Using Amplified Fragment Length Polymorphisms (AFLP), Dr. Marra showed an unexpected amount of genetic variability among these isolates. Also of note was the observation that genetic variation was highest in the northeast, with no isolates appearing to be clones. In contrast, all four isolates from a Louisiana marsh were clonal. This result suggests the hypothesis, which we are currently testing, that the pathogen may have been first introduced in northeastern North America, with subsequent clonal introduction to coastal areas of the southeast and the Gulf. Dr. Marra continues to work with Dr. Elmer in analyzing newly collected isolates, from the south and the Gulf, as well as isolates from *S. alterniflora* in China, which appear to be *F. palustre*.

***Impact*:** This research provides critical insights into understanding Sudden Vegetation Dieback. By identifying significant factors associated with marsh grass recovery in SVD sites, we have established a foundation for understanding how physiological changes in *S. alterniflora* may affect its attraction to herbivores. Additionally, we are defining the role that genetic variability and dispersal of *F. palustre* might contribute to this syndrome.

Biochar and earthworms

Biochar is a fine-grained or granular, charcoal-like product, that when applied to soil will suppress Fusarium crown and root rot of asparagus. Biochar may suppress disease by 1) absorbing toxins in the soil, 2) increasing mycorrhizal colonization in the roots, and 3) allowing the densities of fluorescent pseudomonads to proliferate in the rhizosphere. These beneficial microbes help to suppress disease through antibiosis, competition, or induction of systemically acquired resistance mechanisms.

Dr. Wade H. Elmer has demonstrated that vegetables grew better and had less root diseases when the soils were augmented with adult earthworms. In perennial plantings, where root systems cannot be

easily manipulated after planting, earthworms might be used to provide delivery of beneficial products like biochar to the lower soil horizons. Experimental field plots were established in 2010 at the Experiment Station research farms in Hamden, Windsor, and Griswold, and were designed to examine the individual and combined effect of earthworms and biochar. Earthworms were reapplied in 2011. Yield was taken during the spring 2012 at all three locations (graph at right). Results were similar and show that earthworms significantly promoted yield ($P = 0.046$), but that biochar and the combination of earthworms and biochar were not statistically different, and that the control had no effects (graph at right). This may be due to the ability of biochar to bind up nutrients along with the toxins that led to smaller plants and less yield. Alternatively, the biochar may have been inhibitory to the earthworms and negated their impact. We will continue the study for another year.

Impact: These studies may provide evidence that earthworm activity can result in increased yields. We presume this is due to improve soil health. It also highlights the many factors affecting the successful implementation of this technology and cautions growers as to the negative benefits of biochar.

Suppressing plant disease with silicon application and partial soil saturation in a flooded floor greenhouse.

Use of ebb and flow recycled watering systems has become more common in Connecticut, although 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 Elmer, Martin Gent**, **Richard McAvoy** (University of Connecticut), and **Joe Geremia** (Geremia Greenhouse, Yalesville, CT) resulted in the construction of a flooded floor greenhouse at Lockwood Farm. Earlier studies demonstrated that partial saturation could reduce disease severity, reduce plant size, and increase horticultural marketability. Our objectives were to determine if soluble silicon applications could reduce foliar and root diseases and how that might interact with different irrigation regimes. Poinsettias and zinnias were grown on partial and full saturation with and without silicon applied as potassium silicate. Potassium carbonate was used in the control pots to factor against the effect of potassium. Pythium root rot was suppressed on Si-treated poinsettia plants, but only on plants receiving full saturation. It was observed that powdery mildew on zinnia was more severe under partial saturation than full saturation. However, the application of silicon significantly suppressed powdery mildew when compared to the control (K_2CO_3) (figure at right; control plant on left).

Impact: Partial saturation can offer great value to growers who use ebb & flow irrigation systems to suppress Pythium diseases, by saving fertilizer, fungicides, and producing more marketable plants with longer shelf lives. However the added stress on plants such as zinnias increased the damage caused by powdery mildew. Each crop/disease system may need separate evaluation, but these findings should encourage growers to adopt partial saturation management practices when using ebb and flow irrigation in order to reduce damage from Pythium inoculum. The value of using silicon applications to suppress powdery mildew was demonstrated.

Bacterial spot of stone fruits

Dr. Robert E. Marra continued work on a SARE project on bacterial spot of stone fruits. This project focuses 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 to be 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 have already demonstrated that there is no genetic variation among all of 43 phage strains that were isolated from peach orchards in Connecticut, New York, and Massachusetts. This absence of phage diversity may pose problems for long-term sustainability as a biocontrol, as the bacterium can become resistant fairly rapidly.

Repeated efforts to perform inoculations with the Xap bacteria on potted greenhouse peach trees (the highly susceptible variety O'Henry) failed, as did 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.

Three orchards of 49 trees each were planted in 2010 at the three research farms, Lockwood, Windsor, and Griswold. The variety, Sweet Dream, is considered desirable in southern New England, but is too susceptible to Xap to be economically feasible. The trees were pruned again this past late spring using an open-center training technique, and any dead trees were replaced.

Impact: Bacterial spot caused by Xap is a major problem for peach growers in Connecticut. Control options are limited, and expensive. A naturally occurring bacteriophage would qualify as organic disease control, making it a very desirable option for orchardists.

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

Dr. Robert E. Marra's research on Perennial Canker (also known as Neonectria canker) focuses on the ecology and genetics of the fungal pathogen, *Neonectria ditissima,* with the goal of gaining a fuller understanding of the life history, evolution, and population dynamics of the organism and its interactions with its hosts, particularly black birch (*Betula lenta*) and yellow birch (*B. alleghaniensis*). Fundamental knowledge of the natural history of *N. ditissima* is lacking, yet is an essential prerequisite to the development of an effective control strategy. Field techniques and laboratory tools necessary to the study of this fungus and the disease it causes have been developed and are being used to examine the relationship between mating system and genetic structure.

Previously, Dr. Marra developed a set of 13 polymorphic microsatellite markers. 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. These 13 markers were used to genotype ascospore progeny from 44 perithecia isolated from two nearly adjacent sites at West Rock Ridge State Park in New Haven, CT. Ranging in allelic diversity from 2-15 alleles/locus, with an average of 4.3 alleles per locus in this population, the markers show an unusually high level of diversity. The pooled haplotypes of sibling

ascospores from each of the 44 perithecia resulted in 27 unique multilocus diplotypes, which were then used to estimate parameters of population structure.

Minimally significant ($p \leq 0.05$) linkage disequilibrium (LD) was observed between several pairs of loci, but $\overline{r}_d$, a standardized estimate of multilocus LD, was not significant. Genetic differentiation between the two subpopulations was minimally significant at three loci ($\mathbf{D}_{est}$ = 0.11, 0.17, 0.19), while the harmonic mean across all loci was not ($\mathbf{D}_{est}$ = 0.01); therefore, all subsequent analyses were performed on the entire population. Absence of segregation among sibling haplotypes was observed in 23 of the 44 perithecia, yielding a selfing rate, ***s***, of 0.52. Contrary to expectation given the high degree of genetic diversity, heterozygote deficiencies were observed at all loci: $\boldsymbol{F}_{is}$, the inbreeding coefficient, ranged from 0.39 to 1.0, and averaged 0.71 over all loci. Interestingly, $\boldsymbol{F}_{is}$ estimated from only the outcrossed portion of the population (n=21) was still high, 0.42, supporting the hypothesis that biparental inbreeding contributed significantly to overall inbreeding in this population. These observations support theoretical models that posit the importance of biparental inbreeding to the evolutionary stability of mixed mating.

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 I have failed to reject a null hypothesis of complete random mating (i.e., no selfing). One conclusion that may be drawn from this, which requires further testing, is that there is strong selection against outcrossing, and that dispersal dynamics of this fungus are complex, and require further study.

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

Mathematical models of plant disease epidemics

Dr. Francis J. Ferrandino has challenged the usefulness of latent period and infectious period as epidemic descriptors. One of the ramifications of his analysis is the need to express the dynamics of a plant disease epidemic in terms of the mean generation time and the higher order temporal moments of the time course of progeny production. To this end, a Laplace Transform-based analysis has been devised to compare the epidemiological behavior of current theoretical models of spore production in terms of the temporal moments of the reproduction curve. In addition, in order to compare theory to experiment, Dr. Ferrandino has derived a fourth order approximation that accurately and explicitly predicts the initial infection rate in terms of the temporal moments of the reproduction curve (experimental or theoretical). These research efforts resulted in publications in refereed journals. Future work will include both the spatial spread and the temporal development of plant disease epidemics. The dispersal of inoculum will be modelled using Lagrangian stochastic simulation models founded on a thorough knowledge of the nature of turbulence to calculate the form of the dispersal function.

Impact: This research redefines the basic temporal measures of plant disease epidemics and provides mathematical models of plant disease with parameters that are directly determined using field data. These are essential for evaluating the efficacy and economic and environmental sustainability of IPM programs.

Weather stations at CAES research farms

Dr. Francis J. Ferrandino has converted the weather stations at the three CAES experimental farms to WIFI. This allows hourly updates of the data without any monthly service charge. The cost for the previous cell phone service was ~$40 per month per weather station. The information obtained from these weather stations is used to calculate weekly grape disease-risk ratings, which are posted on the CAES website. This information is also sent out via Email directly to growers. The switch to WIFI allows Dr. Ferrandino to continue providing valuable information to growers without the need for outside funding.

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

Dr. Ferrandino is continuing his work on environmentally-friendly controls of powdery mildew on common home landscape plants (e.g., lilac, deciduous azalea, monarda, phlox, peony, and rudbeckia) and vegetable crops commonly 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, horticultural oil, and potassium bicarbonate products. In 2011, powdery mildew was observed on monarda, phlox, and lilac (photo at right) by 11 July. However, due to the heavy rainfall in August and September, all plants suffered from both fungal and bacterial leaf spots. This complication made it difficult to estimate powdery mildew levels later in the season in order to evaluate relative efficacy of the applied foliar sprays. This year, so far, disease levels are too low to evaluate the efficacy of the various sprays.

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 ELISA 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 for *P. ramorum* by APHIS-PPQ and in March of 2012, **Drs. Marra and Li** were certified in the 2012 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

The 2011-2012 season was one for extremes and unusual weather patterns that contributed to significant health problems on woody ornamental trees and shrubs in the landscape, on forest trees, and on herbaceous plants. Characterized as one of the wettest years on record, weather records at Lockwood Farm reported 68.61 inches of cumulative precipitation in 2011, when compared with the 30-year average of 47.73 inches. Abnormally high levels of precipitation and cool to moderate temperatures were recorded throughout the 2011 season, with the exception of July, and many diseases resulted from these favorable conditions. January through March of 2012 started out relatively dry, but the spring rains provided conditions conducive for infection by many types of pathogens.

A second weather extreme of 2011 occurred in August, as Tropical Storm Irene swept through the state causing significant physical damage to many trees and salt spray and coastal flooding damage to many ornamentals and lawn grasses.

The third weather extreme occurred in late October, when an historic snow storm left over 20 inches of snow in some parts of the state. The snow fell on trees that still had their leaves, so it resulted in significant breakage to trees and shrubs, which resulted in major power outages.

Unusual weather continued into fall and winter 2011 with abnormally mild temperatures that appeared to affect leaf drop, as many deciduous trees held onto their leaves well beyond the "normal" drop period. Many trees and woody shrubs did not enter into true winter dormancy and were damaged by sudden periods of cold temperatures that occurred in winter. Spring 2012 also posed a problem for many

woody ornamentals with summer-like temperatures followed by frost that caused damage to some deciduous trees and conifers.

Disease Survey

Dr. Yonghao Li, Dr. Sharon Douglas, and Mary 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 physiological disorder diseases contributed to key health problems on trees, shrubs, flowers, lawn grasses, fruits and vegetables, although viral and nematode diseases were also identified on some hosts.

Herbaceous and Woody Ornamentals:

A wide range of diseases was identified on perennials and annual flowers this season including downy mildew on alyssum; Thielaviopsis root rot on calibrachoa; Rhizoctonia root rot on catmint; brown rust and white rust on chrysanthemum; downy mildew on coleus; Heterosporium leaf spot on columbine; Botrytis blight on dianthus; bacterial leaf spot, Fusarium root rot, and Pythium root rot on geranium; rust on hibiscus; anthracnose and tobacco rattle virus on hosta; Didymellina leaf spot on iris; bacterial leaf spot on lavender; Botrytis blight on lily; anthracnose on pansy; Botrytis blight, Cladosporium leaf spot, and powdery mildew on peony; Botrytis blight on phlox; bacterial leaf spot, Fusarium stem rot, and Botrytis blight on poinsettia; Septoria leaf spot and downy mildew on rudbeckia; Rhizoctonia blight and Botrytis blight on sedum; rust on sidalcea; Septoria leaf spot and smut on trillium; Botrytis blight on tulip; and rust on violet.

Impatiens necrotic spot virus on begonia

Tobacco rattle virus on hosta

Woody ornamentals and their diseases were abutilon with Thielaviopsis root rot; amelanchier with rust and Entomosporium leaf spot; ash with Botryosphaeria canker; azalea with leaf gall; beech with anthracnose and Phomopsis canker; birch with anthracnose and Septoria leaf spot; boxwood with Thielaviopsis root rot, Volutella canker/blight, and boxwood blight; butterfly bush with bacterial leaf

spot; flowering cherry with black knot, brown rot, fungal leaf spot, and bacterial leaf spot; clematis with Phyllosticta leaf spot; crabapple with scab, rust, frogeye leaf spot, and Botryosphaeria canker; dogwood with anthracnose, bacterial slime flux, Phomopsis canker, Septoria leaf spot, and powdery mildew; elm with Dutch elm disease and black spot; enkianthus with anthracnose and Phyllosticta leaf spot; euonymus with crown rot and bacterial leaf spot; filbert with eastern filbert blight; forsythia with Phytophthora root rot and bacterial leaf spot; hawthorn with rust; heather with Pestalotiopsis leaf spot and Phytophthora root rot; hickory with Phyllosticta leaf spot; holly with fungal leaf spot and Botryosphaeria canker; honeysuckle with bacterial leaf spot and powdery mildew; hydrangea with Phoma leaf spot, anthracnose, and rust; lilac with bacterial blight; magnolia with powdery mildew and Verticillium wilt; maple with anthracnose, Phyllosticta leaf spot, Nectria canker, Diplodia canker, Phomopsis canker, and Verticillium wilt; mountain ash with fire blight and Phyllosticta leaf spot; mountain laurel with Cercospora leaf spot; oak with anthracnose and Tubakia leaf spot; pachysandra with Volutella blight; plum with black knot; privet with Verticillium wilt, rust, anthracnose, and Alternaria leaf spot; quince with rust; redbud with anthracnose, Phomopsis canker, and Botryosphaeria canker; rhododendron with Phytophthora root rot, Botryosphaeria canker, Phomopsis canker, bacterial leaf spot, and fungal leaf spot; rose with black spot, rust, Botrytis blight, and downy mildew; spirea with Botrytis blight; tulip tree with powdery mildew; viburnum with downy mildew; and willow with rust and black canker.

Anthracnose of beech

Septoria leaf spot of birch

Conifer species and their diseases were arborvitae with Pestalotiopsis tip blight; cypress with Botryosphaeria canker and Pestalotiopsis dieback; Douglas-fir with Swiss needlecast, Rhabdocline needlecast, and Diplodia blight; fir with Phomopsis canker, Phytophthora root rot, and Rhizosphaera needlecast; hemlock with Rhizosphaera needlecast; juniper with Phomopsis tip blight, rust, and Diplodia blight; larch with Mycosphaerella needlecast; pine with Canavirgella needlecast, Ploioderma needlecast, Diplodia blight, and Armillaria root rot; and spruce with Rhizosphaera needlecast, Sirococcus blight, Cytospora canker, Diplodia blight, and repeating spruce needle rust.

Vegetables:

Common vegetable diseases were downy mildew of basil; fungal club rot, Alternaria leaf spot, Cercospora leaf spot, bacterial black rot, and bacterial soft rot of broccoli; bacterial black rot and Alternaria leaf spot of cabbage; Alternaria leaf spot and black rot of cauliflower; Septoria leaf spot and cucumber mosaic virus of celery; bacterial black rot and bacterial leaf spot of collard; rust and northern blight of sweet corn; Alternaria leaf spot of crambe; bacterial soft rot and anthracnose of cucumber; Phomopsis leaf spot of eggplant; rust, bacterial soft rot, and Penicillium soft rot of garlic; bacterial black rot of kale; bacterial leaf spot, damping-off, and Phytophthora blight of pepper; late blight of potato; powdery mildew and Phytophthora fruit rot of pumpkin; powdery mildew and bacterial leaf spot of squash; late blight, Septoria leaf spot, early blight, bacterial leaf spot, anthracnose, powdery mildew, and Fulvia leaf mold 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 rot; apricot with black knot, brown rot, and shot hole; blueberry with Botrytis blight, Phomopsis blight, Fusicocum canker, and rust; cherry with shot hole, brown rot, and fungal leaf spot; grape with black knot, anthracnose, and powdery mildew; peach with scab, X-disease, Phomopsis canker, and leaf curl; pear with fungal leaf spot, scab, bitter rot, and fire blight; plum with brown rot and Glomerella leaf spot; and raspberry with Septoria leaf spot, Botryosphaeria canker, spur blight, and Botrytis blight.

Turf:

Common disease problems on residential lawns and golf courses were snow mold, powdery mildew, red thread, Rhizoctonia brown patch, slime mold, anthracnose, rust, summer patch, and Pythium root rot.

Weeds:

Predominant weeds in turf and gardens were annual bluegrass, annual ryegrass, bentgrass, bittercress, chickweed, clover, crabgrass, foxtail, garlic mustard, ground ivy, mugwort, nightshade, nutsedge, oriental bittersweet, phragmites, pigweed, purslane, spurge, red sorrel, speedwell, star-of-Bethlehem, wild violets, and wild garlic. Spreading of true bamboos remained an increasing public concern. Identification and control of Japanese knotweed and poison ivy continued to be significant problems. Increased public awareness of non-native plants led to many inquiries about invasive plants.

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 2012, 343 vegetable, 7 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 as of the date of this report, 300 of the 343 vegetable seed samples have been tested, with 8 seed samples failed label claims for germination. Failures were not retested because of insufficient amounts of seed. None of the vegetable samples contained weed contaminants in 2012. Lawn seeds are tested for both germination and purity. Of the 7 lawn seed samples tested, three met label claims for both purity and germination. Three samples failed purity analysis and one sample failed claims for both germination and purity. No lawn samples contained noxious weed seeds. Of the 10 crop seed samples tested, eight samples met label claims for purity and germination and two samples failed: one failed purity and one failed both purity and germination. No noxious weeds were identified in the samples. 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 unintentional 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 29 samples from the Connecticut Department of Consumer Protection at the request of the Department of Analytical Chemistry of the Experiment Station.

***Samples for 2012 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 2012. 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 Smith** (Deputy State Entomologist) supervised the collection of 180 samples by CAES nursery inspectors. After the ELISA pre-screen for all *Phytophthora* species, 33% of the samples tested positive. This represented a significant decrease in *Phytophthora*-species positive samples when compared with the last three years of conducting national surveys when levels exceeded 75%. 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 2012 nursery survey.

Citizen Inquiries

Plant Disease Information Office

Drs. Li and Douglas, assisted by **Ms. Inman**, answered 5295 inquiries about plant health from Connecticut citizens. Although the majority of inquiries were on ornamentals, trees, and shrubs (66%), other categories, such as food crops (17%) and turf grasses (4%), were also well represented. 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 (60%), there were many inquiries from commercial growers and plant care professionals (29%). Inquiries from cooperative extension, health, news, and agricultural personnel (11%) remained consistent with previous years. A further breakdown of inquiries showed that 39% of the questions came in by phone, 12% came in by mail, 5% came as email, and 44% were brought in person. The number of physical samples handled by the PDIO (56%) continued to exceed the number of phone calls (39%)—this is a trend that has been observed for the past 3 years. 438 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 from stakeholders

Dr. Anagnostakis answered 246 questions, tested 147 samples, and made 15 site visits. **Dr. Elmer** answered 15 questions, and tested 9 samples, and made 10 site visits. **Dr. Ferrandino** answered 12 questions, tested 25 samples, and made 18 site visits. **Dr. Marra** answered 2 questions, tested 1 sample, and made 1 site visit.

Impact: During the period covered by this Report, over **6365** 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. Wade H. Elmer co-sponsored two Bedding Plant Meetings with Ms. Leanne Pundt and Dr. Richard McAvoy of the University of Connecticut. Topics 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 7 February 2012 the meeting was held at the Tolland Cooperative Extension Center in Vernon, CT and on 14 February 2012 the meeting was held at the University of Connecticut, Torrington campus, in Torrington, CT.

Dr. Wade Elmer organized an AgriScience Fair in Jones Auditorium for high school students in Future Farmers of America (FFA). Over 40 high school students presented their science projects, which were judged by several CAES staff members. (11 May 2012)

Lockwood Lectures

Dr. Robert Marra organized a Lockwood Lecture by Dr. David R. Houston, principal plant pathologist (retired) US Forest Service, Forest Insect and Disease Laboratory, Hamden, CT. Dr. Houston is an internationally recognized authority on beech bark disease. The title of the lecture was *Beech Bark Disease: Biology, Ecology, and Forest Responses. A Five-Decade Quest for Understanding.* (23 May 2012)

Conference Organizing

Dr. Robert E. Marra served on a Steering Committee for *Connecticut Conference on Natural Resources* from 2005 to present. The Conference was held this year on Monday, 12 March 2012, at the University of Connecticut, Storrs. The conference was attended by 210 people, including scientists from CAES.

Dr. Robert E. Marra served on the three-person organizing and arrangements committee (and the only local person) for the annual meeting of the Mycological Society of America in New Haven, at the Omni Hotel, at CAES, and at Yale University. (13 -18 July 2012)

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 51 experimental plots at the Windsor farm during the past year. Five Windsor-based scientists had 23 of these plots; six New Haven-based scientists and a University of Connecticut graduate student were using 17 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

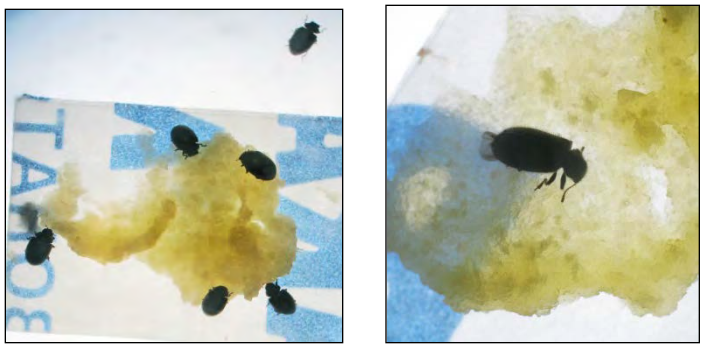
field plots and addressed the specific needs of each scientist. He and his summer research assistants did an outstanding job maintaining the extensive ornamental garden in cooperation with the Connecticut Nursery and Landscape Association. **Mr. Preste and Dr. LaMondia** coordinated the Valley Laboratory effort to comply with EPA Worker Protection Standards for Agricultural Pesticides and organized and conducted training sessions for the staff.

Hemlock Woolly Adelgid (HWA) Research

Biological control using imported predators of the adelgid is a major long-term national strategy for reducing the impact and spread of invasive hemlock woolly adelgid threatening eastern hemlocks. *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 & 2 are funded by the USDA Forest Service and project 3 was funded by USDA Animal and Plant Health Inspection Service – Plant Pest Quarantine (USDA APHIS-PPQ).

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

Dr. Carole Cheah, in collaboration with Dr. Allen Cohen of North Carolina State University, Insect Rearing Program, and supported by the USDA Forest Service, continued to test an artificial diet and/or supplement developed by Dr. Cohen. The optimal diet is to augment and improve the mass-rearing and production of adelgid predators, *S. tsugae* and *L. nigrinus*, for implementation of biological control in infested hemlock forests. Currently all mass rearing of predators requires healthy HWA-infested foliage. Supplies of the latter are unpredictable and of variable quality and affected by drought, winter extremes and accessible collection areas. HWA quality and quantity deficiencies often result is high mortalities of predators reared under laboratory conditions. 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, *S. tsugae* and *L. nigrinus*, when abundant, high quality developing adelgids are not available. In 2011-2012, the optimal egg diet developed by Dr. Cohen and tested by Dr. Cheah (called CC diet) again promoted high survival and reproductive function of adult *S. tsugae* and *L. nigrinus* in laboratory settings when used as a dietary supplement to natural prey rearing. The optimal CC diet in alginate form was also able to sustain *S. tsugae* adults on diet alone for 6 weeks with 96% survival during the summer. Weight measurements indicated that females gained weekly weights on diet alone as compared to adults maintained on dormant sistens first-instar adelgids. Adults also fed on CC diet packaged in stretched parafilm pierced with feeding holes. This form of packaging reduced the need to refresh diets every 2 days after dessication. Packaged diets had a longer shelf life of about a week or more. In addition, newly- emerged adult *S. tsugae* could be maintained on CC diet alone in alginate form for 7 weeks, maintaining or increasing weights on diet alone without mortality. Both females and males were subsequently reproductive 2 weeks later on return to HWA. Similarly, adult *L. nigrinus* in spring 2012 were able to be sustained on CC diet alone for 6 weeks with 75% survival and showed preference over a commercial supplement in choice trials by 2:1. In comparison, survival of *L. nigrinus* on the commercial supplement only was highly inferior to that on CC diet with 86% mortality by day 11. Some *L. nigrinus* adults were reproductive on return to HWA after a prolonged period on diets only.



S. tsugae and *L. nigrinus* feeding on alginate forms of CC diet

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) 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, or 3) the quality of the predators themselves 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 who has developed unique product quality control assessment techniques as a basis for improvement of production and process control for mass-rearing of HWA predators, in collaboration with **Dr. Cheah**. In 2011-2012, biochemical analyses and biomass measurements conducted by Dr. Cohen were expanded to quantify the quality of individual adelgids from various sites. Adelgids and the condition of hemlocks collected were rated for their quality visually by Dr. Cheah as part of the quality analyses. The initial analyses indicate that quality of adelgids is variable and may be a major factor influencing the rearing success and fitness of predators. Weight measurements of individual *S. tsugae* adults by Dr. Cheah indicated that weights varied with the stage and quality of the adelgid stage provided and also with the reproductive state of individuals. Parallel biochemical analyses and dissections by Dr. Cohen with measurements of biological parameters such as weights, oviposition, fecundity, sex ratios, were also conducted in spring 2012 by Dr. Cheah for field collected *L. nigrinus* from the Pacific Northwest and North Carolina for comparisons with lab-reared *L. nigrinus* and *S. tsugae* from South Carolina.

Impact: The Quality Control system being developed 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 in mass rearing insectaries.

3) Project: Establishment of a HWA predator field insectary

A field insectary at the Lockwood Farm was established by **Dr. Cheah** with staff of the Lockwood Farm of 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. The fourth 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 adapted 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, which were planted as much smaller plugs in 2009, were totally protected by snow cover and survived but did not grow well during 2011 and 2012. Overall survival of the original *T. sieboldii* seedlings was the lowest at 36%. However, a new planting of much larger saplings of *T. sieboldii* were obtained from North Carolina and planted in the fall of 2011 to replace dead seedlings, with 100% survival into summer 2012. Survival of western hemlocks was good over the mild winter of 2012 and healthy new growth was recorded in 2012 but overall, survival over 4 years was at 48%. Mountain hemlocks survived (63%) but produced little new growth in 2012. However, *Tsuga diversifolia* has exhibited superior survival (100%) and produced vigorous new growth in 2012 and is the most adapted and established of the 4 species for Connecticut climates.

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.

Hemlock plot at Lockwood Farm June 2012

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

Mile-a-minute weed, *Persicaria perfoliata,* (MAM) originates from Asia, was first discovered in eastern U.S. in the 1930s and is classified as a noxious invasive weed in Connecticut. Infestations are found in 9 eastern states and the first record of MAM in Connecticut was in 1997 in Greenwich. In Connecticut, 26 towns are currently infested. This rapidly growing prickly and prolific vine is annual in its northern range but quickly forms dense thickets which overwhelm and 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.

1) Diet development for biological controls of invasive weeds

Weevil rearing is currently dependent on intensive greenhouse propagation of the vine and the development of an artificial diet for mass rearing would be beneficial in improving winter storage survival of adults, reducing space required for mass production and enhancing survival during shipments. **Dr. Cheah** has collaborated 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 2011-2012, adult *R. latipes* were attracted to feed robustly in the fall and winter on an improved artificial diet developed by Dr. Cohen using novel extraction methods. Dr. Cheah recorded survival of 44% over 96 days on the Cohen artificial MAM diet alone and improved on diet presentation and shelf life using a new packaging technique. However, there was no oviposition during the diet only period but mating was observed. However, weevils were able to feed and oviposit normally on return to MAM foliage in late February for several months. In spring 2012, a repeat of this diet only experiment with new gel formulations used newly emerged weevils about 1 week old. After 24 days on diet alone, 90% of weevils were still alive but while mating was observed, no eggs were deposited during the diet only phase of the trial, even when minimal MAM plant stimuli were provided. Oviposition was observed by the majority of test weevils just one week after return to MAM foliage.


Adult *R. latipes* feeding on packaged Cohen artificial MAM diet

Impact: A suitable artificial diet for *R. latipes* adults would enhance winter storage of weevils produced during mass rearing for biological control in many states. Currently, winter survival during the storage phase without supplements is around 20%.

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 New Jersey Department of Agriculture Phillip Alampi Beneficial Insect Laboratory. **Dr. Carole Cheah**, in collaboration with Donna Ellis from the University of Connecticut and **Dr. Todd Mervosh** of the Valley Laboratory, released an additional 5,600 *R. latipes* in Connecticut in June 2012, with releases in 4 new areas and one new town, Wilton. 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). Dr. Cheah has participated in the releases and monitoring of all the release sites since 2009. Weevils have survived three diverse Connecticut winters, severe spring and summer flooding, and reproduced with multiple generations. High

feeding impact has been recorded in the late summer at several sites. Dispersal also has been recorded to at least 0.5 mile from initial release sites. However, heavy flooding during 2011 appears to have reduced populations in some sites.

Releasing weevils on MAM at a Connecticut Audubon sanctuary in Westport, June 2012

- Weevils have overwintered and established at all release sites from 2009-2011 and in a variety of different habitats
- Weevils released to control mile-a-minute weed in the western and eastern portions of the state are starting to impact and reduce local populations of MAM at several release sites
- 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.

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.

C. ELONGATE HEMLOCK SCALE

Augmentative Biological Control of Elongate Hemlock Scale

Elongate hemlock scale, *Fiorinia externa* (EHS), an exotic scale present in Connecticut since the 1960s, has recently rapidly expanded its range and population densities to seriously damaging levels on forest and landscape hemlocks over much of Connecticut in the past 5 years. Forest stands in Connecticut with heavy elongate hemlock scale infestations have shown thinning crowns and declining health, leading to pre-emptive hemlock salvage in forest management. Preliminary sampling in EHS dominated Connecticut stands in 2010 by **Dr. Cheah** has indicated increased numbers of the twice-stabbed lady beetle, *Chilocorus stigma,* which is a native and widespread omnivorous scale predator. But *C. stigma* has not been mass-reared and is not available commercially. This project, funded by USDA APHIS PPQ, seeks to develop optimal laboratory methods to mass rear suitable scale cultures and *C. stigma* for potential augmentative and safe biological control releases in EHS-affected stands. In 2011-2012, Dr.

Cheah visited several scale-infested hemlock stands for field collections of *C. stigma* in the fall and spring and is continuing a field survey of EHS presence and densities in hemlock stands in Connecticut. Adult consumption rates of EHS under laboratory conditions were measured. In spring 2012, Dr. Cheah scouted and collected several scale species infesting ornamental trees, woody shrubs and greenhouse plants and attempted their culture on butternut squash. Scale species inoculated to date include soft and armored scales such as euonymous scale, Fletcher scale, magnolia scale, cottony maple scale, elongate hemlock scale, circular hemlock scale and cottony taxus scale. Laboratory cultures of different scales on butternut squash are in their preliminary stages at this time.

C. stigma feeding on EHS fall 2011

Impact: Currently, there is no effective non-chemical control of elongate hemlock scale and the range is expanding northwards into Maine. Development of novel mass rearing procedures for *C. stigma*, a safe, omnivorous, climatically-adapted native predator of EHS, would allow implementation into new areas, augment local forest populations and also provide a method of biological control for many scale pests in plantations and orchards.

Insect Management

Dr. Richard Cowles trapped spotted wing drosophila (SWD) on August 19, 2011, while monitoring activity of strawberry sap beetles in a grower's field. This was the first detection of this exotic pest in New England. Within approximately 2 months, SWD adults were detected as far north as Maine, and there was approximately $500,000 of damage to fruit crops in southern New England, with especially heavy damage to fall bearing raspberries, day neutral strawberries, late varieties of blueberries, and red wine grapes. Based upon requests from New England cooperative extension fruit specialists, bait was formulated and tested in the lab to be equivalent to one developed by Peter Landolt (USDA ARS, Yakima, WA). The new attractant consists of a mixture of Welch's white grape juice, apple cider vinegar, and lab ethanol. The white grape juice and ethanol replace inexpensive red wine from Dr. Landolt's original formula, which is (1) difficult to purchase with university accounts and (2) is a dark color, which obscures seeing the wing spots of captured flies. *Drosophila melanogaster*, a close relative of *D. suzukii* (SWD), was reported to be able to taste artificial sweeteners. These sweeteners were tested in choice tests with 10% sucrose; in all cases SWD has a high preference for sucrose. Some artificial sweeteners

appeared to be highly deterrent to SWD, and may stimulate the flies' "bitter" receptors. However, another study of *D. melanogaster* discovered that their taste receptors cannot distinguish between low concentrations of salt (Na^+) and sugar: this was confirmed through phagostimulant studies with SWD. Simulated spray deposits were assessed with behavioral tests to discover the concentration of salt or sugar that would elicit feeding on spray droplets by SWD. A threshold of about 0.1% would work for either material. The addition of 0.1% sucrose is suggested for growers spraying effective materials, such as spinosyns, on susceptible fruit if SWD adults are present. Dr. Cowles hosted a spotted wing drosophila educational meeting at the Valley Laboratory, attended by twenty cooperative extension fruit entomology specialists from all New England states and New York, March 7, 2012.

Spotted Wing Drosophila male.

Bed Bug Management

Dr. Richard Cowles continued pyrethroid resistance studies in bed bugs in collaborations with **Drs. Anderson, Krol**, and **Ridge**. Managing pyrethroid resistant bed bugs continues to be a challenge to homeowners and the pest control industry. Silica aerogel dust is highly effective against bed bugs, but requires contact with the bugs. Oleic acid is part of a healthy human diet and is listed as an EPA Section 25b Exempt ingredient. It was recently discovered to be a necromone (signal the presence of dead insects) to other insects. A laboratory test of bed bug behavior in collaboration with Dr. Ridge demonstrated that bed bugs are sensitive to and highly repelled by oleic acid. We anticipate that the combination of silica gel dust and oleic acid will be more effective than the silica gel alone, because the oleic acid will trigger avoidance behaviors that enhance movement out of refuges and through dust residues. A provisional patent has been filed by the Station for the combination of desiccant dust and oleic acid. We will continue to determine how this combination may best be put to practical use.

Impacts:

- Wine grape growers immediately adopted the use of kaolin to protect their crop from SWD, following laboratory demonstrations that this organically acceptable insecticide is both repellent and an effective desiccant that kills the flies.
- Growers along the East Coast have been adopting the basal trunk spray of dinotefuran (Safari) for protection of Christmas trees from armored scales.

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 elegans was reported from indoor environments for the first time. The nomenclatural status of *Stachybotrys bisbyi* and *Stachybotrys sacchari* were clarified in that they are invalid names which subsequently have no taxonomic values. The type species of both species have been lost. Neotypes of these two species need to be designated to validate these two species in the future.

Impact: Controversies existing in additional species of *Stachybotrys* were clarified. 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** published and described two species new to science, *Codinaea sinensis* sp. nov., *Parapleurotheciopsis quercicola* sp. nov.

Impact: These 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.

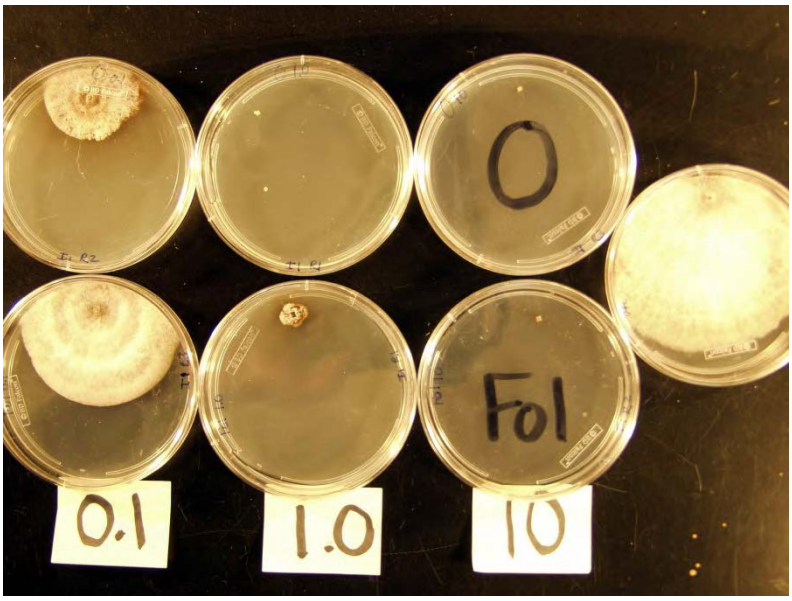
Indoor mold study:

Dr. Li studied household mold and dust allergens and their epidemiological relationship with exposure, sensitization and childhood asthma morbidity in collaboration with Dr. Leaderer's group at Yale. Their results indicated that *Penicillium* spp. are important allergens to children in households. Exposure and sensitization to *Penicillium* indoors significantly increased the risk of developing symptoms such as wheezing in asthmatic children.

Impact : Collaborations to link exposure to indoor molds to medical conditions is necessary and very important to the public, allergic patients and medical practitioners for protecting citizens, particularly children and adults with asthma.

Boxwood blight*:*

Boxwood blight is a new, introduced disease in Connecticut. The impact of the disease has been staggering; boxwood plant losses have been estimated at $3 million in Connecticut since October 2011. In addition, the concern about boxwood has resulted in reduced or lost orders for other plants, resulting in a multiplier effect on economic losses. **Dr. James LaMondia** initiated research shortly after the discovery of this disease to determine fungicide efficacy *in vitro* and in plant systems as a first step in the development of disease management tactics. This research will determine the fungicide concentrations required to achieve 85% suppression (EC_{85}) for at least 20 different fungicides *in vitro*. A number of different protectant and systemic fungicides are being evaluated against spore germination and fungal mycelial growth rate in petri dishes containing artificial growth medium amended with active ingredient concentrations ranging from 50 ppm down to 0.01 ppm (50, 10, 5, 2.5, 1.0, 0.5, 0.2, 0.1, 0.04, and 0.01) to determine EC_{85} concentrations. Typical fungicide application rates are in the 100 to 200 ppm range. At least 20 different fungicide active ingredients are under evaluation alone or in combination. The active ingredients represent registered and unregistered fungicides as well as materials currently under development by Crop Protection Companies being tested under agreement. Typically, up to 10 concentrations of each fungicide will be tested using three replicate plates for each isolate against at least two isolates of *Cylindrocladium pseudonaviculatum* and conducting each experiment at least twice. Initial results are promising. Fungicides with at least two systemic and three protectant modes of action have activity against spore germination and growth.



Range of growth of *Cylindrocladium pseudonaviculatum* on plates amended with different concentrations (ppm) of fungicides. No fungicide control on right.

In planta: Efficacious fungicides are being applied alone or in combination to liners and actively growing boxwood plants in pots in the greenhouse and at the CAES Valley Laboratory Research Farm container nursery area. Fungicides will be applied at label rates to evaluate the potential for any phytotoxicity to boxwood. Treated and control plants will be inoculated with the pathogen at the Valley

Laboratory Research Farm container nursery area under conducive environmental conditions to determine the ability of individual systemic fungicides determined to be effective in vitro or fungicide combinations to prevent infection. The ability to prevent infection will be determined by evaluating plants for visual disease symptoms. Again, early results from greenhouse experiments on liners indicate that disease expression can be reduced by 95%. This research is ongoing and will be conducted over the next year. Our results will be used develop fungicide management programs with different and complementary combinations of active ingredients to inhibit spore germination and also affect growth of the pathogen in plants while following FRAC recommendations to reduce the development of fungicide resistance.

Boxwood blight symptoms on boxwood liner.

Dr. LaMondia has also identified other host plants in the *Buxaceae* family. Pathogenicity testing (Koch's postulates) was conducted by isolating the *Cylindrocladium pseudonaviculatum* pathogen from leaf and stem lesions of *B. sempervirens*. Single-spored cultures were obtained on artificial growth medium. **Dr. Li** identified the pathogen as *C. pseudonaviculatum* by morphological characteristics and **Dr. Marra** used molecular identification techniques to amplify a portion of the β -tubulin gene from two Valley Lab isolates (Cps-CT-L1 and Cps-CT-S1). Amplified sequences were used in a BLAST search against the GenBank database to demonstrate 100% sequence identity only with other *C. pseudonaviculatum* strains. Healthy plants of Japanese spurge, *Pachysandra terminalis*, and Allegheny spurge, *Pachysandra procumbens*, with three plants per 10-cm-diameter pot, were inoculated with a conidial suspension of *C. pseudonaviculatum* (1.0×10^6 conidia per plant) and then transferred to the greenhouse. Circular lesions (1-4 mm-diameter) were evident on leaves ten days after inoculation. All inoculated plants developed lesions, and no lesions were observed on non-inoculated plants. Leaves with lesions were surface sterilized, the pathogen was re-isolated from at least one leaf per plant. After three weeks, many of the leaves with lesions yellowed and dropped to the soil surface and heavy sporulation of

C. pseudonaviculatum and microsclerotia were observed. This is the first report of *C. pseudonaviculatum* causing a leaf spot disease on either *Pachysandra terminalis or P. procumbens*. Pachysandra is a widely grown ground cover suitable for shady, humid environmental conditions that may be conducive for the development of disease. *Sarcococca* sp. had previously been determined by other researchers to be a host of this pathogen. *Cylindrocladium pseudonaviculatum* has now been shown to cause disease on all common ornamental species in the Buxaceae grown in North America.

Cylindrocladium pseudonaviculatum infecting *Pachysandra terminalis*

Cylindrocladium pseudonaviculatum infecting *Pachysandra procumbens*

Impact: The identification of fungicides with activity against spore germination and vegetative growth of the boxwood blight pathogen will lead to the development of effective management strategies. Recognizing that *Pachysandra* species are hosts of the pathogen will remove potential unrecognized sources of the pathogen and remove potential sources of an epidemic.

Biochar inhibits host recognition by plant parasitic nematodes.

Biochar is an engineered charcoal soil amendment that sequesters carbon in soils and has been associated with increased plant growth and yield. Charcoal has high surface area and microporosity and is a strong adsorber of dissolved organic compounds. **Dr. James LaMondia** investigated biochar for potential to reduce the bioavailability of host-specific hatch signaling compounds in soil. Cyst nematodes hatch in greater numbers in response to unknown signaling compounds in host-specific root exudates. Root diffusates prepared from tobacco or eastern black nightshade roots were filtered and frozen until use. Full-strength or 1:10 and 1:100 dilutions of diffusates were percolated though 100 cm^3 pasteurized sandy loam soil or soil amended with biochar (Agrichar, Best Energies, Inc., Madison WI) at rates of 1% or 10% biochar by volume. Collected diffusates were then added to 5 or 6 replicate hatch chambers each containing 15 cysts of *Globodera tabacum* and the numbers of hatched juveniles counted over time. The experiment was conducted twice with similar results. Juvenile hatch from cysts exposed to diffusates leached through biochar-amended soil was significantly reduced compared to diffusates leached through non-amended soil (P=0.002). Both 1% and 10% biochar amendments were effective in reducing juvenile hatch from full-strength root diffusate to levels similar to water alone or the 100-fold dilution of the root diffusate control, which were not different. Biochar may adsorb host-specific hatch signaling compounds, disrupting *G. tabacum* host recognition and subsequent hatch stimulation.

Cyst nematode females developing on roots.

Impact: Recognizing that Biochar may adsorb host-specific hatch signaling compounds, disrupting *G. tabacum* host recognition and subsequent hatch stimulation may allow crop production without nematode infection and losses.

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. 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. Last year, a male-sterile F1 hybrid 'B2' highly resistant to Fusarium wilt, TMV and the TCN and with moderate resistance to blue mold was released and licensed. Black root rot, caused by the fungus *Thielaviopsis basicola* has been damaging in recent years with cool wet springs. We obtained three sources of dark wrapper tobacco with high levels of black root rot resistance from cooperating scientists in Kentucky. Crosses and back crosses to CT broadleaf have been selected for resistance and for broadleaf characteristics. Inbreds are being developed for use in hybrid lines with resistance to multiple pathogens.

Impacts: 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 has been released as a new cultivar and seed production has been licensed to a local company. Proceeds will support further research on plant resistance. Adding resistance to black root rot will further reduce plant losses to disease.

Target Spot in Tobacco:

In June 2011, fifteen transplant beds of broadleaf cigar wrapper tobacco (*Nicotiana tabacum*, cultivar 'C9') plants in Hartford County, Connecticut were observed with nearly 100% infection by the target spot pathogen. Leaf lesion symptoms ranged from small (2 to 3 mm) water-soaked spots to larger (2 to 3 cm) lesions. Disease was subsequently observed, also at nearly 100% incidence in a field on that farm and at additional broadleaf tobacco farms from two other towns in Hartford County and one town in Tolland County. Lesions exhibited a pattern of concentric rings, necrotic centers and tears in the centers and margins that often resulted in a shot-hole appearance. Some lesions had chlorotic halos. **Dr. LaMondia** isolated *Rhizoctonia solani* (*Thanatephorus cucumeris*) from the margins of lesions. Multiple isolations were made and the pathogen was identified based on mycelial characteristics including multinucleate cells, septate hyphae wider than 7 µm and hyphal branches occurring at approximately right angles, constricted at the base. Healthy tobacco plants were inoculated by spraying with a mycelial suspension (1×10^5 CFU) of an isolate of *R. solani* recovered from tobacco. After 8 days, the pathogen

was re-isolated from all inoculated plants exhibiting water-soaked spots as disease symptoms. Leaves inoculated with water alone were asymptomatic. **Dr. Vossbrinck** identified the pathogen using molecular techniques. DNA was liberated from hyphae of the *R. solani* isolate by bead beating in STE buffer using 0.15 mm zirconium beads. Two microliters of the eluate was used to amplify the ITS region. Amplified DNA was purified and sequenced. The sequence was exactly the same as an isolate from Massachusetts that we sequenced in 2010. The ITS sequence confirmed our identification of this new isolate as *R. solani* anastomosis group (AG) 3. This disease has been previously reported on tobacco from South America, South Africa, and the southern United States, from Canada and from Massachusetts. Conditions were very conducive for disease as 2011 was a very wet year in Connecticut. To our knowledge, this is the first report of this disease in broadleaf cigar wrapper tobacco in Connecticut. The sequence data suggested that it may have been introduced to Connecticut from Massachusetts. We have found the target spot pathogen distributed across the tobacco producing area of Connecticut. This constitutes a serious threat as there are no systemic fungicides currently registered for control of this disease in broadleaf tobacco.

Target spot symptoms on a tobacco leaf.

Dr. LaMondia evaluated Azoxystrobin fungicide for efficacy against *Rhizoctonia solani*, causal agent of tobacco sore shin and target spot, in greenhouse and in vitro tests. Azoxystrobin significantly increased root weights and reduced disease ratings compared with untreated controls, and also reduced the percent of the stem girdled. Some phytotoxicity (observed as fleck) was visible on one or two leaves of Quadris-treated transplants about one week after treatment. Leaves that expanded after treatment did not show symptoms. Activity of azoxystrobin fungicide *in vitro* was not as effective as might be expected from what we have seen in field observations and greenhouse experiments. Dose-response

experiments of *R. solani* mycelial growth rate on azoxystrobin-amended half-strength PDA measured mycelial growth inhibition of only 30% by 1000 µg/ml a.i. Salicylhydroxamic acid (SHAM), used to inhibit the alternative oxidase pathway in a number of fungi, was tested at 100 µg/ml SHAM in media to determine the efficacy of azoxystrobin against two isolates of *R. solani* in the absence of the alternative oxidase pathway. In the presence of SHAM, the inhibition of mycelial growth was over the LD_{50} for all concentrations tested, indicating that *R. solani* does use an alternative oxidation pathway *in vitro*. However, the observed inhibition decreased over time; inhibition averaged over all azoxystrobin concentrations was 63.3% after the first 24 hours, 52.0% after 48 hours and only 26.5% during the third to fourth day of exposure ($P = 0.001$). It appears that an additional mechanism of alternative oxidation may become active over time in *R. solani*. Azoxystrobin (Quadris) is registered for management of tobacco blue mold and should be valuable as a transplant band treatment to protect shade-grown tobacco plants from sore shin caused by *Rhizoctonia solani*.

Impact: Early detection of a new pathogen allows for the development of management approaches and control before the pathogen becomes widespread. Azoxystrobin application early in the season can reduce the development of sore shin and target spot diseases.

Fungicide resistance to blue mold in tobacco:

Tobacco blue mold, caused by *Peronospora tabacina,* may be difficult to manage in commercial tobacco crops despite repeated dimethomorph (DMM) fungicide applications. To investigate whether this may be due to reduced efficacy, **Dr. LaMondia** compared fungicide efficacy in replicated field trials in certain years from 2002 to 2011 and in *in vitro* assays to evaluate sporangial germination, infection, and sporulation. In 2002 and 2004, DMM fungicide was as efficacious against blue mold as DMM plus mancozeb, a broad-spectrum protectant fungicide. In 2009 and 2011, however, DMM was intermediate to mancozeb and untreated controls. In 2002, sporangial germination on 1.2 or 12 mg/L DMM-amended media was 87.0% and 9.1%, respectively, of germination on 0 mg/L media. No germination occurred at 120 mg/L DMM. In 2011, normalized sporangial germination on 1.2, 12, and 120 mg/L DMM-amended media was 86.2, 12.3, and 3.0%, respectively. In 2002, researchers in NC, using detached leaf assays, determined baseline sensitivity to DMM was less than 1 mg/L, with no sporulation observed. In 2011, using similar assays, we determined that 37% of leaf disks floating on 1.2 mg/L DMM were diseased, with sporangiophores and sporangia present. Based on these data, efficacy of DMM against *P. tabacina* has been reduced over time

Blue mold developing on detached tobacco leaf disks in a bioassay.

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 cooperates in IR-4 projects to secure national registrations for pesticides needed by growers of ornamental plants. He also cooperates with personnel from the University of New Hampshire to annually update a bulletin for the New England Christmas tree growers. Growers from several states and Canada consult with him for advice on their vegetation control problems.

SERVICE ACTIVITIES

Requests for information

A total of 7,074 inquiries were answered at the Valley Laboratory during the past year. The majority of these queries (81%) were answered by **Dr. LaMondia** (2,216 – 90% commercial), and by **Dr. Mervosh** (2,051), and **Ms. Rose Hiskes** (1,530) 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 87 presentations to grower, professional and citizen groups, (approximately 3,780 people), were interviewed 20 times and made 225 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. His laboratory conducted diagnostics for 165 nematode samples and was approved by APHIS as a certified pinewood nematode export testing facility.

Thomas Rathier, emeritus soil scientist, continued to visit 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 4,557 soil tests were expertly performed by **Ms. Diane Riddle** during the past year. About 61% were performed for commercial growers, 37% for homeowners, 6% for municipalities, and the remainder for Station research. Of the commercial samples submitted, 57% were for landscapers; 18% for tobacco growers; 7% for vegetable growers, 8% for nursery growers; 2% for golf course superintendents; and 2% for Christmas tree growers. Diane Riddle was also completed USDA APHIS Authorized Certification Official training.

Gordon S. Taylor Conference Room

Many agricultural organizations used the conference room at the Valley Laboratory regularly for their meetings. During the past year 15 different groups used the room on 48 occasions. Our most frequent users were the Connecticut Department of Agriculture, Connecticut Rhododendron Society, Connecticut Invasive Plants Working Group, Connecticut Farmland Trust, Connecticut Council for Soil & Water Conservation, Connecticut Christmas Tree Growers Association, Connecticut Green Industries, USDA/APHIS, Co-operative Agricultural Pest Survey, Farmland Preservation, Yale Forestry School, Connecticut Nursery & Landscape Association, USDA Farm Service Agency. **Ms. Jane Canepa-Morrison** scheduled the meetings and **James Preste** arranged the furniture and ensured that the room was available after hours.

BULLETINS OF THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION PUBLISHED 2010-2011

1031 A New Connecticut Broadleaf Cigar Wrapper Tobacco with Resistance to Multiple Pathogens. 7 pages. James A. LaMondia, Ph.D. (2011)

1032 Composition of Salad Greens: A Comparison of Locally-Grown and Supermarket Produce. 8 pages. Martin P. N. Gent, Ph.D. (2011)

1033 Personal-Sized Watermelon Trials 2008-2010. 20 pages. Abigail A. Maynard, Ph.D. (2010)

TECHNICAL BULLETINS OF THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION PUBLISHED DURING 2010-2012

1 Analysis of Fertilizer Products Sold in Connectciut 2008. 20 pages. Craig Musante and MaryJane Incorvia Mattina, Ph.D. (2010)

2 Seed Germination and Purity Analysis 2009. 13 pages. Sharon M. Douglas, Ph.D. and Mary K. Inman. (2010)

3 Pesticide Residues in Produce Sold in Connecticut in 2008. 17 pages. Walter J.Krol, Ph.D., Brian D. Eitzer, Ph.D., MaryJane Incorvia Mattina, Ph.D., and Terri Arsenault. (2010)

4 Seed Germination and Purity Analysis 2010. 16 pages. Sharon M. Douglas, Ph.D. and Mary K. Inman. (2010)

5 Pesticide Residues in Produce Sold in Connecticut in 2009. 24 pages. Walter J. Krol, Ph.D., Brian D. Eitzer, Ph.D., Terri Arsenault, and Jason C. White, Ph.D. (2011)

6 Pesticide Residues in Produce Sold in Connecticut in 2010 with Concurrent Surveillance for Microbial Contamination. 29 pages. Walter J.Krol, Ph.D., Brian D. Eitzer, Ph.D., Terri Arsenault, John Fontana, Ph.D., Stacey Kinney, and Jason C. White, Ph.D. (2011)

7 Seed Germination and Purity Analysis 2011. 16 pages. Sharon M. Douglas, Ph.D., and Mary K. Inman. (2012)

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