

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION

Record of the Year

2004-2005



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

RECORD OF THE YEAR

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TABLE OF CONTENTS

INTRODUCTION	4
BOARD OF CONTROL	5
STATION STAFF	6
PLANT SCIENCE DAY 2004	9
EVENTS HELD AT THE STATION	13
Hosting of Summer Program on Plants and Animals	13
Connecticut Greenhouse Growers Association Winter Meeting	13
Plant Science Day in the Spring	13
Lockwood Lectures:	14
Dr. Christopher D. Collins	14
Dr. Kerry O'Donnell	14
Dr. Robert B. Tesh	14
Seminars:	14
Dr. Jennifer A. J. Feighny	14
Dr. Ronald J. Sarno	14
EVENTS HELD AT THE VALLEY LABORATORY	15
Christmas Tree Growers Twilight Meeting	15
Nursery and Landscape Research Tour	15
Private Applicator Pesticide License Review Class	15
Annual Tobacco Research Meeting	15
Springfield College Students' Tour	16
EVENTS HELD AT LOCKWOOD FARM	16
Farm City 2005	16
EVENTS HELD AROUND THE STATE	17
Connecticut Public Television Family Science Expo	17
THE STATION IN THE COMMUNITY	17
Visit to Albertus Magnus College	17
Food Donations	17

AWARDS AND RECOGNITION RECEIVED BY STATION STAFF	18
EXPERIMENT STATION ASSOCIATES	19
THE PUBLIC SPEAKS	20
THE PRESS SPEAKS	33
SCIENTIFIC OFFICERSHIPS AND MEMBERSHIPS ON STATE, NATIONAL, OR REGIONAL COMMITTEES	38
Department of Biochemistry and Genetics	38
Department of Entomology	38
Department of Forestry and Horticulture	39
Department of Plant Pathology and Ecology	40
Department of Soil and Water	41
Valley Laboratory	42
LECTURES, SEMINARS AND INTERVIEWS	44
ADVANCES IN KNOWLEDGE	83
Department of Analytical Chemistry	83
Department of Biochemistry and Genetics	91
Department of Entomology	96
Department of Forestry and Horticulture	112
Department of Plant Pathology and Ecology	124
Department of Soil and Water	142
Valley Laboratory	153
STATION BULLETINS PUBLISHED DURING 2004-2005	176
SCIENTIFIC JOURNAL ARTICLES PUBLISHED BY STATION STAFF DURING 2004-2005	177
Department of Analytical Chemistry	177
Department of Biochemistry and Genetics	177
Department of Entomology	178
Department of Forestry and Horticulture	179
Department of Plant Pathology and Ecology	179
Department of Soil and Water	180
Valley Laboratory	182

INTRODUCTION

The Experiment Station had another great year. Good progress was made in research, and strong efforts continued in outreach. Thousands of residents received answers to their questions, reporters published articles on new discoveries, and the Station received assistance from the Governor and legislators.

Governor Rell facilitated the appropriation of special state funds to increase the ability of plant pathologists to diagnose Ramorum blight (formerly known as Sudden Oak Death). Funds were provided for technical help, equipment, and supplies. Three laboratories have been renovated to meet the increased needs of diagnostic testing, including the use of molecular techniques. Governor Rell also appointed F. Philip Prelli to be Commissioner of Agriculture, a post which also carries the assignment to be a member of the Station's Board of Control.

Public interest in Station research programs remains high. There were numerous inquiries on mosquitoes and encephalitis viruses, ticks and tick-borne pathogens, invasive plants, forest pest problems, food safety issues, and plant diseases. Three Station publications: Identification Guide to the Mosquitoes of Connecticut, Tick Management Handbook, and a Guide to Aquatic Invasive Plants have attracted national attention and are in great demand.

This Record of the Year reports on scientific advancements, staff member interactions with the public, and comments received from residents of Connecticut.

Louis A. Magnarelli
Director

BOARD OF CONTROL

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

As of June 30, 2005, the members of the Board of Control are:

Governor M. Jodi Rell, President
Norma O’Leary, Vice President
Leon Zapadka, Secretary
Dr. Louis A. Magnarelli, Director

Commissioner F. Philip Prelli
Dr. Stephen L. Dellaporta
John Lyman, III
Dr. Donald Oliver

The Board of Control met on August 4, 2004, October 20, 2004, January 18, 2005, and April, 20 2005

On November 12, 2004 Dr. John F. Anderson retired as Director of the Station to concentrate full time on his research. He was named Distinguished Scientist. Dr. Louis A. Magnarelli was named the Station’s new Director and took over on November 12, 2004.

STATION STAFF

An experiment station exists to advance the frontiers of knowledge for mankind, and that advance depends completely upon the quality of its staff. The following was the staff of The Connecticut Agricultural Experiment Station as of June 30, 2005.

ADMINISTRATION

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

ANALYTICAL CHEMISTRY

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

BIOCHEMISTRY & GENETICS

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

BUILDINGS AND MAINTENANCE

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

ENTOMOLOGY

Dr. Kirby C. Stafford, III, Department Head
Elizabeth E. Alves
Dr. John F. Anderson, Distinguished Scientist
Erin S. Amezzane
Dr. Anuja Bharadwaj
Rosemarie J. Bonito
Dr. Carole Cheah
Terrill D. Goodman
Bonnie L. Hamid
Ira J. Kettle
Morgan F. Lowry
Dr. Chris T. Maier
Tia M. Mastrone
Tanya Petruff
Gale E. Ridge
Dr. Claire E. Rutledge
Stephen J. Sandrey
Eleanor Clare Secker-Walker
Dr. Victoria L. Smith
Dr. Kimberly A. Stoner
Heidi Stuber
Peter W. Trenchard
Michael P. Vasil
Kenneth A. Welch
Tracy Zarillo

FORESTRY & HORTICULTURE

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

LOCKWOOD FARM

Richard M. Cecarelli, Farm Manager
Rollin J. Hannan, Jr.

PLANT PATHOLOGY & ECOLOGY

Dr. Donald E. Aylor, Department Head
Dr. Sandra L. Anagnostakis
Dr. Matthew T. Boehm
Mary K. Boucher
Sandra E. Carney
Dr. Sharon M. Douglas
Dr. Wade H. Elmer
Dr. Francis J. Ferrandino

Evan M. Lowery
Dr. Robert E. Marra
Brian T. Skelly
Pamela Sletten
Peter W. Thiel

SOIL & WATER

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

VALLEY LABORATORY

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

PLANT SCIENCE DAY

A mild, partly sunny day was on tap for the 794 visitors to Lockwood Farm on Plant Science Day 2004.

The following short talks and demonstrations were all well attended:

Victoria L. SmithSudden Oak Death – A Potential New Threat
.....to Connecticut Forests
Kenneth A. WelchDiagnosis, Identification, and Processing of Insect Specimens
Theodore G. AndreadisLearning to Live With West Nile Virus in Connecticut
Thomas M. RathierThe Wonders Beneath Our Feet – Simple Explanations of
.....How Healthy Soil Works
Douglas W. DingmanGrub Diseases: What’s Going on Under the Grass?
Richard C. CowlesManaging Hemlock Woolly Adelgid

The barn exhibits displayed were:

Emerging Plant Diseases Caused by New Strains of a
Common PathogenWade H Elmer
Micro RNA Molecules: Resisting Viruses and Regulating
DevelopmentNeil A. McHale
Biological Control of Hemlock Woolly AdelgidCarole A. Cheah, Mary Kay Frost
.....Jason Parent
Dispersal and its Effect on Fawning Success Among
Male White-Tailed Deer.....Uma Ramakrishnan and Scott Williams
Using Plants to Clean Contaminated SoilJasonWhite and MaryJane I. Mattina

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

Visitors made their way to the following field plots. These plots are planted and maintained by Station scientists with the help of Farm Manager Richard Ccarelli and his assistant Rollin Hannan. Summer workers K. Dixon, M. Harris, and M. Kutys also helped to maintain the plots. Also, the farm crew helped prepare Lockwood Farm for the hundreds of visitors that came on Plant Science Day.

CHINESE CHESTNUT TREES. Sandra Anagnostakis, assisted by Pamela Sletten
SHEET COMPOSTING WITH OAK AND MAPLE LEAVES. Abigail Maynard and David Hill
ANNUAL CULTURE OF GLOBE ARTICHOKEs. Abigail Maynard and David Hill
JILO TRIALS. Abigail Maynard and David Hill
CALABAZA SQUASH. Abigail Maynard and David Hill
EFFECT OF SHADE ON QUALITY OF GREENHOUSE TOMATO. Martin P. N. Gent, assisted by
Michael Short

SUPPRESSION OF CROWN ROT OF ASPARAGUS WITH BIOLOGICAL CONTROL OF AGENTS.
Wade Elmer, assisted by Joan Bravo and E. Bruley

UTILIZATION OF COMPOST IN ONION AND LEEK PRODUCTION. Abigail Maynard and
David Hill

GRAPE VARIETY TRIAL. William Nail

COMPOSTING LEAVES USING THE STATIC PILE METHOD. Abigail Maynard and David Hill

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

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

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

ALIEN INSECTS RECENTLY DISCOVERED IN CONNECTICUT. Chris T. Maier, assisted by
J. Daigler, Morgan Lowry, S. Struble, S. Zappulla, and Tracy Zarrillo

IDENTIFICATION OF CATERPILLARS ON CONIFERS IN THE NORTHEAST. Chris T. Maier,
Carol R. Lemmon, Jeff M. Fengler, D. F. Schweitzer, and R. C. Reardon,
assisted by Tracy Zarrillo

ORCHARD CHESTNUTS. Sandra Anagnostakis, assisted by Pamela Sletten

DISPERSAL OF CORN POLLEN IN THE ATMOSPHERE. Donald E. Aylor, assisted by
Peter Thiel, M. Boehm, T. Schneider, and B. Skelly

EXPERIMENT STATION ASSOCIATES. Members of the Associates

HEIRLOOM TOMATO TRIALS. Abigail Maynard and David Hill

STIMULATION OF NATIVE MICROORGANISMS TO DEGRADE HAZARDOUS COMPOUNDS IN
COAL TAR CONTAMINATED SOIL. Joseph Pignatello and J. Li

SPIDERS OF CONNECTICUT. Charles Vossbrinck

MOSQUITO SURVEILLANCE FOR WEST NILE VIRUS. Theodore Andreadis,
John F. Anderson, and Phil Armstrong, assisted by John Shepard, Michael
Thomas, S. Finan, Bonnie Hamid, Andy Main, Terry Goodman, Michael Vasil,
F. Beecher, E. Calandrella, J. Capotosto, L. Cash, R. Ferrucci, L. Haibi,
C. Godman, K. Gohen, D. Gonzalez, C. McGee, M. Misencik, T. Petruff, S. Reiff,
C. Secker-Walker, and I. Startz

MILK AS A CONTROL FOR POWDERY MILDEW ON MUSKMELON. Francis Ferrandino and
Victoria Smith

MINIMUM FERTILIZATION FOR HOME GARDENS AMENDED BY LEAF COMPOST. Abigail
Maynard and David Hill

CROP-TREE RELEASE INCREASES BLACK BIRCH DIAMETER GROWTH. Jeffrey S. Ward,
assisted by J. P. Barsky

PROTECTING CONNECTICUT'S LAKES AND PONDS FROM NON-NATIVE WEEDS.
Gregory Bugbee, Jason White, and R. Capers, assisted by R. Selsky, J. Slusher,
and C. Manuck

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

THE "DEER" TICK *Ixodes scapularis*. Kirby Stafford, assisted by Heidi Stuber,
J. P. Barsky, C. Stoehr, S. Cardona, A. Penna, M. Nelson, and L. Colligan.

UPDATE ON THE RODENT BAITBOX FOR THE CONTROL OF THE "DEER" TICK. Kirby
Stafford, assisted by Heidi Stuber, J. P. Barsky, C. Stoehr, S. Cardona, A. Penna,
M. Nelson, and L. Colligan.

ANTIBODY RESPONSES OF DEER TO TICK-TRANSMITTED AGENTS. Louis A. Magnarelli, Uma Ramakrishnan, and Kirby Stafford, III, assisted by Tia Blevins

CONNECTICUT WEEDS AND WILD PLANTS. Todd Mervosh, assisted by J. Simmons

SYSTEMIC ACQUIRED RESISTANCE – NONCHEMICAL PLANT DISEASE CONTROL. James A. LaMondia, assisted by Jane Canepa-Morrison

INDOOR MOLDS OF HUMAN HEALTH SIGNIFICANCE. Dewei Li

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

CAULIFLOWER TRIALS. Abigail Maynard and David Hill

MILK AS A CONTROL FOR POWDERY MILDEW ON PUMPKIN. Francis Ferrandino and Victoria Smith

FUSARIUM WILT OF TOMATO. Wade Elmer, assisted by Joan Bravo and E. Bruley

CHEMICAL SUPPRESSION OF FUSARIUM ROT OF GLADIOLUS. Wade Elmer, assisted by Joan Bravo and E. Bruley

FUSARIUM WILT OF BASIL. Wade Elmer, assisted by Joan Bravo and E. Bruley

MILK AS A CONTROL FOR POWDERY MILDEW ON TOMATO AND ZINNIA. Francis Ferrandino and Victoria Smith

NATIVE WOODY SHRUBS. Jeffrey S. Ward, assisted by E. P. Belinsky

DIVISION OF FORESTRY – CT DEPARTMENT OF ENVIRONMENTAL PROTECTION. DEP Foresters

ORGANIC AGRICULTURE AND LAND CARE IN CONNECTICUT. Bill Duesing

CONNECTICUT FARMLAND TRUST. Elisabeth Moore

SOUTHWEST CONSERVATION DISTRICT. J. DeRisi

CONNECTICUT FUND FOR THE ENVIRONMENT. B. McGovern

BUTTERFLY AND BIRD GARDEN. Anne Bell, L. Starr, and B. Payton, assisted by Richard Cecarelli, Rollin Hannan, Rose Bonito and the Spring Glen Garden Club

CONNECTICUT NURSERYMEN’S GARDEN. Connecticut :Nurserymen

NURSERY AND BEE INSPECTIONS. Victoria Smith, Jeff Fengler, Ira Kettle, Steve Sandrey, and Peter Trenchard

HOW DO DISEASE-CAUSING BACTERIA EVOLVE? Douglas W. Dingman, assisted by Craig Musante

MOLECULAR APPROACHES TO FUNGAL POPULATION STUDIES. Robert Marra

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

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

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

INSECTARY PLANTINGS OF FLOWERS TO ATTRACT BENEFICIAL INSECTS. Kimberly Stoner, assisted by Erin Amezzane, Tracy Zarrillo, and Morgan Lowry

AERIAL SPREAD OF RUST SPORES IN A SOYBEAN CANOPY. Francis Ferrandino

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

BEACH PLUM TRIALS. Abigail Maynard and David Hill

PAWPAW AND JAPANESE PLUM VARIETY TRIALS. Abigail Maynard and David Hill

PLANTING OF PINOT GRIS GRAPES. William Nail

Tents were set up and other physical arrangements were done by Alfred Gagliardi and Ralph Russell under the supervision of Bancroft Nicholson of the Maintenance Department. They were helped by students from the Sound School under the guidance of Chas Mavrelion.

At 11:30 am Dr. John F. Anderson, Director, greeted visitors and staff. He then introduced Julie Belaga, Co-Chair of the Connecticut League of Conservation Voters, Vice Chairwoman of the Board of Directors of the Bank of Westport, and Board member of the National Audubon Connecticut and the Connecticut Fund for the Environment, as the Samuel W. Johnson Memorial Speaker for Plant Science Day 2004. She gave the talk "Turning Science into Public Policy". After speaking, Dr. Anderson presented her with a certificate signed by Governor M. Jodi Rell, President of the Board of Control, Norma O'Leary, Secretary of the Board of Control, and himself as Director.

The Century Farm Award for 2004 was given to Gotta's Farm of Portland. The Connecticut Agriculture and Natural Resources Association made the presentation. Gotta's Farm was founded in 1898 by John Gotta who immigrated from northern Italy. He purchased the initial 20 acres of farmland, a barn, and a 10 room house for \$1,100 with money he saved while operating a fruit store in New York City. Initial crops grown were fruit and tobacco. Dairy cows and chickens were also raised on the farm. Gotta's is presently owned by Richard Gotta, great grandson of John Gotta. He lives on the farm with his wife Jackie and their son Richard and daughter Elizabeth. Richard also has a son Christopher who is a local landscaper. Richard's grandfather Leo took over the farm around 1918 and began growing a variety of vegetables. Richard's father Robert, uncle Jim Kane and aunt Jennie Kane became partners with their father in the late 1940s. Their first farm stand was built in 1947, and the cow's were sold in 1951. Richard's father became the sole owner of the farm in 1968. When he died in 1973 Richard and his mother, Helen became the operators. This diversified and well operated farm of 85 acres near the Connecticut River has 50 acres of sweet corn, 13 acres of apples, peaches, pears, plums, and nectarines, and 11 acres of tomatoes, peppers, cucumbers, melons, pumpkins, strawberries, and cut flowers. Pick-your-own is a feature for customers interested in fruit and strawberries at appropriate times during the year. Annual bedding plants, perennials, hanging baskets, and potted plants are grown under the 35,000 sq. feet of greenhouse space. A new farm stand with a bakery was completed in 2002. A satellite farm stand is located on Route 66 in Portland. Richard Gotta is a member of several Connecticut agricultural organizations including the Connecticut Pomological Society, the Connecticut Farm Bureau, and the Connecticut Greenhouse Growers Association.

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

Plant Science Day 2004 was a very successful day. From the preparation of Lockwood Farm by the farm crew, the setting up of tents and equipment by the farm and maintenance crews, and the manning of exhibits and field plots, information tables, and refreshment stands by professional, technical and clerical staff, all did their part to make the day enjoyable and educational for all who attended.

EVENTS HELD AT THE STATION

HOSTING OF SUMMER PROGRAM ON PLANTS AND ANIMALS

On July 13, 2004 Dr. Sharon Douglas organized and hosted a visit to the Station for a group of students from Wintergreen Magnet School in Hamden who are in the summer program on plants and animals. The program included talks by Stephen Sandrey on “Bees and beekeeping,” Ken Welch on “Exploring the world of insects,” Dr. Sharon Douglas on “Plant diseases and their impact on our lives,” Dr. Jeffrey Ward on “All about trees,” Dr. Neil McHale on “Plant genetics,” and Dr. Douglas Dingman on “Genetic engineering: Past, present, and future”.

CONNECTICUT GREENHOUSE GROWERS ASSOCIATION WINTER MEETING

On January 5, 2005 The Connecticut Greenhouse Growers Association Winter Meeting was held in Jones Auditorium. There were 107 registrants at the meeting. This meeting has been held annually at the Station for more than 60 years. Director Louis A. Magnarelli welcomed the group and gave them an update on research being done at the Station. Dr. Wade Elmer organized and hosted the event. A large lunch was served to the group. At the end of the day the remaining food from the luncheon was donated to the Downtown Evening Soup Kitchen.

PLANT SCIENCE DAY IN THE SPRING

On April 18, 2005 around 100 people attended Plant Science in the Spring held in Jones Auditorium. Vickie Bomba-Lewandoski planned and hosted the event. The speakers were Dr. Sharon Douglas who spoke on “Ramorum Blight in Connecticut”; Dr. Chris Maier who spoke on “The Invasion of Alien Insects”; and Dr. Robert Capers who spoke on “Invasive Aquatic Plants: Why They’re a Problem and What We’re Doing About It”. The new website for the aquatic weeds program was introduced by Roslyn Selsky. Greenhouse and laboratory tours were also available and were conducted by Terri Arsenault, Regan Huntley, Lisa Kaczinski, and Tia Mastrone. Dr. Donald Aylor demonstrated Efficiency of Pollination in Corn Plants; Dr. MaryJane Incorvia Mattina spoke on “Theory and Practice of Analytical Chemistry”; Dr. John Anderson allowed visitors a look in on the Biosafety Level 3 Laboratory (mosquito/virus analyses); and Dr. Theodore Andreadis showed visitors around the Mosquito Laboratory and explained the work going on there. Staff were also available to answer questions on plant diseases, soil testing, insect identification, and weed questions. Set up for the event was done by Fred Gagliardi and Roberta Milano-Ottenbreit.

LOCKWOOD LECTURES:

Dr. Christopher D. Collins

On July 30, 2004 Dr. Christopher D. Collins, Senior Lecturer in Environmental Pollution, Department of Environmental Science and Technology at Imperial College of Science, Technology, and Medicine in South Kensington, London, England, gave the Lockwood Lecture: “Phytoremediation of Organic Pollutants” in Jones Auditorium.

Dr. Kerry O’Donnell

On April 12, 2005 Dr. Kerry O’Donnell, Microbial Genomics and Bioprocessing Research, Agricultural Research Service, Peoria, Illinois, gave the Lockwood Lecture “Discordant Evolution of Fusarium Head Blight Species and Their Toxins: Evidence From Multigene Genealogies” in Jones Auditorium.

Dr. Robert B. Tesh

On June 21, 2005 Dr. Robert B. Tesh, George Dock Distinguished Professor, Department of Pathology, Center for Biodefense and Emerging Infectious Diseases at the University of Texas Medical Branch in Galveston, gave the Lockwood Lecture “Recent Field and Experimental Studies on West Nile Virus Infection” in Jones Auditorium.

SEMINARS

Dr. Jennifer A. J. Feighny

On April 27, 2005, Dr. Jennifer A. J. Feighny of the Department of Biological Sciences, University of Northern Colorado, presented the seminar “Acoustic Form and Signature Characteristics of Male Wapiti Bugles” in Jones Auditorium. The seminar was sponsored by the Department of Forestry and Horticulture.

Dr. Ronald J. Sarno

On May 4, 2005, Dr. Ronald J. Sarno of the Department of Biology, University of South Florida, presented the seminar “Juvenile Survival, Genetic Variation, and Conservation of Guanacos in Southern Chile” in Jones Auditorium. The seminar was sponsored by the Department of Forestry and Horticulture.

EVENTS HELD AT THE VALLEY LAB

CHRISTMAS TREE GROWERS TWILIGHT MEETING

On July 20, 2004, more than 60 Christmas tree growers and professionals attended the Christmas Tree Growers Twilight Meeting at the Valley Laboratory in Windsor. The meeting is sponsored annually by the Experiment Station and the Connecticut Christmas Tree Growers Association and is organized by Thomas Rathier. Attendees heard the following presentations: "Conifer transplant survival and conifer nutrition," by Thomas Rathier; "Managing insects and mites in conifers," by Dr. Richard Cowles, "Managing weeds in Christmas tree plantations," by Dr. Todd Mervosh, "Connecticut weed display," by Dr. Todd Mervosh and Jeremy Leifert. Richard Horvath, Mike McHill, Matt Deltenre and Jeremy Leifert provided assistance with planning and preparation.

NURSERY AND LANDSCAPE RESEARCH TOUR

On July 20, 2004 more than 40 nursery and landscape professionals attended the Nursery and Landscape Research Tour at the Valley Laboratory. The tour is sponsored annually by the Experiment Station and organized by Thomas Rathier. Director John F. Anderson welcomed the group. Attendees heard about the following plots: Conifer transplant survival and nutrition, by Tom Rathier; Managing horsetail in landscapes, by Dr. Todd Mervosh; Managing root knot nematodes in landscapes, by Dr. James LaMondia and Steven Lamoureau; CAES/CNLA education gardens, by Rose Hiskes; Connecticut weed display, by Dr. Todd Mervosh and Jeremy Leifert; Connecticut insect display, by Rose Hiskes; Invasive pest display, by Dr. Victoria Smith; Tolerance of herbaceous perennials to herbicides, by Drs. John Ahrens and Todd Mervosh; and Comparison of granular herbicides for residual weed management in containers, by Dr. Todd Mervosh. The meeting concluded with the following short talks: Managing hemlock woolly adelgid, by Dr. Richard Cowles; Sudden oak death, by Dr. Sharon Douglas; Disease and plant problem update, by Dr. Sharon Douglas; Transplant survival of landscape plants, by Timothy Abbey; Arthropod and pesticide update, by Timothy Abbey. Richard Horvath, Jane Morrison, John Winiarski, Mike McHill, Matt Deltenre, Jeremy Leifert, Laura Heath, and Jill DeMers provided assistance with planning and preparation.

PRIVATE APPLICATOR PESTICIDE LICENSE REVIEW CLASS

28 Christmas tree growers attended a review class to prepare for the CT Private Applicator License at the Valley Laboratory on November 9 and 18, 2004. The class was instructed by Diane Jorsey of the CT DEP, and Rose Hiskes and Tom Rathier of the Valley Laboratory

ANNUAL TOBACCO RESEARCH MEETING

145 people attended the Connecticut Agricultural Experiment Station's annual Tobacco Research Meeting held at the Suffield High School auditorium on February 22, 2005. Director Dr. Louis A. Magnarelli and Harrison Griffin, Director of the Suffield Vo-Ag

Program, welcomed growers. The meeting addressed many topics of concern to growers. Department of Agriculture Commissioner Bruce Gresczyk spoke to growers about branding Connecticut tobacco. Dr. James LaMondia spoke about research on management of tobacco pathogens including blue mold and tobacco mosaic virus and results of the breeding program for pathogen resistance. Thomas Rathier spoke about nutrient management under plasticulture, black root rot problems and curing problems in 2004. Dr. Todd Mervosh discussed herbicide use and experiments in tobacco. Ross Eddy of the Farm Services Administration provided updates on their services to growers. Robin Helrich of the New England Agricultural Statistics Service provided updates on their services to growers. Christina Berger of the CT DEP spoke about worker protection and pesticide storage requirements. Jeremy Forrett of the USDA Risk Management Agency spoke about crop insurance and other services to growers, and Kathy Johnson of NRCS spoke about EQIP grants available to growers. Dr. Matt Mahoney of Bayer and Steve Zapack of Syngenta updated growers on recent changes in products available for tobacco. Jane Canepa-Morrison and Rich Horvath assisted with much of the behind the scenes work for the meeting. The meeting qualified for pesticide applicator recertification credit in both Connecticut and Massachusetts.

SPRINGFIELD COLLEGE STUDENTS TOUR VALLEY LAB

On March 31, 2005 over 100 undergraduate and graduate students from the Sports Management and Recreation Department at Springfield College toured the Valley Laboratory. They heard presentations from Dr. James LaMondia who gave an overview of the Station and spoke on plant pathology research at the Valley Lab; Rose Hiskes who spoke on the CAES/CNLA educational landscape, John Winiarski who talked about soil testing; and Tom Rathier who spoke on the diagnostic services provided by the Station.

EVENTS HELD AT LOCKWOOD FARM

FARM CITY 2005

On May 17, 2005 The Station hosted Farm City Week 2005 at Lockwood Farm. More than 925 students from 28 classes in 16 different schools in the New Haven County school district participated. Students interacted with stations showcasing animals, soils, integrated pest management, bees, wildlife, and biotechnology. They also attended short informational sessions from the CT Farm to School Program, CT Greenhouse Growers Association, and NOFA, and viewed displays provided by the CT Farm Bureau Association, and 4-H, and were able to observe chicken eggs hatching by a display provided by UCONN. Station staff who participated were Vickie Bomba-Lewandowski who planned and coordinated the day, Richard Cecarelli, Rollin Hannan, Ira Kettle, Steve Sandrey, Peter Trenchard, Rose Hiskes, and Scott Williams.

EVENTS HELD AROUND THE STATE

CONNECTICUT PUBLIC TELEVISION FAMILY SCIENCE EXPO

On April 7-10 The Station had an exhibit at the Connecticut Public Television Family Science Expo at the Expo Center in Hartford. The booth drew a lot of attention and gave educational hands-on experiences to children who visited. The booth was manned by Vickie Bomba-Lewandoski, Rose Bonito, Rose Hiskes, Ira Kettle, Jane Canepa-Morrison, Lisa Kaczynski, and Tia Mastrone.

THE STATION IN THE COMMUNITY

VISIT TO ALBERTUS MAGNUS COLLEGE

On May 17, 2005 Drs. MaryJane Incorvia Mattina, Brian Eitzer, David Stilwell, Walter Krol, and Craig Musante, William Iannucci-Berger, and Terri Arsenault visited the new science building at Albertus Magnus College. The tour was conducted by Albertus science faculty. The group discussed cooperation between the two institutions including possible student internships.

FOOD DONATIONS

Lockwood Farm

Close to 17,000 pounds of tomatoes, peppers, summer squash, eggplant, winter squash, pumpkins, leeks, Indian corn, onions, potatoes, gourds and cauliflower produced on Lockwood Farm were donated to area food banks and relief agencies. The recipients were: St Vincent de Paul in Waterbury, High Meadows in Hamden, St. Ann's Church in Hamden, the Connecticut Food Bank in East Haven, St. Brendan's Church in New Haven, Gianelli's Preschool in Middletown, and Casa Otonal in New Haven. Produce was also brought to Senator Crisco's Senior Fair and the Big E. Farm Manager Richard Ccarelli and Rollin Hannan handled the distribution of the produce.

Valley Laboratory

A total of 10,250 pounds of tomatoes, pumpkins, cauliflower, squash and leeks grown at the Valley Laboratory were donated to Foodshare of Hartford and 2,800 pounds of pumpkins were given to Foodshare, the Boy Scouts, the Sound School and Northwest Park of Windsor. Drs. Abigail Maynard, David Hill, Todd Mervosh and James LaMondia generated the fresh produce, and Dr. LaMondia organized the distribution effort. The Valley Laboratory also loaned irrigation equipment to the Connecticut Epilepsy Foundation in support of their Mud Volleyball Tournament Fundraiser. Mr. Horvath coordinated the distribution of the irrigation equipment.

AWARDS AND RECOGNITION RECEIVED BY STATION STAFF

On July 20, 2004 a Liberty Elm tree was presented in recognition of the excellent works of Dr. Mark McClure. The presentation was made by Ron Vidal, Tree Warden of the Town of Suffield at the Nursery and Landscape Research Meeting held at the Valley Laboratory.

In August 2004 Dr. Sandra Anagnostakis was elected President of the Northern Nut Growers Association.

In September 2004 Dr. Dewei Li was selected to serve on the Technical Advisory Panel of the American Industrial Hygiene Association.

In November 2004 Dr. John Anderson received the Connecticut Farm Bureau's Recognition Award for service to agriculture

In November 2004 Dr. John Anderson received the Distinguished Service Award from the Connecticut Greenhouse Growers Association

In November 2004 Dr. John Anderson received a Certificate of Special Congressional Recognition

In November 2004 Dr. John Anderson received a Certificate of Appreciation from the USDA

In November 2004 Dr. John Anderson received a Proclamation of Appreciation from the City of New Haven

In December 2004 Rollin Hannan was elected to the National Honey Commodities Board for the American Farm Bureau

On December 7, 2004 Dr. John Anderson was presented the Award of Merit by the Connecticut Pomological Society at their annual meeting

In January 2005 Dr. Louis Magnarelli was elected a Councilor of the Connecticut Academy of Science and Engineering for a term of July 1, 2005 through June 30, 2011

On January 20, 2005 Dr. Jeffrey Ward was elected President of the Connecticut Tree Protective Association at the annual meeting in Plainville, CT

On April 7, 2005 Dr. Victoria L. Smith was nominated to the National Cooperative Agricultural Pests Survey (CAPS) Committee as a representative of the Eastern Region

EXPERIMENT STATION ASSOCIATES

On March 15, 2005 the Experiment Station Associates held their Fourteenth Annual Meeting in Jones Auditorium. Dr. Louis A. Magnarelli, Director, spoke on Station highlights. Dr. Robert Marra spoke on Sudden Oak Death (Ramorum Leaf Blight), and Dr. MaryJane Incorvia Mattina gave the talk “Analytical Chemistry: Theory and Practice”. Following the meeting Dr. Mattina gave a guided tour of her laboratory.

THE PUBLIC SPEAKS

In July, 2004 Robert Heffernan wrote the following to Dr. Richard Cowles and Dr. Todd Mervosh. “You created a great program on spraying for our Summer Field Day, and we’re so grateful for your work & time invested in it. Both of you are valued advisors to our industry. Thanks so much!”

On July 13, 2004 Connecticut Attorney General Richard Blumenthal wrote the following to Dr. Kirby Stafford. “Thank you very much for forwarding me your Tick Management Handbook, which is extraordinarily interesting and informative. I will be sure to share the handbook with my colleagues. Many thanks, and warmest regards.”

On July 14 Donald W. Day wrote the following to Dr. Sharon Douglas. “First, thank you for your professional reply and accompanying information, *Volutella pachysandra*. I am so overwhelmingly impressed – stunned – I should say – from receiving such professionalism and personal response. This truly is a model of “uncommon excellence. ...”

On July 30, 2004 Joe Lesiak of the New Haven Ecology Project wrote the following to Dr. Sharon Douglas. “Thank you so much for taking time out of an especially difficult day to talk with us about the very important work you do in the public good. We hope to see you again next year. We will not forget learning about “Dog-vomit fungus” and the scientific methods as applied to our daily lives.”

In August, 2004 Cherry Watkinson of Cheshire Public Schools wrote the following to Dr. Theodore Andreadis. “On behalf of the School/Business Partnership Council, I would like to sincerely thank you for your partnership with our schools this past academic year. It has been said many times, that “It takes a whole village to make a child.” We are very fortunate that our business community fully supports this belief by participating in hundreds of partnership activities each year. Our staff and students greatly appreciate your time and efforts to invest in the future of our community. Whether your activity lasted for thirty minutes or thirty hours, you have touched a child and you HAVE made a difference. We thank you.”

On August 2, 2004 Chris Donnelly of the Connecticut Tree Protective Association wrote the following to Dr. Sharon Douglas. “Let me first thank you for Connecticut Agricultural Experiment Station’s participation in the 2004 summer meeting of the Connecticut Tree Protective Association. It was indeed a successful meeting, due in no small part to the contributions and enthusiasm of the exhibitors. We do very much appreciate your being a part of this meeting. ... We are looking forward to your participation in our 2005 Annual Meeting to come up on January 20, a mere 6 months away. We greatly value what you offer to the Association and to the practice of tree care in Connecticut, and hope to see you there.”

On August 5, 2004 Mildred Rick, Corresponding Secretary for the Sharon Garden Club wrote the following to Dr. Todd Mervosh. “On behalf of the Sharon Garden Club, please

accept our thanks for your most comprehensive presentation. All who attended expressed their appreciation of all your efforts in making it so interesting and informative. Please also accept our apologies for not letting you get a chance to give your own talk. I'm afraid many members let their enthusiasm get the best of them. Again, many thanks, and hope that you will come again."

On August 13, 2004 R. C. Josephson wrote the following to Dr. Sharon Douglas. "This is just to thank you very much for sending info on "Why trees and shrubs fail to flower". My dogwood will bloom next spring, I'll bet! Let you know."

On August 20, 2004 Leigh Tunick of the Sharon Garden Club wrote the following to Dr. Todd Mervosh. "What a very special program you presented to our Sharon Garden Club, and bringing all those plants was greatly appreciated by all our members. I've been asked by some that if you were willing to return next year to talk of garden weeds and their eradication, that would be great. But having that great display and giving us specific info on some of the worst "plant thugs" was very useful."

In September, 2004 Judith Nelson, MPH, Director of Health in the Westport Weston Health District wrote a letter to the residents of the Westport Weston Community upon completion of its five-year Target Lyme Disease project. She wrote "... A key partner in the TLD effort was Dr. Kirby C. Stafford, III, of the Connecticut Agricultural Experiment Station in New Haven. Dr. Stafford, an entomologist and nationally recognized expert on ticks, provided the scientific underpinnings for the TLD educational efforts. Dr. Stafford has just published a comprehensive *Tick Management Handbook* that is the last word on tick control and personal protection. It is fitting that he has agreed to allow TLD, as its final contribution to the community, to distribute his handbook to every homeowner. Please take the time to read and understand the tick control concepts in this book. They will help you and your family avoid Lyme disease and other tick-borne illnesses. ..."

In September, 2004 Libby Taylor, Coordinator for the Northwest Park Country Fair and wife of the late Gordon Taylor, former Chief Scientist at CAES Valley Laboratory, wrote the following to Dr. Todd Mervosh and Jeremy Leifert. "The Pumpkins were wonderful and real kid and adult pleasers! You are terrific to bring them to the Park – such a tremendous help! We truly appreciate the two truck loads that you gave for the Country Fair – that is a huge donation! THANK YOU!!"

On September 17, 2004 Alan Smith wrote the following to Dr. John Anderson. "This spring and summer I had occasion to call the Experiment Station regarding questions about home gardens. I spoke with Mary Inman who was very helpful and promptly mailed useful information which I shared with others. I have been acquainted with the Station for 30 years while working with a health district in Connecticut. Questions about insects, pesticides, etc. were always answered by the staff, or a correct referral given. I also attended many conferences hosted by the Station at 123 Huntington Street, New Haven. I hope your service will continue."

On October 8, 2004 Bernard J. Silkowski of Northeast Utilities occupational Safety and Health Department, wrote the following to Gale Ridge and Kenneth Welch. “Thank you for your help in the past month concerning our investigation into possible causes of “biting sensations” among employees in our Customer Service Department in Wethersfield. We appreciate the time you’ve taken to answer our questions on the phone, provide information, and analyze the vacuum samples Although we haven’t identified the cause(s) yet, the information and advice you’ve provided are helpful in our ongoing effort. We sincerely appreciate the professional and timely service both of you provide through the Connecticut Agricultural Experiment Station.”

On October 8, 2004 Leslie J. Mehrhoff, Director of the Invasive Plant Atlas of New England, Torrey Herbarium, University of Connecticut, wrote the following to Dr. Todd Mervosh. “You and your committee pulled off a top-shelf symposium. Everybody with whom I spoke thought it was great and learned a lot. It was impressive how many people showed up. Again, thanks for the great day.”

On October 12, 2004, Donna Ellis, Extension Educator in the Department of Plant Science, UCONN, Storrs, wrote the following to Dr. Todd Mervosh. “I can’t thank you enough for all the hard work you put into the symposium. Having headed up the last planning committee, and knowing how much of a larger scale this one was, you did an excellent job organizing everyone and all the tasks to be accomplished. BRAVO!! . . .Mary Musgrave congratulated us all on a successful symposium, and I continue to hear great things about the day from those who attended. . . .”

On October 15, 2004 Christin e-mailed the following to Dr. Jeffrey Ward. “Thanks again for taking the time to bring my kids into a bit of the forester’s world. You really are a generous soul, and very good with kids. See you next year.”

On October 19, 2004 David Bloniarz e-mailed the following to Dr. John Anderson. “Thank you very much for making the arrangements for Dr. Richard Cowles to speak at the 2005 University of Massachusetts Community Tree Conference, planned for March 29th in Amherst. After speaking with Dr. Cowles, I know that he will do a good job, and I hope that he will take the opportunity to introduce the conference attendees to the great work that you are leading at the CT Agricultural Experiment Station. I appreciate your assistance and interest in helping to make the conference a success. Again, thank you for your help.”

On October 22, 2004 Mary L. deManbey, Program Manager of CBIA Education Foundation wrote the following to Dr. John Anderson. “On behalf of CBIA, we would like to once again thank you for your participation in the National Science Foundation ATE Grant Summer Externship Program. To show you our appreciation, we are enclosing a Certificate of Appreciation. As the grant enters its final year, we hope you will feel free to make suggestions and participate in associated activities that will enhance our teachers’ understanding of technology in the workplace. We welcome your comments, and look forward to working with you in the future.”

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On October 25, 2004 Lieutenant J. D. Smith, District Manager, Department of Police Service, Hill North District wrote the following to Richard Cecarelli. “On behalf of children of Stevens Street, we want to thank you for making Sunday’s Halloween Craft Workshop and party such a success. We had over seventy children make costumes, spiders, ghosts, candy apples, jack-o-lanterns and got their faces painted. It was also great to see so many moms helping their children. But none of it could have been done without the generous support of people such as you. And because a portion of the event was devoted to Halloween safety including every child being given a glow-in-the-dark trick or treat bag and a glow stick, you helped us help them have a safer Halloween night. Once again thank you for the pumpkin donation. We look forward to a continued partnership in the near future. Feel free to contact me should you have any questions or should I be of any assistance to you and your organization. The pumpkins made the party! Thanks Richard.”

On October 27, 2004 Cassandra Godman wrote the following to Dr. John Anderson. “I just wanted to write you a note to thank you for writing my recommendations. I know in your busy schedule it must have taken a significant amount of your time. I will keep you posted on the status of my applications. Once again, thank you!”

On November 2, 2004 Liz Stanley wrote the following to Dr. Sharon Douglas. “Many thanks for the wonderful program you presented to the Gardening Study School students. The comments were all positive. They felt they learned and that you presented the material in an easy to understand format. I’ve read through the evaluation sheets and the other notable thing that the students commented on was the “PowerPoint” guide you provided for them. That was the first time I’d seen that done and certainly wish everyone who does such a program would provide the easy to follow printout. Again, thank you.”

On November 5, 2004 Dr. Jack Fong, coordinator of the 19th Annual Pediatrics Update Conference at Danbury Hospital, wrote the following to Dr. Kirby Stafford. “I do not know words that will truly express our deepest appreciation of your contribution to the success of our Annual Conference. The attendees just loved your presentation. I shall forward to you details of evaluations by attendees once I have them tabulated. I also want to thank you for your generosity in sending me additional copies of your ‘Tick Management Handbook’. ... Thank you again.”

On November 29, 2004 Daryll C. Borst, Professor of Biology at Quinnipiac University, wrote the following to Dr. Robert Marra. “I would like to thank you for taking time to

discuss your research on cankers of black birch. Your discussion on how *Neonectria galligena* infects black birch and the economic impact of cankers on black birch was most appropriate for my students. Your discussion vindicated my insistence on understanding the importance of pathogenic fungi. It is important that students learn that applied, practical research is just as important as pure research. Because biology today emphasizes molecular research, it has become my mission to expose my students to the world of organisms. Exposure to serious plant science research is a crucial segment of my botany course. Thank you again for your talk to my botany students.”

On November 29, 2005 Daryll C. Borst, Professor of Biology at Quinnipiac University, wrote the following to Dr. Wade Elmer. “I would like to thank you for taking time out of your busy schedule to discuss your current research with my botany students. Biology today is emphasizing molecular research almost to the exclusion of organisms; therefore exposure to serious plant science research is a crucial segment of my botany course. Your discussion on how mycotoxins pose a severe risk to human and animal health was an eye-opener. Your talk about the effects of Fusarium on our food and flower crops really brought home to my students how knowledge of organisms is equally important as knowledge of molecular biology. Our students live mainly in an academic world of molecular biology and seldom appreciate that world of plants. Your comments on the fact that there is no effective fungicidal treatment of Fusarium, and that the only way to combat Fusarium is by developing resistance, got the message across that there isn’t a quick fix to all of our problems. Your talk on your research was very meaningful. Thank you again for your presentation to my botany class.”

On November 29, 2004 Dr. Daryll C. Borst wrote the following to Dr. Sharon Douglas. “I would like to thank you for taking time this year to speak to my botany students about your work with plant diseases. Unfortunately, a thirteen week semester does not allow me to spend much time on every aspect of botany, and plant pathology is only superficially covered. Your presentation provides my students with an excellent overview of the importance of plant pathology, and how your work specifically provides this valuable service to the citizens of the State of Connecticut. The statistics of the inquiries to your section emphasize this. Your talk about the historical impact of plant pathogens such as late blight of potatoes and coffee rust, underscored to my students how relevant plant science is to their daily lives. Your explanation of the interrelationships of the plant disease “triad”, and the steps for disease prevention and control, clearly showed the complexities and importance of plant pathology. Your work at the Station always provides my students with new career possibilities that they were not aware of. Thank you again for your talk to my botany students.”

In December, 2004 Sandi Wilson of the Fairfield County Master Gardeners wrote the following to Dr. Jeffrey Ward. “Thank you so much for speaking to the Master Gardeners at our Volunteer Appreciation Lunch. Everyone commented that they really enjoyed your talk. I really did too. I appreciate your taking the time to come and share your knowledge with us. I hope your holidays were happy. Have a great 2005.”

On December 9, 2004 Carol Donahue wrote the following to Mary Inman. “Thank you so much for your help with my jade plants! You are a very patient and precise person. I still find it hard to believe that there is a place in Connecticut that one can go to for help with this plant! I came home and watered my plants – not too much! Plus, I’m crossing my fingers that they will recover. ... Thank you.”

On January 7, 2005 Adam Moore wrote the following to Dr. Jeffrey Ward. “Thank you very much for taking the time to spend a day in the woods with me last month. It was great to get outside! I’m looking forward to reading your paper in the Northern Journal. Also, congratulations on your promotion to Chief of the Department of Forestry and Horticulture! You will do an excellent job and I wish you the best. I wish you and your family all the best in 2005.”

On January 19, 2005 Nancy Wogman, Affiliate Director of the Future Problem Solving Program of Connecticut, wrote the following to Dr. Jason White. “On behalf of the Future Problem Solving Program of Connecticut, I wish to thank you for the outstanding presentation you did for our students and teachers on Wednesday, January 19, 2005. You were so professional and knowledgeable. I have heard nothing but positive remarks. You gave the students a unique perspective that I’m sure will be helpful as they attempt to solve whatever future scene they get in the next round of competition.”

On January 30, 2005 Kathleen Litchfield, NOFA/Mass Organic Land Care Course Coordinator, wrote the following to Dr. Kirby Stafford. “Thank you so much for presenting Ticks & Lyme Disease during NOFA/Mass’ 4th annual course in Organic Land Care. The students really enjoyed your presentation and I really enjoyed meeting and working with you! Thank you also for generously donating your speakers’ fee of \$90 to NOFA/Mass’ Organic Land Care Program. The NOFA/Mass course this year was a great success, thanks to you and our other 17 devoted speakers! We hosted 44 professional land care business owners, municipal employees and enthusiasts, each of whom enjoyed five full days of presentations, case studies and informal networking in their fields. The demand for organic landscaping services has never been greater and we appreciate your support of this important offering. I look forward to working together in the future!”

On February 3, 2005 Robert J. Canelli, Principal of Wilbur Cross High School, wrote the following to Vickie Bomba-Lewandoski. “On behalf of Wilbur Cross High School staff and students in our Science Department we would like to thank you for participating as a judge in our school Science Fair. Wilbur Cross’s Fair would not have been the success that it was without people volunteering their time to assist in recognition of the hard work that the students put into their projects. Cross’s 2005 Science Fair has started what we hope to be a long tradition of academic excellence and you were an integral part. Thank you again and we would like to take this opportunity to invite you to be a mentor/judge in next year’s fair.”

On February 4, 2005 Donna Planeta wrote the following to Dr. Sharon Douglas. “The Open Door group really enjoyed your presentation on house plants. We had many

favorable comments. You really do a great job. Thank you for taking the time to come for our group. It was much appreciated.”

On February 11, 2005 Mike Whaling e-mailed the following to Dr. Sharon Douglas. “You are amazing! Thank you so much for your insightful and quick response. Yes, it is a Texas variety. Yes, there is lots of green under the limbs and bark. I will wait till about six more weeks before assessing which are dead and which are not, and then prune as you have suggested. Once again, thank you so much.”

On February 15, 2005 Bob Heffernan wrote the following to Dr. Kirby Stafford. “Many thanks for your talk on the Station’s work at our Winter Symposium! Our industry loves the work of the Station and its staff. People like you are its strength.”

In February, 2005, Nancy Worthington of the Hadlyme Hall Garden Club wrote the following to Dr. Wade Elmer. “On behalf of the Hadlyme Hall Garden Club, I would like to thank you for speaking to our group on asparagus. I was very sorry to have to miss it, due to illness, but have been told you were both very pleasant and knowledgeable on the subject. Many members told me you were very comfortable speaking in front of a group and that they felt you were the best speaker we have ever had in our five years of existence. They look forward to attempting an asparagus bed. Thank you again.”

In March, 2005 Mr. Will Jones of the Connecticut Christmas Tree Growers Association wrote the following to Dr. Victoria Smith. “Thanks a lot for coming out to speak to our group. It was really appreciated.”

On March 2, 2005 Richard Tice of the Connecticut Grounds Keepers Association wrote the following to Dr. Victoria Smith. “On behalf of the Connecticut Grounds Keepers Association, I would like to thank you for your participation in our 2005 Conference & Trade Show. You played a big role in the success of the event. ... If I did not get a chance to meet you personally, I apologize but that is the price that I must pay given my responsibilities in the management of the event. It seems that there is always some detail that requires my immediate attention. I do look forward to working with you again in the future...”

On March 7, 2005 Gavin Erasmus e-mailed the following to Dr. Sharon Douglas. “Thank you very much for the time you spent with me on the telephone today, advising me about the symptoms of over-watering of young Christmas trees. It was a pleasure speaking to you and I do appreciate our advice and recommendations very much indeed. ...”

On March 8, 2005 Pat Bollettieri forwarded the following letter she had written to Representative Stripps and Senator McKinney regarding service she had received from the Station to Dr. Louis Magnarelli. “I would like to commend The Connecticut Agricultural Experiment Station for the service it provides to the citizens of Connecticut, and I would like to request your support in providing funding for this agency. Compared to some of the other over-weighted agencies that we have in Connecticut, this one

provides excellent value and a very important service. I recently dealt with the agency in trying to have what I thought was a tick identified. The person who answered the phone knew exactly where to direct my call. After I left a voice mail message, I received an almost immediate response by a staff member who researched my request while I was on the phone. I know that the Experiment Station does much more than test ticks for Lyme disease, but with this disease so rampant in Connecticut I believe that this would be reason enough to justify a state agency. I know that Attorney General Blumenthal is concerned enough about Lyme disease to have held numerous hearings on it, but the problem seems to be under the radar of most of the citizenry. Because the Connecticut Agricultural Experiment Station is in the business of protecting the health of Connecticut citizens, it is much more worthy of funding than the special interest groups that I see in the roster of Connecticut state agencies.”

On March 11, 2005 Dr. Victoria L. Smith, Deputy State Entomologist, wrote the following to Dr. Robert Marra. “Thank you for your presentation at the annual Forest Health Monitoring Workshop. This event fosters cooperation between Experiment Station scientists and the Department of Environmental Protection foresters, and your contribution is appreciated.”

On March 12, 2004, Robert Gregg of Woodbridge wrote the following to Dr. Todd Mervosh. “I thank you for your discourse on Roundup. I can see that this took quite a lot of your time and we are indebted to you. ... Because you have already spent so much time on this, I would like to suggest that you make any changes you think should be made in my suggestions for the first three paragraphs. Then I’ll use that with the rest of your discourse to give to the Board of Selectmen. Thanks again.”

On March 16, 2005 Kristie Gonsalves Harrington, President of North East Expos, Inc. wrote the following to Dr. Jeff Ward. “Thank you for presenting a seminar at the 24th Annual Connecticut Flower and Garden Show that was held at the Connecticut Expo Center this past February. The seminar portion of the show continues to increase in popularity every year. We received many positive comments from the attendees about the quality and diversity of the seminars this year. Again, thank you for speaking at the Connecticut Flower & Garden Show. I look forward to the opportunity to work with you again in the future.”

On March 21, 2005 Scott Crans, President of the New Jersey Mosquito Control Association, Inc., wrote the following to Dr. Theodore Andreadis. “The Executive Committee of the New Jersey Mosquito Control Association, Inc., along with all the members, wish to thank you for your very active participation at the NJMCA annual meeting in Atlantic City this past March. Your presentation on Epidemiology of West Nile Virus in Connecticut, USA: A Six Year Analysis of Mosquito Data 1999-2004 was very informative, timely, and much appreciated. We’ve received many compliments on the success of our meeting, and we know that this success could not have been achieved without your valued contribution.”

On March 22, 2005 David W. Gregg, Executive Director of Rhode Island Natural History Survey, wrote the following to Dr. Jeff Ward. “Thank you for taking part in the Rhode Island Natural History Survey’s 10th Annual ecology conference. There were over 180 participants, including people from a wide-range of agencies, non-profits, land trusts, and just plain folks. There were eleven speakers, sixteen posters, and nine organizational displays, plus the special showing of Salvatore Mancini’s exhibit. Several high school teachers and over a dozen high school students also attended. ... Without your efforts, the conference program would not have been nearly as rich as it was. Thank you again for supporting the conference and the Rhode Island Natural History Survey, whose mission is to provide a natural history information infrastructure for Rhode Island. ...”

On March 24, 2005 Robert L. Wick, Professor in the Plant Pathology Department of University of Massachusetts at Amherst, wrote the following to Dr. Wade Elmer. “Thanks again for an excellent presentation on Fusarium diseases. I appreciate very much, your willingness to take the time from your busy schedule to drive up here from New Haven to lecture to my Diagnostic Plant Pathology course. The students appreciate learning from someone outside the university, especially from a nationally-recognized expert in the field. I hope you can continue to contribute to our plant pathology curriculum in the future.”

On March 30, 2005 Lise Orville, Mentor Coordinator for the New Haven Science Fair, wrote the following to Dr. Theodore Andreadis. “On behalf of the New Haven Science Fair Steering Committee I would like to thank you for once again being Nick Olsen’s science fair mentor. You have been a very important part of Nick’s life over the last several years. I’m sure he told you that he was a medalist and received first prize in the Audubon awards at the Connecticut Science Fair this year. He also received a plaque for attending for six years! And finally, of course, won first prize at the New Haven Fair. Prizes aside, he has become an excellent researcher. ... He certainly has a good foundation from working with you at the CT Ag Station. ... Thank you again.”

On March 30, 2005 Marjorie Bingham and Paul Grimmeisen of the Connecticut Master Gardener Association wrote the following to Dr. Sharon Douglas. “We would like to extend our sincere appreciation to you for your informative presentation at our 12th Annual CMGA symposium on March 19th at Manchester Community College. Your participation served to encourage record attendance and enrichment to the programs’ central theme. A significant portion of funds the Symposium generates serves to help support education and outreach projects linked to the Connecticut Master Gardener programs throughout the state. Again, thank you for helping to make our major event of the year such a success.”

On March 31, 2005 Jody Gangloff-Kaufmann, NYS IPM Program Coordinator – Cornell University, wrote the following to Dr. Kirby Stafford. “I would like to express my gratitude for your participation in the Public Health Workshop at the Northeast Integrated Pest Management Conference on Community and Urban Pest Management. Your talk on tick IPM was very informative. Even though attendance was a little low, partly due to the many concurrent sessions, the participants in our session gained much needed

information on public health and tick IPM. The discussions were excellent. The session and the conference were both a success. Thank you, again, for your participation. And, it was great to finally meet you. I hope that we may collaborate in some way in the future.”

On March 31, 2005 Margery Winters of the Roaring Brook Nature Center, wrote the following to Dr. Kirby Stafford. “On behalf of Roaring Brook Nature Center, I would like to thank you so very much for your presentation last Thursday night at the Nature Center. Your talk on Lyme Disease was most informative and entertaining. I regret that more people were not present to enjoy it – I think the final (I hope) snowstorm of the winter was enough to keep many home. However, the audience that was present learned a great deal and was most appreciative of the information. My apologies that, in their enthusiasm, they kept you until 10pm! And you had such a long ride home. ... Thank you again for making time for us in what I am sure is a very busy schedule.”

On April 2, 2005 Dr. George Whitney wrote the following to Dr. Kirby Stafford. “Your presentation on ticks and Lyme Disease was a highlight of the many presentations of Station scientists to members of the Institute for Learning in Retirement and was a worthy contribution to our effort. It was not only worthy but remarkable in the depth and professionalism. This is a word of thanks for a job well done. Spreading knowledge and making friends is a worthy enterprise. Thank you for all of us.”

On April 2, 2005 Dr. George Whitney wrote the following to Dr. Sharon Douglas. “Your presentation on Sudden Oak Death was a remarkable presentation in depth and quality of the many presentations of Station scientists to members of the Institute for Learning in Retirement and was a worthy contribution to our effort. It was not only worthy but remarkable in depth and professionalism. This is a word of thanks for a job well done. Spreading knowledge and making friends is a worthy enterprise. Thank you for all of us.”

On April 4, 2005 David Kittredge of the University of Massachusetts, Amherst wrote the following to Dr. Victoria Smith. “Greetings workshop speakers, and thank you very much for traveling to Enfield, Connecticut during some very wintry weather on 10 February to participate in the Yankee Division SAF’s continuing forestry education event on Stand Development. There were approximately 150 people in attendance, and when you review the enclosed evaluation results, I think you will agree that the audience considered it a worthwhile experience. ... The fact that the turnout was so strong, and the comments and participation of the audience so engaging, is a firm indication that the workshop successfully met the overall goal of bringing practitioners up to speed on a variety of subjects that they may have not had exposure to since they were in forestry school. ... Thank you again very much for traveling to Enfield and participating in the workshop. Excellent speakers are the cornerstone of any continuing forestry education event, and the evaluations indicate that we were successful in inviting a talented and effective group this time. Thank you for helping provide a continuing opportunity to practicing professionals in southern New England.”

On April 12, 2005 Elizabeth O. Fearon, President of the Garden Club of Woodbridge, wrote the following to Michael Last. “On Wednesday, April 6, Richard Kiyomoto presented a superb slide presentation on irises at a joint meeting of the Bethany and Woodbridge Garden Clubs. His comments, response to questions and wonderful array of plants provided an excellent educational opportunity for our joint membership. At the request of Richard Kiyomoto, each Club is making a contribution ... to the Connecticut Agricultural Experiment Station. As Garden Club members we appreciate the important work being done by the CAES and also the opportunity for the members of the Federated Garden Clubs of Connecticut to meet at your facility.”

On April 12, 2005 Dr. Thomas F. Draper, Co-Chair of the Lyme Disease Task Force and Director of the Office of Community Medicine at Danbury Hospital, wrote the following to Dr. Kirby Stafford. “Please accept this donation to The Connecticut Agricultural Experiment Station from the Danbury Hospital Medical Staff to help further your research in the prevention of Lyme Disease and related tickborne infections. Your presentations at the Hospital have been an enormous assistance in the education of our physicians and our communities.”

On April 13, 2005 Rob Rork wrote the following to Dr. Jeffrey Ward. “Thanks for doing a “Great” presentation for the forestry portion of the Connecticut Envirothon. Several teachers said that you were excellent and that they learned a lot. (I’m sure the students did too!) Sorry that there were so many date changes – I really appreciate your flexibility.”

On April 22, 2005 Seton O’Reilly of the Litchfield Garden Club wrote the following to Dr. Sharon Douglas. “Very simply, you were wonderful yesterday! All our members and guests left being much more knowledgeable about the threat to our beloved oaks, and hopeful that thanks to the perseverance of CAES and you, we can keep on top of it. All your hand outs were scooped up, and we’ll make some more copies of the triage fact sheets to distribute further. You were so generous with your time, as well as your talent, and Jane Hinkle and I are endlessly grateful. You made us look good! Our club is giving the CAES Library a \$100.00 honorarium in your name. It is the very least we can do in thanks for your speaking to us yesterday. Again, Jane and I thank you. We feel sure that the large turnout was more due to your well established reputation than our efforts.”

On April 28, 2005 Edmund B. Tucker, President of the Orange Land Trust, wrote the following to Dr. Kirby Stafford. “Thank you so much for participating in our Annual Meeting last night by presenting your specialty, the non-medical side of the Lyme Disease program. We feel that the program served a public need and that the attendance confirmed the interest in the subject. I am continually surprised at the number of people who have had one or more bouts of Lyme Disease. Our past Annual Meetings have tended to concentrate on some aspect of conservation or open space preservation and yet the turn out last night justified our choice of a program concentrating on a local health problem relating to the great outdoors. A number of the attendees approached me after the meeting and thanked us for sponsoring the presentations. It was a very successful evening. ...”

On May 1, 2005 Mr. Julian J. Grossman wrote the following letter to Governor M. Jodi Rell. “I recently had the pleasure of taking a five session course under the auspices of the Institute for Learning in Retirement at the Agricultural Experiment Station in New Haven. All the scientists who spoke to us on their area of specialization did a superb job of providing important insights at a level which was appropriate for us. Among the topics were Lyme Disease, various plant diseases, and West Nile virus. Dr. Magnarelli and his staff are consummate professionals who do very important work in research and in public health enhancement. They provide superlative service in enhancing our lives by helping to protect us from a host of diseases, as well as providing ways of maintaining the aesthetics of our natural environment.” *(Dr. Sandra Anagnostakis, Dr. John Anderson, Dr. Sharon Douglas, Dr. Louis Magnarelli, and Dr. Kirby C. Stafford, III all participated in the course).*

On May 4, 2005 Nancy Worthington wrote the following to Dr. Sharon Douglas. “On behalf of the Hadlyme Hall Garden Club, I would like to thank you for your slide show and discussion on fruit and fruit trees. It was very interesting and I know we all learned a lot. Thank you once again.”

On May 6, 2005 Bonnie Schoelzel of the Litchfield Garden Club wrote the following to Dr. Sharon Douglas. “This is a very belated thank you for the program on the threat of Sudden Oak Death you presented to the Litchfield Garden Club in April. The news is indeed chilling, but making the public aware of Ramorum blight is part of the battle. The work done by scientists at CAES is so important in discovering plant and pest diseases – and finding ways of combating those threats. Public awareness is key – and you have helped get the word out through your program. Thank you for your important work, and good luck with your continued research on Ramorum blight.”

On May 16, 2005 Tom Malley, Chief of Public Health and Immunizations at Hanscom Air Force Base, Massachusetts, wrote the following to Dr. Kirby Stafford. “Thank you for authoring and/or publishing “Tick Management Handbook”. The document was very readable, interesting, and informative.”

On May 18, 2005 Cindy Barry, Assistant Director of the Ledge Light Health District in Groton wrote the following to Dr. Kirby Stafford. “Thank you so much for being my guest on Health Watch. Here is a copy for your library. I think that the viewers will appreciate your ability to share information in an easy to understand way. Your expertise and your willingness to always be there is something I really admire! Thank you as always for your support of our local project.”

On May 19, 2005 Nadine Vaspasiano, a teacher at Momauguin School in East Haven, wrote the following to Vickie Bomba Lewandoski. “I just want to thank you for the wonderful field trip on May 18. The children really enjoyed themselves as you can see by their letters. The guides were excellent, very helpful. Thank you for all the generous goodies for the students.” *Eighteen of Ms. Vaspasiano’s students also wrote to Vickie to thank her for the field trip.*

On June 10, 2005 Gwen Thaxter wrote the following to Dr. Kirby Stafford. “Thank you for responding so quickly, Dr. Stafford. It’s always a pleasure asking you for information.”

THE PRESS SPEAKS

On July 6, 2004 *The Day* carried the article “War Against Lyme Disease Moves to the Backyard,” by Judy Benson. The article reported on the efforts being made to educate the public in keeping the numbers of ticks down in their own yards, and educating them about Lyme disease. Dr. Kirby Stafford’s research and his leading training sessions about tick control were reported on.

On July 11, 2004 *Northeast Magazine* carried the article “Tick Talk” by Robert J. Miller. The reporter spent the better part of the day following the three people who work in the tick lab (Bonnie Hamid, Beth Alves, and Michele Guidone) and writing down what they did and their thoughts on the research they were doing.

On August 11, 2004 the *Hartford Courant* carried the article “Weather May Hold Clues to West Nile: Mosquito study shows link to summer cycles,” by William Hathaway. For the sixth straight year West Nile virus showed up in birds and mosquitoes across Connecticut. Dr. Theodore Andreadis who monitored and completed an analysis of mosquito trapping in the state noted a dramatic difference in the statewide distribution of mosquitoes that tested positive for the virus in 2002, a hot and dry season, compared with 2003, which was very wet and cool.

On August 16, 2004 the *Record Journal* carried the article “Recent trend of rugged winters is taking toll on hemlock pests,” by Trudy Tynan. A downward trend in the numbers of hemlock woolly adelgid, an insect pest destroying huge numbers of hemlock trees from Maine to Georgia, is being attributed to harsh winters with extremely low temperatures. Dr. Carole Cheah said the winter kill in Connecticut has been so severe that adelgids have been brought in from Pennsylvania to continue research programs. She stated that these lower numbers were “a message of hope.”

On September 6, 2004 the *New Haven Register* carried the article “Area weather has had its share of ups and downs through year”, by Abram Katz. Dr. Sharon Douglas was interviewed about the extremes in weather and its effect on plants. The temperatures and rainfall varied drastically all year. Dr. Douglas stated “We’ve had really unusual conditions this year. We’re seeing conditions we don’t usually see. Last winter was extreme. The snow blanket protected plants, but the extremely cold temperatures made them more vulnerable to fungi and bacteria. Now people are beginning to notice.” She went on to describe various fungal and bacterial infections plants can get from the extremes in temperature and rainfall.

On September 28, 2004 the *Journal Inquirer* carried the article “Nature’s laboratory: The Connecticut Agricultural Experiment Station unlocks mysteries of the plant world”, by Christine McCluskey. The article showcased the Valley Laboratory. Dr. James LaMondia described the research that is performed there, and the number and types of inquiries answered per year for farmers, the public, garden clubs, and anyone else who has a question about agriculture.

On October 3, 2004 the New York Times carried the article “West Nile is down, but is it a Trend?” by Jeff Holtz. A decline has been noted in West Nile virus in the Northeast region of the US for the first time since the virus was detected in 1999. Dr. Theodore Andreadis said cool and wet conditions this summer may be the reason for less bird mortality, fewer mosquitoes carrying the virus, and no humans acquiring the virus locally in the state.” He also stated that continued surveillance and testing was important in determining whether there is a pattern of decline.

On October 7, 2004 the New Haven Register carried the article “Company faces \$55G fine in contaminated soil case” by Michael Gannon. It reported that contaminated soil taken from a school clean up site was disposed of illegally. Dr. Brian Eitzer and William Iannucci-Berger did the testing on the soil to determine the amount of contaminants in the soil for the EPA.

The Hartford Courant of December 3 carried the editorial “Get Plant Tracking System.” A fungus-like organism found on rhododendron plants shipped to Connecticut from a nursery in Oregon is posing a serious threat to the state’s oak forests, along with other types of trees and plants. Dr. Louis Magnarelli stated that this fungus spreads quickly and will kill more than 60 species of trees and plants. It is being suggested that the nursery industry should be required to affix bar codes to labels on plants so that their origin can be easily identified. This will enable officials to track where infected plants came from and may make it easier to track where they were sold and who they were sold to.

The New York Times of December 5, 2004 carried the article “A Killer of Oak Trees Has Surfaced in the State” by Jeff Holtz. Sudden Oak Death, a new to Connecticut fungus-like pathogen found its way into the state in a shipment of rhododendron plants from Oregon. Dr. Louis Magnarelli stated that there was no evidence that any trees in the state had been affected yet. He also stated that the Station would continue to examine trees and nurseries for signs of the organism, and the public would be educated about it.

The New Haven Register of December 28, 2005 carried the article “Fatal Oak Disease Threatens State” by Calli Planakis. The article reported that ten thousand rhododendron plants shipped from Oregon had been exposed and possibly carried Sudden Oak Death disease, a condition that has the capability to kill not only oak but dozens of other species of plants and trees. The plants were impossible to track as they had been sold throughout the state with no tracking system in place. Dr. Magnarelli stated that the few plants that were tracked tested positive for the disease. He also stated that the Station had the personnel with the expertise to test for the disease, but lacked funding for equipment. Dr. Jeff Ward stated that the nursery and landscaping industry would be badly affected if Sudden Oak Death spread throughout the state.

The Connecticut Post of March 2, 2005 carried the article “Endangered Labs: Agriculture Station Fears Budget Cuts, Lost Abilities” by Peter Urban. The article described how research programs at the Station would be cut if the Federal formula funds were eliminated. Dr. Louis Magnarelli stated “There would be definitely a diminished

reaction time to address problems”. President Bush’s plan to eliminate formula funds and put that money into competitive grant programs would be cumbersome. It would take months or years to get a grant to start up new research programs. Formula funds are readily available for starting new research. Many successful research programs such as studying West Nile virus, Lyme disease, Sudden Oak Death, responding to problems in the food supply and others would not have been possible if it weren’t for formula funds.

In March, 2005, the Hartford Courant carried the article “New Name, Same Concern: Scientists unsure if Sudden Oak Death will ravage state” by Steve Grant. The article reported that since the organism called Sudden Oak Death affects many more species than just oak, it will be called by its scientific name, *Phytophthora ramorum* from now on. It was brought into Connecticut first on camellia plants in 2003, and then again in rhododendron plants shipped to Connecticut from Oregon. Dr. Louis Magnarelli stated “There are a couple of big questions. One, is it established? Two, is it going to jump into the trees?” There is a question of whether the organism can survive the climate in Connecticut. While it flourishes in a microclimate of fog and warmth on the west coast, we don’t have those conditions in Connecticut. The organism can either perish or adapt and spread. The impact of the pathogen will not be known for several years.

The Connecticut Post of April 14, 2005 carried the article “Fighting the Elements: Beehives facing more obstacles, deadly results” by Charles Walsh. The article reported on problems facing beekeepers. Steve Sandrey stated that “there are 370 beekeepers in Connecticut, both amateur and commercial, and they have 2,375 hives. If last year’s 70 percent hive mortality rate is repeated this spring, it will mean only 713 hives will have survived. Bees die for several reasons. Ira Kettle stated “Varroa’s a really big problem here”. It gets into the larvae shell and even can ruin the honey. Tracheal mites are also a big problem in our area. The mites lodge in the windpipe of the bee and eventually kill it. Agriculture is vital to Connecticut. Bees are vital to agriculture to pollinate crops. The health of the bees in the state is crucial to achieve healthy crops. Beekeepers are trying to strengthen their hives by importing European strains of bees that are more resistant to Varroa and tracheal mites.

The New Haven Register of April 21, 2005 carried the article “Weed growth plagues lake” by Peggy Schenk. The weed problem in Lake Quonnipaug in Guilford was reported on. The lake has a vegetation problem, making swimming, boating and fishing difficult and unpleasant. The article reported that the Experiment Station has been called in to help control both native and invasive species of weeds in the lake. In the last five years the Station has helped control weeds at the town’s beach, work is now being done in other areas.

A News Release was sent out from Edenspace in Atlanta, GA on April 21, 2005. The release was to announce that at the International Phytotechnologies Conference sponsored by the US Environmental Protection Agency, Edenspace Systems Corporation was awarded a six-month Small Business Innovation and Research grant to explore new methods for remediating persistent organic pollutants (POPs) in soil and excavated

sediments. It will be doing the work in cooperation with the Station. Dr. Jason White is their partner for the project at the Station.

The Connecticut Post of April 24, 2005 carried the letter “Celebrating our Mother Earth: Experiment Station is State’s Jewel” in its Forum section. The letter was written by Terry Jones, a fifth generation Shelton farmer and Chairman of Working Lands Alliance. The letter gave a historic background of the Station and then went on to describe the present day research that is going on at the Station and how Station scientists and staff reach out to the public to help with all aspects of agriculture. He also described the Station’s involvement with Homeland Security with the Food Emergency Response Network – the Station was chosen as one of only 4 locations in the country to do food surveillance work. The author also described how he has been coming to the Station and events held here since he was a very young boy and how he has never tired of it. He stated “The achievements of the Connecticut Agricultural Experiment Station read like a litany of the progress and betterment of life in Connecticut and beyond. ...The scientists are here today as they have been for over 130 years making Connecticut and our nation a better place.”

The New Haven Register of April 26, 2005 carried the article “Volunteers can help track invasive plants” by Gretchen Zonas. The article described the research work of Dr. Robert S. Capers in controlling invasive aquatic plants in Connecticut Lakes. He is looking for volunteers to collect and identify samples of aquatic plants in state lakes. Dr. Capers stated that “aquatic plants provide food and habitats for wildlife and help regulate the nutrient cycle within the body of water. Invasive plants threaten the ecological health of lakes and ponds by displacing the native plants and interfering with boating and swimming, blocking flood-control canals and irrigation ditches and increasing sediment accumulation. The damage causes lakes to fill in and age at a faster rate.” Volunteers would be trained during a two hour session including hands-on practice identifying the invasive plant species.

The Hartford Courant of May 26, 2005 carried the article “New Focus in West Nile Fight. Study Finds Officials Chasing Wrong Mosquito Breed”. The article stated that the mosquito that health officials had been tracking and trying to kill is not the real threat in spreading West Nile virus. *Culex pipiens*, a mosquito that dwells in storm drains and catch basins, was the mosquito that was being focused on. It has been discovered that *Culex salinarius*, a swamp dwelling mosquito, is the main source of infection. The new information was discovered by Dr. Theodore Andreadis and Dr. Gourdarz Molaei.

The Hartford Courant of May 26, 2005 carried the article “Will Weather Gloom Spell Garden’s Doom?” by Anne Farrow. May, 2005 was the third coldest since 1917. By the end of the month the soil was still cold and wet. The conditions were expected to set plant growth back by two weeks. Warm weather crops that had been planted during the cold conditions were either dying or barely growing. Dr. Donald Aylor stated that “Generally what happens is that the development of the plants is really slowed down by the cold. But plants can catch up.”

The New Haven Register of June 3, 2005 carried the article “Weep Not for Huge Tree” by Robert Varley. The article described the efforts of Dr. Nickolas Nickou, a lifetime Branford resident, to save a 100 year old Sargent weeping hemlock tree from being destroyed to make way for a sewage pumping station. Dr. Nickou and several other long time Branford residents had been tending to the tree for almost 50 years. The town of Branford stated that had no intention to cut the tree down and the tree will remain. Experts had been called in to examine the tree. Dr. Jeffrey Ward was one of the experts called in and declared the tree to be “healthy and a beautiful specimen”. He also stated “I tell you, I wanted it in my back yard. It looks like a beautiful bonsai. That’s what adds character to a neighborhood, trees like that”.

The Hartford Courant of June 15, 2005 carried the article “Tick Control System a Success” by Garret Condon. He reported that a study on tick control done on Mason Island was so successful that residents of the island plan to pay for continuing the control efforts themselves now that the experiment is over. The use of bait boxes (Maxforce Tick Management Systems) which douse mice with insecticide that kills ticks were placed around the island. A marked reduction in ticks was noted. Cases of Lyme disease fell also. Dr. Kirby Stafford stated that while the Maxforce devices are potentially useful, they are no panacea.

The Hartford Courant of June 15, 2005 carried the article “Two New Weapons In Battle Against Mosquitoes” by Garret Condon. The article reported large populations of mosquitoes in the 2005 season. Dr. Theodore Andreadis stated “People are certainly going to be bothered with them, certainly at dawn and dusk. The weather we’re having this year is perfect for mosquito activity.” Two new ingredients for repellents were now available on the market to ward off biting mosquitoes. The new ingredients approved by CDC were Picaridin and Oil of lemon eucalyptus.

The New York Times of June 26 carried the article “He Minds Everyone’s Beeswax” by Carolyn Battista. The article described the work done around the state by Ira Kettle, state apiary inspector. He has kept bees for over 30 years. His work takes him to every corner of the state. In summer he sometimes travels 2000 miles a month, inspecting hives, consulting with beekeepers, attending agricultural fairs, school events and meetings, disseminating the latest information and advice on keeping bees and dealing with problems that arise in beekeeping.

The July 2005 issue of Wethersfield LIFE carried the article “Can lady Beetles from Japan Save Wethersfield’s Hemlocks? By Joyce Rossignol. The article described the research with Lady Beetles that was started by Dr. Mark McClure. Dr. Carole Cheah has continued the research, breeding more beetles and introducing them into the environment onto hemlock trees to control the advance of hemlock woolly adelgid. One of her efforts was in a stand of hemlocks in Wethersfield where she said she thought the beetles would be beneficial as the trees weren’t that infested yet. The beetles are very tiny and she and her crew need to painstakingly put the beetles onto the branches of the trees with paintbrushes and tweezers.

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

DEPARTMENT OF BIOCHEMISTRY AND GENETICS

NEIL MCHALE

- Doctoral Research Committees for Jalean Petricka/Tim Nelson (Yale University)
- Chairman, Institutional Biosafety Committee
- Member, American Society of Plant Biologists

RICHARD PETERSON

- Secretary, Quinnipiac Chapter Sigma Xi
- Radiation Safety Officer
- Member, American Society of Plant Biologists

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

DEPARTMENT OF ENTOMOLOGY

LOUIS A. MAGNARELLI

- Research Affiliate, Department of Epidemiology, Yale University
- Administrative Advisor, Multistate Research Project NE-171, Biologically Based Systems for Management of Plant Parasitic Nematodes
- Member, Connecticut Academy of Science and Engineering
- Chairman, Agriculture, Food and Technology Board, Connecticut Academy of Science and Engineering
- Member, Council of the Connecticut Academy of Science and Engineering
- Member, Forest Inventory and Analysis Program
- Member, Eastern Plant Board
- Member, Connecticut Legislative Council on Invasive Plants

CHRIS T. MAIER

- Curatorial Affiliate in Entomology, Peabody Museum of Natural History, Yale University
- Member, Advisory Committee, Cooperative Agricultural Pest Survey, USDA
- Member, Archives Committee, Connecticut Entomological Society
- Member, Connecticut Endangered Species Committee, Invertebrate Subcommittee
- Member, Nominating Committee, Connecticut Entomological Society

- Member, Program Committee, Connecticut Pomological Society
- Member, Steering Committee, Connecticut Butterfly Atlas Project
- Research Associate, Division of Plant Industry, Florida Department of Agriculture and Consumer Services

CLAIRE RUTLEDGE

- Member, Entomological Society of America
- Member, International Organization of Biological Control

VICTORIA SMITH

- Member, New England Wildflower Society, Connecticut Task Force
- Member, National CAPS Committee
- Member, Connecticut Cooperative Agricultural Pest Survey (CAPS) Committee
- Member, Eastern Plant Board
- Member, Connecticut Pomological Society

KIMBERLY STONER

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

DEPARTMENT OF FORESTRY AND HORTICULTURE

JOSEPH P. BARSKY

- Chair, Yankee Division, Society of American Foresters

MARTIN P. N. GENT

- Program Chair, New England Vegetable & Berry Growers Conference
- Associate Editor, *Journal of Plant Nutrition*

ABIGAIL MAYNARD

- Ex-Officio Member, Connecticut Council on Soil and Water Conservation
- Member, State Technical Committee
- Editorial Board, *Compost Science & Utilization*

JEFFREY S. WARD

- Secretary, Connecticut Tree Protection Examination Board
- President, Connecticut Tree Protection Association

- Executive Board Member, Connecticut Urban Forest Council
- Executive Board Member, Connecticut Forest Council
- Ex-Officio Member, Goodwin Scholarship Committee

DEPARTMENT OF PLANT PATHOLOGY AND ECOLOGY

SANDRA L. ANAGNOSTAKIS

- Current President and Life Member, Northern Nut Growers Association
- Member, Regional Research Project NE-1015, “Biological Improvement, Habitat Restoration, and Horticultural Development of Chestnut by Management of Populations, Pathogens, and Pests”
- Member, Chestnut Marketing Association (Chestnut Growers of America)
- Member, American Society for Horticultural Science
- Park Naturalist, Sleeping Giant Park Association
- International Registrar for Cultivars of *Castanea*, International Society for Horticultural Science
- Life Member, Mycological Society of America
- Member, Society of American Foresters
- Member, Connecticut Forest and Park Association
- Member, Sigma Xi

DONALD E. AYLOR

- Member, Connecticut Academy of Science and Engineering
- Editorial Board, *Agricultural and Forest Meteorology*
- Adjunct Professor, Plant Pathology Department, Cornell University
- Research Affiliate, School of Forestry and Environmental Studies, Yale University

SHARON M. DOUGLAS

- Member and Section Chair for Diseases of Plants, Scientific Programs Board, The American Phytopathological Society
- Member, Diagnostics Committee, The American Phytopathological Society
- Member, Youth Programs Committee, The American Phytopathological Society
- Member, Tree Fruit, Nut, and Vine Disease Workers Group, The American Phytopathological Society
- Member, USDA-APHIS PPQ Cooperative Agricultural Pest Survey (CAPS) for Connecticut
- Member, Institutional Biosafety Committee, The Connecticut Agricultural Experiment Station

WADE H. ELMER

- Vice President, Northeastern Division, The American Phytopathological Society
- Member, International Editorial Board, *Crop Protection*
- Member, Program Committee, Connecticut Greenhouse Growers Association
- Member, Connecticut Gladiolus Society

FRANCIS J. FERRANDINO

- Member, Epidemiological Committee of the National Plant Disease and Pest Detection Network (NPDPDN)

DEPARTMENT OF SOIL AND WATER

THEODORE G. ANDREADIS

- Lecturer in Epidemiology and Public Health, Yale University School of Medicine
- Adjunct Professor, Department of Pathobiology, University of Connecticut
- Member, Regional Research Project S-301, “Development, Evaluation and Safety of Entomopathogens for Control of Arthropod Pests”
- Member, State of Connecticut Mosquito Management Program

GREGORY J. BUGBEE

- Director, New England Aquatic Plant Management Society
- Director, Clear Lake Improvement Association
- Member, Northeast Soil Testing Committee, NEC-67

JOSEPH J. PIGNATELLO

- Adjunct Professor in Environmental Engineering, Department of Chemical Engineering, Yale University
- Associate Editor, *Environmental Engineering Science*.
- Member of W-82 Regional Project “Pesticides and Other Organics in Soil and Their Potential for Groundwater Contamination”

BRIJ L. SAWNEY

- Distinguished Member, the Clay Minerals Society

CHARLES R. VOSSBRINCK

- Visiting Assistant Professor, Department of Pathology, Albert Einstein College of Medicine, Yeshiva University, Bronx, New York.
- Member, Regional Research Project S-301, “Development, Evaluation and Safety of Entomopathogens for Control of Arthropod Pests”

JASON C. WHITE

- Lecturer in Environmental Engineering, Department of Chemical Engineering, Yale University
- Managing Editor, *The International Journal of Phytoremediation*.
- Member, Editorial Board, *Environmental Pollution*.
- Member, Editorial Board, *Environmental Toxicology and Chemistry*
- Scientific Advisor, Environment Committee, Mill River Watershed Association

VALLEY LABORATORY

TIMOTHY M. ABBEY

- Coordinator, Connecticut Nursery Integrated Pest Management Implementation Team
- Member, Connecticut Environmental Industry Council
- Member, Connecticut Grounds Keepers Association
- Member, Connecticut Invasive Plant Working Group - Education Subcommittee
- Member, Connecticut Nursery and Landscape Association
- Member, Connecticut Tree Protective Association Education Committee
- Member, New England Pest Management Network
- Connecticut Representative, Northeast Greenhouse and Ornamentals IPM Commodity Work Group
- Member, Entomological Society of America

JOHN F. AHRENS

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

CAROLE CHEAH

- Member of the International Organization for Biological Control

RICHARD S. COWLES

- Japanese Beetle Harmonization Agreement Treatment Committee

ROSE T. HISKES

- Member, Education Committee, Connecticut Nursery & Landscape Association
- Member, Education Subcommittee, Connecticut Tree Protective Association
- Member, Connecticut Invasive Plant Working Group

JAMES A. LAMONDIA

- Member, Chair and Webmaster, Northeast Regional Project NE-171, “Biological and Cultural Management of Plant Parasitic Nematodes”
- Senior Editor, Journal of Nematology
- Editor, Tomato & Potato Section; Biological and Cultural Tests for Control of Plant Diseases
- Ex-Officio Member, Connecticut Tree Protection Examining Board.
- Worker Protection Standards Trainer for the Valley Laboratory.
- North American Blue Mold Forecast Center State Coordinator
- Society of Nematologists Honors and Awards Committee Chair-elect
- Member, Cooperative Agricultural Pest Survey Committee
- Section Editor for the 2003-2004 New England Apple Pest Management Guide

DEWEI LI

- Board Member of the Analytic Accreditation Board of American Industry Hygiene Association (AIHA).
- Member, Mycological Society of America
- Member, British Mycological Society
- Member, International Aerobiology Association
- Member, Pan-America Aerobiology Association
- Member, American Phytopathological Society
- Member, Canadian Phytopathological Society

TODD L. MERVOSH

- Connecticut Invasive Plant Working Group - Chair of Stewardship Committee, Chair of Symposium Committee
- Weed Science Society of America - Member of Weed Alert Committee and Herbicides for Minor Uses Committee
- Associate Editor for the journal *Weed Science*
- Northeastern Weed Science Society – Chair of Conservation, Forestry & Industrial section at 2005 NEWSS Annual Meeting

THOMAS M. RATHIER

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

LECTURES, SEMINARS AND INTERVIEWS

During the year, staff members present formal lectures and seminars to 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 newspaper, radio and TV reporters interview our staff. These occasions are listed below.

ABBEY, TIMOTHY

- Gave the presentation “Bugs are Nice” as part of the children’s program series at the University of Connecticut Co-Op in Storrs *July 10, 2004*
- Presented “An Introduction to IPM” to the Farm Bureau in New Haven *July 12*
- Gave the presentation “Pest Management Update” at the CAES Valley Laboratory Tour in Windsor *July 20*
- Helped staff the Station display at the Connecticut Tree Protective Association’s Summer Meeting in Farmington *July 25*
- Designed the display “Native ornamental plants” that was present in the New England Center building at the Big E, West Springfield, MA *September 17-October 3*
- Presented the talk “Alternatives for invasive ornamental plant species” at the Connecticut Invasive Plant Working Group Symposium at the University of Connecticut in Storrs *October 7*
- Presented the talk “Ornamental insect pests” to a pesticide applicator training class at Soundview Landscaping in West Haven *October 12*
- Presented the talk “Why trees fall apart: Insects, diseases and injury” to the Connecticut Tree Warden School in Middlefield *October 21*
- Presented the talk “Introduction to plant diseases” and “Introduction to ornamental insect pests” at the Connecticut Nursery and Landscape Association Nursery Accreditation Program in Southington *October 19 and 26*
- Presented the talk “Introduction to weeds” at the Connecticut Nursery and Landscape Association Nursery Accreditation Program in Southington *November 2*
- Assisted with the CTPA Arboriculture 101 Tree Conditions Lab in New Haven *November 3*
- Presented the “2004 Corn Rootworm Update” at a meeting of the Litchfield County Dairy Council in Torrington *November 9*
- Presented the talk “Designing an integrated pest management program” for the Connecticut Tree Protective Association Arboriculture 101 class in New Haven *November 10*
- Presented the talk “Top new insect threats to organic land care” at a NOFA Organic Land Care Update course at the Tolland County Agriculture Building in Tolland *December 2*
- Attended and served on the Winter Education Committee for the Connecticut Nursery and Landscape Association Winter Meeting in Stamford *January 11-12, 2005*
- Presented the talk “Organic pest management for ornamental insect pests” at the Northeast Organic Farming Association Organic Land Care Course at the MA Horticultural Society in Wellesley, MA *January 20*
- Gave the talk “Ornamental plant insect pests” to a pesticide applicator training class in West Hartford *January 25*
- Gave the talk “Ornamental plant insect pests” to a pesticide applicator training class in East Haven *January 27*
- Gave the talk “Woody ornamental plant problems” to a University of Connecticut Master Gardener class in Brooklyn, CT *January 28*
- Gave the talk “Woody ornamental plant problems” to a University of Connecticut Master Gardener class in Stamford *January 31*
- Presented a University of Connecticut Master Gardener class “Woody Plant Pest Management and Care” in West Hartford *February 2*
- Presented a University of Connecticut Master Gardener class “Woody Plant Pest Management and Care” in Haddam *February 8*

- Participated in a meeting of the Connecticut Invasive Plant working group Steering Committee in Storrs *February 9*
- Gave the talk “Organic Pest Management for Ornamental Insect Pests” at the Northeast Organic Farming Association Organic Land Care Course at the Station in New Haven *February 10*
- Presented a University of Connecticut Master Gardener class “Woody Plant Pest Management and Care” in Bethel *February 17*
- Gave the talk “New and Exotic Insect Problems in Ornamentals” at the Connecticut Groundskeepers Association Winter Meeting in Hartford *February 23*
- Participated in the University of Connecticut Perennial Plant Conference in Storrs *March 9*
- Participated in the CAES Forest Health Monitoring Workshop in New Haven *March 11*
- Presented the talk “Integrated Pest Management” for the Farm City Program at Lockwood Farm in Hamden *May 19*
- Participated in a meeting of the USDA Cooperative Agricultural Pest Survey State Committee in Windsor *May 26*
- Participated in a meeting of the Connecticut Nursery and Landscape Association Winter Program Committee at the CNLA Open House at The Garden Barn in Vernon *June 23*

AMEZZANE, ERIN

- Helped set up and man an exhibit booth in the Connecticut Building at the Eastern States Exposition, West Springfield, MA *October 2 -3, 2004*
- Manned an exhibit and handed out information at the Connecticut Flower and Garden Show at the Expo Center in Hartford *February 27, 2005*

ANAGNOSTAKIS, SANDRA L.

- Gave the talk “Chestnuts in the 21st Century” to the Bethlehem Land Trust in Bethlehem *July 18, 2004*
- Presented two papers entitled “Update on Sudden Oak Death” (co-authored by Sharon Douglas) and “Nut grafting for chestnuts” at the Annual Meeting of the Northern Nut Growers Association in Columbia, MO *August 14-20*
- Spoke about her chestnut research and gave a tour of the chestnut plots at Lockwood Farm to visiting plant pathologists from China *September 7*
- Presented Experiment Station chestnut research at the Multistate Research Project NE-1015 Annual Meeting in State College, PA *September 9-11*
- Gave the talk “Chestnuts in the 21st Century” at the Goodwin Conservation Center in Hampton, and led a walk to look at an old experimental plot *October 2*
- Gave the keynote address “Chestnuts in the United States for food and for timber” at the Third International Chestnut Congress held in Chaves, Portugal *October 18-24*
- Spoke about Connecticut chestnut research to a Botany class from Quinnipiac University at the Station *November 8*
- Reported on the progress of Experiment Station chestnut research at the Forest Health Meeting in Jones Auditorium *March 11*
- Gave a paper entitled “Introduction of *Phytophthora cinnamomi* into the U.S. and the Death of the Chestnuts” at the symposium “Sudden Oak Death: East Coast Perspective” at the Potomac Division Meeting of the American Phytopathological Society in Eastern Shore, MD *March 16*
- Gave the talk entitled “Chestnuts in the 21st Century” at the Yale Forestry School *March 24*
- Spoke about careers in agricultural science to a group of Girl Scouts in North Haven *April 2*
- Gave a Sigma Xi-sponsored lecture on “Chestnuts in the 21st Century” at Quinnipiac University in Hamden *April 14*
- Discussed chestnut research and toured the chestnut orchards at Lockwood Farm and the Sleeping Giant Chestnut Plantation with Susan Freinkel, who is writing a book about chestnuts *April 19*
- Gave a talk on “Chestnuts in the 21st Century” to the Litchfield Garden Club in Litchfield *April 21*
- Gave a talk on “Chestnuts in the 21st Century” at Connecticut College in New London *April 28*
- Gave a lecture for a Sigma Xi series on “Chestnuts in the 21st Century” at Quinnipiac University in Hamden *May 4*

ANDERSON, JOHN F.

- Participated in a CDC orientation teleconference on West Nile virus *July 6, 2004*
- Hosted a group of Connecticut high school teachers at the Station *July 8*
- Hosted and participated in the annual meeting of the Northeast Directors Association in Mystic *July 11-13*
- Hosted a trip to Plum Island for participants in the annual Northeast Directors Association meeting in Mystic *July 14*
- Welcomed the Nursery and landscape Research tour at the Valley Lab in Windsor *July 20*
- Served on a CDC panel discussing West Nile virus in Atlanta, GA *August 1-2*
- Hosted Plant Science Day at Lockwood Farm *August 3*
- Participated in a meeting of the Natural Resources Council in New Haven *August 18*
- With Greg Bugbee and Jason White gave a tour of treated invasive weeds in Bashan Lake and untreated weeds in Pickerel Lake to Allison Dodge, Congressional Aide to Rosa Delauro and Elyse Gittleman of the Office of Legislative Management *August 19*
- Was interviewed about West Nile virus by Rich Weizel of the New Haven Register *August 26*
- Met with the New Haven County Farm Bureau and Congresswoman Rosa DeLauro at Bishop's Orchard in Guilford *September 2*
- Participated in a meeting of NE-1015 as Administrative Advisor in State College, PA *September 9-11*
- Spoke on the Bird and Butterfly Garden to the Spring Glen Garden Club at Lockwood Cottage *September 13*
- Hosted and participated in a meeting of the Board of the Experiment Station Associates *September 15*
- Gave a seminar on West Nile virus at the University of Illinois, Urbana, IL *September 19-21*
- Participated in a meeting of the Peabody Fellows Biodiversity and Human Health Program at Peabody Museum at Yale University *September 28*
- Gave a talk on West Nile virus to a group of retired teachers in Branford *September 29*
- Participated in a meeting of the Lyme Disease Foundation in Hartford *October 16*
- Hosted and participated in a meeting of the Station's Board of Control in Windsor *October 20*
- Gave a talk on what the State is doing to stop invasive plants to The Connecticut Federation of Lakes in Jones Auditorium *October 23*
- Greeted participants in a Garden Club of America meeting held at the Station *October 25*
- Talked to the New Haven Farm Bureau in New Haven *October 25*
- Met with Elizabeth Moore of CT Farmland Trust at Lockwood Cottage *November 2*
- Addressed the Federated Garden Clubs in New Haven *November 17*
- Spoke to the Pomological Society in Glastonbury *December 7*
- Met and hosted Caren Wilcox, Aide to Congresswoman Rosa DeLauro *December 21*
- Participated in a Board Meeting of the Lyme Disease Foundation *December 30*
- Hosted Drs. Mary Jane Lis and Bruce Sherman of the CT Department of Agriculture *January 5, 2005*
- Gave a tour of the Johnson-Horsfall Building to the Directors of the Federated Garden Clubs of Connecticut *January 19*
- Gave a talk to the Connecticut Tree Protective Association in Southington *January 20*
- Met with Mrs. Joseph Willems and her son Chris Willems at the Lockwood Cottage to see the plaque honoring Mr. Joseph Willems. The plaque was placed at the beginning of the boardwalk, which was installed in January 2005. Donations directed to the Station from the Willems family helped to pay for the boardwalk. The installation was done by Richard Cecarelli and Rollin Hannan, with help from Scott Williams, Uma Ramakrishnan, JP Barsky, Jeff Ward, and Frank Ferrandino *January 30*
- Hosted Connecticut Department of Agriculture veterinarians and showed them the Biosafety Level 3 Laboratory *February 5*
- Participated in a Board meeting of the Natural Resources Council of Connecticut in New Haven *February 10*
- Spoke about the Biosafety Level 3 Laboratory to high school students for Branford High School *February 17*
- Participated as a panelist at an NIH program "Innovative virology in Response to BioDefense and Emerging infectious Disease Research Opportunities Program" in Bethesda Maryland *March 16-18*

- Gave a tour and explained the Biosafety Level 3 Laboratory to a group of teachers associated with the Farm City program *March 30*
- Participated as a panel member of a NIH review of “Special Emphasis Panel for the Regional Biocontainment Laboratories Construction Program” in Gaithersburg, MD *April 11 and 12*
- Gave a talk on Lyme Disease, West Nile virus, and the Bird and Butterfly Garden to the Norwalk Garden Club *April 13*
- Gave a talk about research in the Biosafety Level-3 Laboratory to citizens attending Plant Science Day in the Spring *April 18*
- Gave a talk about West Nile virus to a group of retired citizens meeting at the Station *April 22*
- Gave a talk about research in the Biosafety Level-3 Laboratory to Connecticut high school teachers *April 25*
- Gave a talk about West Nile virus to Connecticut Valley Independent School Science Teachers Association at Cheshire Academy *April 26*
- Arranged a tour of the Johnson-Horsfall Building for the New Haven Garden Club and gave a talk about research in the Biosafety Level-3 Laboratory *May 2*
- Gave a talk on West Nile virus to the Bethany Garden Club *May 9*
- Gave a talk on West Nile virus to the Stratford Department of Health *May 25*
- Gave a talk to Avery Heights Retirement Community in Hartford *June 7*
- Was interviewed about ticks and Lyme disease by Nicole Danna of the Darien Times *June 24*

ANDREADIS, THEODORE G.

- Was interviewed about the first isolations of West Nile virus of the 2004 season by Fran Schneido of WCBS Radio *July 7, 2004*
- Was interviewed about the first isolations of West Nile virus of the 2004 season by CT Metro News *July 7*
- Was interviewed about the first isolations of West Nile virus of the 2004 season by Leon Collins of WFSB-TV in Hartford *July 7*
- Was interviewed about the first isolations of West Nile virus of the 2004 season by Marc Sims of CT Public Radio *July 7*
- Was interviewed about the first isolations of West Nile virus of the 2004 season by Amy Perez of Fox 61 *July 7*
- Was interviewed about the first isolations of West Nile virus of the 2004 season by Gillian Neff of Cablevision 12 Norwalk *July 8*
- Presented an invited talk “Evolutionary strategies and adaptations for survival between mosquito-parasitic microsporidia and their intermediate copepod hosts” at a NATO Advanced Research Workshop “Emergent Pathogens in the 21st Century: First United Workshop on Microsporidia from Invertebrate and Vertebrate Hosts” held in Ceske Budejovice, Czech Republic *July 12-16*
- Was interviewed about West Nile virus and the Mosquito Trapping and Testing Program by Chris Francis of WTIC Radio in Hartford *July 20*
- Was interviewed about West Nile virus, Eastern equine encephalitis and the Mosquito Trapping and Testing Program by Steve Kotchko of CT Public Radio *July 22*
- Was interviewed about human infection with microsporidian parasites from mosquitoes by Abe Katz of the New Haven Register *July 27*
- Was interviewed about recent West Nile virus activity in birds and mosquitoes in Connecticut by Fran Schneido of WCBS Radio, New York *July 30*
- Presented the talk “Learning to live with West Nile virus” at Plant Science Day in Hamden *August 4*
- Was interviewed about West Nile virus and the Mosquito Trapping and Testing Program by Jeremy Esposito of the Darien Times *August 9*
- Was interviewed about West Nile virus and the Mosquito Trapping and Testing Program by Bill Hathaway of the Hartford Courant *August 9*
- Was interviewed about West Nile virus and the Mosquito Trapping and Testing Program by Marc Sims of CT Public Radio *August 10*
- Was interviewed about the outbreak of Eastern Equine Encephalitis in southeastern Massachusetts by Marian Gail Brown of the Connecticut Post *August 13*

- Was interviewed about the impact of weather and rainfall on mosquitoes and West Nile virus in the region by Kathleen Marple of WNLK Radio in New York *August 18*
- Was interviewed about the lower levels of West Nile virus activity in birds and humans in the northeastern US in 2004 by Dawn Fallik of the Philadelphia Inquirer *August 24*
- Was interviewed about the lower levels of West Nile virus activity in birds and humans in the northeastern US in 2004 by Steve Kotchko of Connecticut Public Radio *August 24*
- Was interviewed about the detection of Eastern Equine Encephalitis in mosquitoes collected in southeastern Connecticut by Marian Gail Brown of the Connecticut Post *August 25*
- Was interviewed about West Nile virus and the Mosquito Trapping and Testing Program by Steve Kotchko of CT Public Radio *September 1*
- Was interviewed about West Nile virus and the Mosquito Trapping and Testing Program by Kent Pierce of WTNH TV8 *September 1*
- Was interviewed about the detection of West Nile virus in Fairfield by Erin Lynch of the Fairfield Citizen *September 13*
- Was interviewed about the decline in West Nile virus activity in Connecticut by Marc Sims of CT Public Radio *September 14*
- Was interviewed about West Nile virus and the Mosquito Trapping and Testing Program by Jason Fell of the Pictorial Gazette *September 15*
- Was interviewed about the decline in West Nile virus activity in the northeastern US by Bob Miller of the Danbury News Times *September 20*
- Was interviewed about the detection of West Nile virus in Westport by Lisa Chamoff of the Stamford Advocate *September 21*
- Was interviewed about the current status of West Nile virus in the northeastern US by Kathleen Marple of WALK Radio, New York *September 22*
- Presented an invited talk entitled “West Nile virus surveillance and response in Connecticut” at the 36th Annual Meeting of the Society of Vector Ecology in Boston, MA *September 26-29*
- Was interviewed about West Nile virus and the Mosquito Trapping and Testing Program by Steve Kotchko of Connecticut Public Radio *October 13*
- Was interviewed about West Nile virus and the Mosquito Trapping and Testing Program by Marianne Gail Brown of the Connecticut Post *October 13*
- Gave the invited talk “Epidemiology of West Nile virus in Connecticut: a Six Year Analysis of Mosquito Data 1999-2004” at the Annual Meeting of the Entomological Society of Canada, held in Charlottetown, Prince Edward Island *October 17*
- Presented an invited talk “Epidemiology of West Nile virus in Connecticut: a six year analysis of mosquito data, 1999-2004” at the 50th Annual Meeting of the Northeastern Mosquito Control Association held in Newport, RI *December 6*
- Gave an overview of the Experiment Station’s mosquito and West Nile virus research and surveillance program to Caren Wilcox, Aide to US Representative Rosa DeLauro *December 21*
- Participated in the CDC sponsored 2005 National Conference on West Nile virus in the United States in San Jose, CA *February 8-9, 2005*
- Was interviewed about the feeding patterns of mosquito vectors of West Nile virus by Marian Gail Brown of the Connecticut Post *March 9*
- Presented an invited talk, “Epidemiology of West Nile Virus in Connecticut: A Six-Year Analysis of Mosquito Data, 1999-2004” at the Annual Meeting of the New Jersey Mosquito Control Association in Atlantic City, NJ *March 10*
- Was interviewed about spring mosquitoes by Jeff Holtz of the New York Times *March 14*
- Participated in qualifying exams for Heidi Brown, a Ph.D. candidate in the Department of Epidemiology and Public Health at Yale University School of Medicine *March 23*
- Was interviewed about the impact of the heavy spring rains on the anticipated mosquito season and West Nile virus by Kevin Hogan, WFSB TV3 Hartford *April 5*
- Was interviewed about mosquitoes and West Nile virus by Dan Kane, WFSB TV3 Hartford *April 7*
- Presented an overview of the Experiment Station’s Mosquito/West Nile Virus Surveillance and Research Programs to a group of teachers from FFA *April 25*

- Presented a seminar “West Nile virus: a six-year perspective on the introduction and spread of an emerging infectious disease” at Manchester Community College, Manchester, CT *May 4*
- Was interviewed about mosquitoes and West Nile virus in Connecticut by freelance writer Marylynn Moss, WFSB TV3 Hartford *May 9*
- Was interviewed about mosquito control and protection from West Nile virus by Sam Gingerela WTIC Radio *May 18*
- Was interviewed about mosquitoes and the State West Nile Virus Surveillance Program by Leon Collins of WFS B TV3 *May 19*
- Was interviewed about current research findings on the host feeding patterns of the mosquito vectors of West Nile Virus in the northeastern US by Fran Schneido of WCBS radio NY and Kent Pierce of WTNH TV8 *May 20*
- Was interviewed about mosquito research on West Nile virus by Mike McCune of the Hartford Courant *May 31*
- Was interviewed about mosquitoes and West Nile virus by Garrett Condon of the Hartford Courant *June 8*
- Was interviewed about the State Mosquito/West Nile Virus Trapping Program and the outlook for this year by Marc Sims of CT Public Radio *June 10*
- Was interviewed about mosquitoes and West Nile virus by Judy Benson of The Day *June 16*
- Was interviewed about mosquitoes, repellants and West Nile virus activity in Connecticut by Steve Kotchko of Connecticut Public Radio *June 23*
- Was interviewed about deer flies and mosquitoes by Bridget Ruthman of the Waterbury Republican American *June 27*

ARMSTRONG, PHILIP

- Presented a poster “Isolations of Potosi virus from Connecticut Mosquitoes” at the 53rd Annual Meeting of the American Society of Tropical Medicine and Hygiene *November 10*
- Gave a seminar on the transmission of Dengue virus to the West Nile Virus Discussion Group (participants included members of Yale University and L2 Diagnostics) held at the Experiment Station *November 30*

ARSENAULT, TERRI

- Led a tour of the Station for students from Branford High School *February 17*
- Met with staff of the Connecticut Post and discussed issues related to formula funding and work impacted by such funding in Analytical Chemistry *March 1*

AYLOR, DONALD E.

- Spoke about the aerobiology of corn pollen to a group of high school science teachers from Connecticut who were visiting the Station and Lockwood Farm *July 8, 2004*
- Presented the paper “Quantifying aerial dispersal of pollen in relation to outcrossing in maize” at the American Meteorological Society’s 26th Conference on Agricultural and Forest Meteorology in Vancouver, British Columbia, Canada *August 25*
- Spoke about “The role of spore dispersal in the epidemiology of apple scab and potato late blight” with visiting plant pathologists from China *September 7*
- Talked about his research on “Modeling aerial dispersal of corn pollen” at a Workshop on Confinement of Genetically Engineered Crops held by USDA/APHIS Biotechnology Regulatory Services in Riverdale, MD *September 13-15*
- Presented the invited talk “Aerobiology: Science at the interface of meteorology and biology” in the Department of Earth Sciences at Millersville University in Millersville, PA *October 28*
- Spoke about “Aerial dispersal of pollen and spores in the atmosphere” to a Botany class from Quinnipiac University at the Station *November 8*
- Spoke about “Plant diseases: Their diagnosis and spread” to a group of high school teachers associated with Farm-City who were visiting the Station *March 30*
- Spoke about “The effect of wind and plant architecture on completeness of seed set in maize production fields” during a 90-minute teleconference with scientists in Iowa and in France *April 14*

- Spoke about “Efficiency of pollination in corn plants” as part of the greenhouse tour at Plant Science in the Spring *April 18*
- Spoke about “Epidemiology and the spread of plant diseases and cross-fertilization in corn” to a group of FFA teachers touring the Station *April 25*

BARSKY, J.P.

- Attended and served as Chair at the Yankee Division Society of American Foresters Steering Committee Meeting in Marlborough *October 1*
- Participated in wildland fire fighting workshop sponsored CT-DEP at the Sessions Woods Wildlife Management Area in Burlington *October 28*
- Attended and served as Chair at the Yankee Division Society of American Foresters Steering Committee Meeting in Marlborough *December 3*
- Participated in a conference on “The Natural and Cultural History of the Connecticut Forest” sponsored by the Connecticut Chapter of the Society of American Foresters in Storrs *January 13*
- Attended and served as Chair at the Yankee Society of American Foresters Annual Winter Business Meeting in Enfield *February 10*
- Attended the Tenth Annual Forest Health Monitoring Workshop in New Haven *March 11*
- Prepared and staffed a display on forestry research at Forestry Day in the State Capitol Concourse in Hartford *March 23*
- Attended and served as Chair at the Yankee Division Society of American Foresters Steering Committee Meeting in Marlborough *June 29*
- Participated in the Game of Logging Levels I-IV training curriculum at Metropolitan District Commission Headquarters in Barkhamsted *June 30*

BOMBA-LEWANDOSKI, VICKIE

- Participated in a meeting of the Farm City Planning Committee at the Fairfield County Extension Office in Bethel *August 5, 2004*
- Participated in a meeting of the Farm City Planning Committee at Lockwood Cottage *September 2*
- Coordinated people to staff the booth and planned and set up the Station exhibits in the Connecticut Building at the Big E in West Springfield, MA *October 2-3*
- Participated in a meeting of the Farm City Planning Committee at Kellogg Environmental Center *October 6*
- Guided a tour of the Station for Federated Garden Clubs of America group who were visiting the Station *October 25*
- Helped set up a display on the Station at the New Haven Public Library in New Haven *October 28*
- Participated in a meeting of the Farm City Planning Committee at the USDA & FSA Office in Wallingford *November 8*
- Set up and manned a booth with Station information at the Farm Bureau’s Annual Meeting in Vernon, and also presided over the meeting as President of the New Haven County Farm Bureau *November 9*
- Acted as a judge for the annual Wilbur Cross High School Science Fair *January 21, 2005*
- Participated in a meeting of the Farm City Planning Committee at the USDA & FSA office in Wallingford *January 25*
- Was a tour guide for a group of Branford High School students who visited the Station *February 17*
- Coordinated, planned and gathered materials for displays, and helped to set up the Station’s display at the Connecticut Flower and Garden Show in the Hartford Expo Center *February 24-27*
- Coordinated and gathered materials for the Station’s display at The Garden Expo held at Fairfield Ludlowe High School *March 20*
- Coordinated the booth and put the display together and manned the booth for Ag Day at the Capitol *March 23*
- Hosted a teacher workshop for Farm City in Jones Auditorium *March 30*
- Along with Dr. Louis A. Magnarelli, Dr. MaryJane Mattina, and Michael Last, met with the head of Yale’s Scientific Library System to discuss cooperative interaction between the Station and Yale *April 4*.

- Participated in a meeting of the Farm/City Planning Committee at the USDA/FSA Office in Wallingford *April 4*
- Coordinated the booth and organized and manned the display at the CPTV Family Science Expo held at the Hartford Expo Center *April 7*
- Coordinated the Station's booth at the Seth Haley Science Fair at Seth Haley School in West Haven *April 14*
- Helped to coordinate Plant Science Day in the Spring *April 18*
- Gave a tour of the Station to FFA teachers visiting the Station *April 25*
- Coordinated the Station booth at the Earth Day Festival at Earthplace in Westport *April 30*
- Helped to plan and coordinated, and set up Farm/City Week at Lockwood Farm *May 16-20*
- Coordinated and helped gather display items for the Station's booth at Top Most herb Farm in Coventry *June 4*

BONITO, ROSE

- Set up and manned an exhibit for the Station at the Connecticut Agricultural Fair in Goshen at the Goshen Fairgrounds *July 24-25, 2004*
- Was interviewed about the Bird and Butterfly Garden at Lockwood Farm by Kathleen Greenleaf of the Hamden Chronicle *August 16*
- Set up a display featuring history and information on the Station, soil testing, composting, bird and butterfly gardening, and native plants at the New Haven Land Trust Gardening Conference in Jones Auditorium *September 11*
- Set up and manned a display booth on butterfly gardening, West Nile virus, Lyme Disease, native plants, soil testing and arsenic in pressure-treated wood at the 4th annual Celebrating Agriculture at Woodstock Fairgrounds *September 18*
- Helped set up and man an exhibit booth in the Connecticut Building at the Eastern States Exposition, West Springfield, MA *October 2-3*
- Manned an exhibit and handed out information at the Connecticut Flower and Garden Show at the Expo Center in Hartford *February 26, 27, 2005*
- Helped to set up an exhibit and greeted the public at the Annual Garden Expo at Fairfield Ludlowe High School, Fairfield *March 19-20*
- Participated in planning the Station display and assembling the materials for the CPTV Family Science Expo at the Expo Center in Hartford *April 7, 9, & 10*
- Set up and manned an exhibit on ticks and the history of the Station at the Seth Haley Science Fair 2005 at the Seth G. Haley Elementary School, West Haven *April 14*
- Set up and manned Station exhibits at the EarthPlace Earth Day Festival in Westport *April 30*
- Set up and manned a Station information booth at the 10th Annual Herb Festival 2005 at the Topmost Herb Farm in Coventry *June 4*

BUGBEE, GREGORY J.

- Spoke on soil fertility at a meeting of the Connecticut Farm Bureau held at the Station *July 12, 2004*
- Participated in a town meeting at the Middletown Town Hall regarding control of aquatic weeds in Crystal Lake *October 15*
- Spoke on "Container Gardening" to the Spring Glen Garden Club in Hamden *October 18*
- Met with officials of the Guilford Fields Committee to discuss methods of growing athletic fields under water restrictions in Guilford *October 19*
- Hosted the annual meeting of the Connecticut Federation of Lakes in Jones Auditorium *October 23*
- Spoke on soil testing to groups from the Federated Garden Club of America visiting the soil test lab *October 25*
- Spoke on composting to the Shoreline Gardeners at the Madison Library *October 26*
- Presented a seminar on "Lawns and groundcovers" as part of the Federated Garden Clubs Study Course in Jones Auditorium *October 27*
- Spoke on "Improving soil in home gardens" to the Hebron Garden Club at the Hebron Public Library *November 17*

- Gave a seminar on “Connecticut soils” to an environmental science class at the Cooperative High School in New Haven *November 23*
- Spoke on “Controlling Aquatic Vegetation in Lake Quonnipaug” at a meeting of the Friends of Lake Quonnipaug at the North Guilford firehouse *November 28*
- Hosted a meeting of officials from the CT DEP and the CT Federation of Lakes to draft protocol for developing a CT lakes database and providing training sessions for volunteer lake water monitoring and aquatic vegetation identification *November 30*
- Spoke on “Improving soil in the home garden” to the Madison Garden Club at the Bauer Farm in Madison *January 13, 2005*
- Moderated a session of the Northeast Aquatic Plant Management Societies Annual conference in Saratoga Springs, NY *January 18-19*
- Spoke on “Container Gardening Indoors and Out” to the Hill and Dale Garden Club in Glastonbury *February 10*
- Presented a seminar on “Lawn Care” to the Brinkman Group in Milford *February 14*
- Spoke on “Container Gardening Indoors and Out” to the East Hartford Garden Club *March 7*
- Helped conduct the first of three workshops to train volunteers to identify invasive aquatic plants and to explain survey and boat-ramp surveillance procedures to be used as part of the volunteer lake-monitoring program *April 30*
- Spoke on Spring Lawn and Garden Preparation to the Pratt and Whitney Retirees Club in North Haven *May 17*
- Spoke on the CAES Invasive Aquatic Plant Program” to the Connecticut Invasive Plant Council at the CT DEP Headquarters in Hartford *June 14*
- Instructed volunteers on how to perform aquatic vegetation surveys as part of the Candlewood Lake Environmental Awareness and Responsibility Week *June 20-24*

CAPERS, ROBERT

- Spoke with residents living on Pinewood Lake in Trumbull to talk about concerns with aquatic plants in their lake *September 1, 2004*
- Worked with residents in a Wallingford condominium, helping them replace an invasive species of water plant in their pond with native white water lilies *September 3*
- Participated in the Connecticut Invasive Plant Working Group Symposium at the University of Connecticut *October 7*
- Gave a presentation on the Station’s aquatic plant survey program during a meeting among officials from throughout the Northeast who are responsible for invasive species planning in Natick, MA *March 23*
- Gave a presentation explaining plans for a volunteer lake-monitoring program that the Station is launching this spring to increase the number of people looking for invasive aquatic plants and submitting data on their occurrence to the Connecticut Invasive Plant Working Group *March 28*
- Presented a talk on the Experiment Station’s aquatic plant survey during Plant Science Day in the spring. He and Roslyn Selsky also had a table display to distribute information on the State’s invasive aquatic plants and showed people live and preserved specimens of the most common invasive aquatic plants *April 18*
- Was interviewed about the volunteer lake-monitoring program the Experiment Station launched this spring in conjunction with the Connecticut Federation of Lakes by Gretchen Zonas of the New Haven Register *April 18*
- Was interviewed about invasive plants in Connecticut by Judy Benson of the New London Day *April 19*
- Presented a talk about the Experiment Station’s aquatic plant surveys and the volunteer lake-monitoring program to the Longmeadow Lake Management Committee and members of the Bethlehem Conservation Commission in Bethlehem *April 19*
- Conducted the first of three workshops with Greg Bugbee and Roslyn Selsky to train volunteers to identify invasive aquatic plants and to explain survey and boat-ramp surveillance procedures to be used as part of the volunteer lake-monitoring program *April 30*

- Conducted a workshop to train participants in a volunteer lake-monitoring program that is being organized by the Experiment Station and the Connecticut Federation of Lakes *May 20*
- Conducted a workshop with Roslyn Selsky in Bolton instructing volunteers in plant identification and the procedures to use in conducting surveys *May 14*
- Spoke about the results of a 2004 survey and provided general information on invasive plant ecology at the Lake Besek Association *June 21*

CECARELLI, RICHARD

- Assisted Prism Communications, Inc. and Sussex County Weather Network in the installation of the new weather station at Lockwood Farm (provided by the national Weather Service), which will provide online weather data in the spring of 2005 *December 2004*

CHEAH, CAROLE

- Participated in a meeting of HWA biological control researchers and federal program managers in Philadelphia *July 13-14, 2004*
- Hosted Dr. Kamal Ibrahim, population geneticist from the Department of Zoology, Southern Illinois University, Carbondale, IL *July 19-22*
- Was interviewed about winter mortality of hemlock woolly adelgid and hemlock recovery in Connecticut by Trudy Tyman of the Associated Press *August 6*
- Participated in a Supervised Agricultural Experience program with two interns with the HWA biological control project for the entire school year *September 2004-June 2005*
- Gave a tour of the Valley Laboratory and discussed the setting up of a hemlock woolly adelgid internship program with Joe Rodrigues from the Harris Agriscience Center in Bloomfield, CT and students from Weaver High School in Hartford *September 1*
- Gave a tour of the Valley Lab Farm to Dr. Scott Costa from the Entomology Research Laboratory at the University of Vermont at Burlington *October 2*
- Hosted Dr. Scott Costa from the Entomology Research Laboratory, University of Vermont at Burlington and gave him a tour of the Valley Laboratory Farm, *October 20*
- Was interviewed about biological control of hemlock woolly adelgid by Dominic Olivas, a graduate student from Colorado State University *October 29*
- Gave a tour of the Valley Laboratory to Jamie Fischer, wildlife biologist with the DEP on *November 16*
- Was interviewed on hemlock woolly adelgid and biological control by Sam Fretwell of The State, Columbia, SC *November 19*
- Gave the presentation “Assessments of biological control of hemlock woolly adelgid with *Sasajiscymnus (Pseudoscymnus) tsugae* in Connecticut and New Jersey” at the 3rd HWA Symposium, Asheville, North Carolina *February 1-3, 2005*
- Co-Authoring 2 posters on artificial diets and winter mortality of HWA in the northeast, and gave an update on the development of an artificial diet for *S. tsugae* at a HWA biological control forum *February 2*
- Gave a talk on biological control of hemlock woolly adelgid at the annual Forest Health Monitoring Workshop in Jones Auditorium *March 11*
- Gave a tour of the Valley Laboratory to Weaver High School interns *March 22*
- Presented a poster on hemlock woolly adelgid and biological control in Connecticut on Agriculture Day at the Capitol *March 23*
- In collaboration with the USDA Forest Service in Hamden, conducted the first release in the Northeast of *Scymnus sinuanodulus*, an exotic coccinellid predator of hemlock woolly adelgid from China, at Centennial Memorial State Forest in Weston *April 22*
- Met with Dr. Steve Patton of the Nature Conservancy at Centennial Memorial State Forest and gave him a tour of the first northeastern release site for *Scymnus sinuanodulus*, an imported coccinellid species from China for biological control evaluations *April 29*
- Gave an update on *Scymnus* research to scientists at the Northeastern Research Station, USDA Forest Service in Hamden *May 23*

- Gave a tour of the Kenneth White Insectary at the Valley Laboratory to Mr. John Leper of the Wethersfield Tree Commission May 25
- Was interviewed about a release of *Sasajiscymnus tsugae* for the hemlock woolly adelgid biocontrol project by Joyce Rossignol of Wethersfield Life in Wethersfield June 1
- Met with officials at Great Mountain Forest to discuss proposed predator overwintering studies in Great Mountain Forest in Norfolk June 16
- Met with and discussed HWA and biological control of hemlock woolly adelgid with the Conservation Officer at Mashamoquet Brook State Park in Pomfret June 30

COWLES, RICHARD

- Presented the talk “Imidacloprid application techniques and hemlock woolly adelgid management” for an educational program at the Connecticut Nursery and Landscape Association’s Summer Meeting in Bethel July 14, 2004
- Presented “Hemlock woolly adelgid management” at the Valley Laboratory Nursery and Turf Field Day in Windsor July 20
- Spoke on insect and mite management in Christmas trees at the Connecticut Christmas Tree Growers Association Meeting in Windsor July 20
- Gave the talk “Chemical control of hemlock woolly adelgid” at Plant Science Day at Lockwood Farm in Hamden August 4
- Participated with WTIC Radio’s Len and Lisa Gardening Show August 7
- Discussed “Exotic pests and management of hemlock woolly adelgid” with an ecology class from Asnuntuck Community College on a field trip at Shenipsit State Forest in Somers August 8
- Was interviewed about management of elongate hemlock scale by a reporter from Christmas Tree News Magazine September 29
- Participated in a conference call with USDA Forest Service and Pennsylvania Department of Natural Resources professionals regarding imidacloprid application to control hemlock woolly adelgid October 7
- Presented the talk “Insect pests of Christmas trees” to the Connecticut Christmas Tree Growers’ Association in South Windsor October 16
- Spoke to the Forest Health Cooperators’ Meeting about “Chemical control of hemlock woolly adelgid” at Sturbridge, MA October 26
- Spoke on “Conventional plant breeding for strawberry tolerance to black vine weevil” to the Cornell Club of Greater Hartford, Storrs November 6
- Spoke on “History of American entomology” and “Africanized Honey Bees” at Eastern Connecticut State University, Willimantic November 15 and 17
- Coauthored two posters “Natural dyes as novel insecticides” and “Disruption of the immune response in scarab larvae by *Steinernema glaseri* surface coat proteins” presented at the Entomological Society of America National Meeting in Salt Lake City, Utah November 16
- Gave the talk “Organically acceptable management of turf insect pests” to the Northeast Organic Farmers Alliance’s Organic Land Care Workshop in Wellesley, MA January 20, 2005
- Spoke on the subject “Chemical control of hemlock woolly adelgid” at the 16th USDA Interagency Research Forum on Gypsy Moth and Other Invasive Species, in Annapolis, MD January 21
- Spoke on “Managing troublesome insect pests in Christmas trees” to the New Jersey Christmas Tree Growers’ Association in Freehold, NJ January 29
- Gave the talk “Chemical control of hemlock woolly adelgid” at the Third Symposium on Hemlock Woolly Adelgid in the Eastern United States, Asheville, NC February 2
- Presented “Organically acceptable management of turf insect pests” to the Northeast Organic Farmers Alliance’s Organic Land Care Workshop, New Haven February 10
- Spoke about “Insect pests of flowering shrubs” to the Connecticut Nursery Foundation Educational Series in Windsor February 16
- Presented the talk “Chemical control of hemlock woolly adelgid and biological control of elongate hemlock scale” at the Connecticut Forest Health Conference in New Haven March 11

- Presented “Protecting our forest hemlocks” to the Conservation Biology Class at Eastern CT State University in Willimantic *March 14*
- Presented the talk “Chemical control of forest pests: hemlock woolly adelgid and western poplar clearwing bores” at the Eastern Branch Meeting of the entomological Society of America, Harrisburg, PA *March 22*
- Presented “Protecting our forest hemlocks to the Massachusetts Community Tree Conference in Amherst, MA *March 29*
- Spoke about “White grubs in blueberries” and “Black vine weevil management in strawberries” at the Ontario Berry Growers’ Association in Guelph, Ontario *March 31*
- Gave the talks “White grubs in blueberries” and “Black vine weevil management in strawberries” to the Eastern Ontario Berry Growers’ Association in Kemptville, Ontario *April 1*
- Spoke about “Prospects for conventional breeding of strawberries for resistance to black vine weevils” at the CAES Lunch Club *April 11*
- Gave the talk “White grubs in blueberries” to the Massachusetts Blueberry Growers’ Association, Plymouth, MA *June 18*
- Gave the talk “Insect pests in Christmas trees” to the members of the Connecticut Christmas Tree Growers’ Association at their meeting in Voluntown *June 21*
- Was interviewed about control of white grubs by Pamela Weil of the Connecticut Gardener Magazine *June 30*

DOUGLAS SHARON M.

- Hosted and organized a visit to the Station for a group of students from Wintergreen Magnet School in Hamden *July 13, 2004*
- Organized the Station’s exhibit booth at the summer meeting of the Connecticut Tree Protective Association and answered questions on tree health problems and sponsored a tree disease quiz in Farmington *July 15*
- Gave the talks “Sudden oak death” and “Update on current disease problems in the Connecticut landscape” at the annual Nursery tour at the Valley Lab in Windsor *July 20*
- Spoke about plant diseases, disease diagnostics, and the Plant Disease Information Office to a group of students visiting from Common Ground High School Ecology Project *July 23*
- Participated in a leadership forum and scientific planning board meetings at the annual meeting of The American Phytopathological Society in Anaheim, CA *July 28-August 2*
- Was interviewed about late blight of tomato outbreaks in New England and its status in Connecticut by Mark Sims of the Connecticut Radio Network *August 9*
- Was interviewed about late blight and other tomato diseases in Connecticut by a reporter from Channel 30 News *August 9*
- Was interviewed about late blight of tomato fungal diseases of vegetables in Connecticut this season by Bob Miller of the Danbury News-Times *August 11*
- Participated in a round-table discussion of instructors of the Connecticut Tree Protective Association’s Arboriculture 101 course regarding ways to improve the course *August 17*
- Was interviewed about an unusual phenomenon reported as growth of a tomato out of a fig tree by Ann Zucker of The Connecticut Post *August 19*
- Was interviewed about late blight and other diseases of tomato, weather-related delays in ripening, and the quality of this year’s crop by Christine McCluskey of the Journal Inquirer *August 27*
- Was interviewed about the health of Connecticut ornamental and food crops and about what gardeners should or can do now by Abe Katz of the New Haven Register *September 2*
- Discussed the Plant Disease Information Office with visiting plant pathologists from China *September 7*
- Participated in and assisted the Connecticut Tree Protective Examining Board (CTPX) in oral examinations of candidates for arborists licenses at the Station *September 8*
- Participated in a meeting focused on developing a Connecticut emergency management plan for pests of regulatory concern at the Station *September 14*

- Presented a talk and conducted a hands-on workshop on “Methods for propagating plants” for members of the North Stonington Garden Club held at the Otto Kerr Greenhouse in North Stonington *September 15*
- Gave a presentation about noteworthy diseases for Connecticut during 2004 at the Extension Update during the annual meeting of the Northeastern Division of The American Phytopathological Society in State College, PA *October 6-8*
- Gave the lecture “Diseases of shade and ornamental trees” as part of the Connecticut Tree Protective Association’s Arboriculture 101 course in Jones Auditorium *October 13*
- Participated in the annual fall meeting of the Connecticut Christmas Tree Growers Association and presented lectures on current diseases of Christmas trees during the field tour held at Dzen Tree Farm in South Windsor *October 16*
- Gave a talk to members of the Garden Clubs of America and discussed the role of the Plant Disease Information Office *October 25*
- Presented the lecture “Understanding plant diseases” and “The doctor is in” as part of the Federated Garden Club’s Garden Study School in Jones Auditorium *October 26*
- Participated in a meeting of the Pests of Regulatory Concern Emergency Action Committee at the Lockwood Cottage *November 2*
- Discussed tree diseases as part of the Hands-on Workshop of Arboriculture 101 at the Station *November 3*
- Spoke about the Plant Disease Information Office and the history of plant diseases to a Botany class from Quinnipiac University at the Station *November 8*
- Gave the presentation entitled “The top new disease threats to organic land care” at the NOFA Organic Land Care Recertification Seminar in Tolland *December 2*
- Was interviewed about the science and biology of *Phytophthora ramorum*, the causal agent of Sudden Oak Death (SOD) and Ramorum Blight by Tammy Tragakiss of the Litchfield County Times *December 13*
- Assisted in the oral exams of the Connecticut Tree Protective Examining Board and presented an update on the status of Sudden Oak Death in Connecticut *December 15*
- Presented a talk entitled “An update on Sudden Oak Death in Connecticut” and organized and participated in an exhibit booth for the Experiment Station at the Winter Meeting of the Connecticut Tree Protective Association in Southington *January 20, 2005*
- Participated in a round-table discussion with Faith Campbell, Senior Policy Representative, The Nature Conservancy, on proposed policy changes submitted by USDA-APHIS regarding importation of plants and its impact on exotic diseases and insects *January 24*
- Gave a talk entitled “General care and problems with houseplants” for the luncheon meeting of the Open Door Seniors Group at Spring Glen Church in Hamden *February 2*
- Gave a talk entitled “Common diseases of perennials in the home landscape” for the Olde Ripton Garden Club in Shelton *February 7*
- Participated in the CAPS Program State Survey Committee Meeting and provided an update on SOD/Ramorum blight *February 8*
- Presented the talk “Understanding plant diseases” for the NOFA 4th Annual Course on Organic Land Care *February 15*
- Discussed plant diseases and the role of the Plant Disease Information Office with students from Branford High School *February 17*
- Participated in a roundtable discussion on “Eco-gardening” and presented environmentally-friendly methods for disease management with the “Friends of Nature” group in Hamden *February 22*
- Gave a lecture on “Diseases of shade and ornamental trees” as part of the Connecticut Tree Protective Association’s Arboriculture 101 course *February 23*
- Gave a talk entitled “Environmentally-friendly methods for managing plant diseases” to members of the Gardeners of Greater New Haven at the cottage at Lockwood Farm *March 7*
- Assisted the Connecticut Tree Protective Examining Board conduct oral exams for licensing *March 9*
- Gave a talk entitled “Recognition and management of common diseases of perennials” for the Hill & Dale Garden Club of South Glastonbury *March 10*

- Participated in a “Career Shadowing Experience” for a middle school French and Spanish teacher in an area outside of her expertise, as part of an enrichment program *March 11*
- Participated in the Forest Health Workshop held in Jones Auditorium *March 11*
- Was interviewed about Ramorum Blight, bacterial leaf scorch, and oak wilt by Kathy Connolly of Connecticut Gardener *March 15*
- Conducted the Tree Diseases portion of the Hands-on Night of the Connecticut Tree Protective Association’s Arboriculture 101 Course in Jones Auditorium *March 16*
- Gave the presentation entitled “Top three disease threats to Connecticut trees and shrubs” at the Connecticut Master Gardener symposium in Manchester *March 19*
- Met with members of the New Haven Garden Club, caretakers of Phelps Triangle, and a landscape architect, to discuss disease, insect, and cultural problems of plantings in the triangle; and suggested strategies to maintain plant health and vigor *April 6*
- Gave a presentation entitled “Ramorum Blight (Sudden Oak Death) in Connecticut” to participants in the Institute of Learning in Retirement in the Board Room *April 8*
- Participated in a meeting with APHIS/PPQ, UCONN, and DEP-Forestry about developing policies for Ramorum Blight in Connecticut for 2005 at the Lockwood Farm Cottage *April 14*
- Gave a talk entitled “Ramorum Blight (Sudden Oak Death) in Connecticut” and answered questions about plant health problems at Plant Science Day in the Spring *April 18*
- Participated in a symposium sponsored by the Litchfield Garden Club and presented a talk on Ramorum Blight (Sudden Oak Death) in Connecticut – Are We At Risk?” in Litchfield *April 21*
- Gave a presentation entitled “The home orchard” to members of the Hadlyme Garden Club in Hadlyme *April 27*
- Gave the presentation “The Connecticut Agricultural Experiment Station: Who We Are and What We Do” and provided an update on Ramorum Blight in Connecticut to the Wilton Rotary Club in Norwalk *April 29*
- Was interviewed about cedar-apple rust and the horny gall wasp on pin oak by Abram Katz of the New Haven Register *May 2*
- Participated in the Cooperative Agricultural Pest Survey (CAPS) meeting in Windsor *May 26*
- Assisted the Connecticut Tree Protective Association Examining Board with the oral exam for arborists *June 1*

EITZER, BRIAN D.

- Gave a presentation on the analysis of persistent organic pollutants by mass spectrometry to a visiting group of students from the Biogeochemistry and Pollution class at Yale University *September 24, 2004*
- Spoke about the functions of the Analytical Chemistry Department, the research in progress, and the instrumentation to conduct the work in the department with students and Dr. Gaboury Benoit from the Yale School of Forestry and Environmental Studies *September 24*
- Presented a joint presentation with Dr. MaryJane Incorvia Mattina on Station research on the uptake of organic contaminants by plants at the 25th annual Society of Toxicology and Chemistry meeting in Portland, Oregon *November 14-18*
- Acted as judge at the Wilbur Cross High School Science Fair (he was a mentor to 2 students) *January 20-21, 2005*
- Gave the talk “Organic Pollutants and the Environment” to the Talented and Gifted sixth grade class group at Fair Haven Middle School *February 1*
- Talked about work in analytical chemistry to students from Branford High School *February 17*
- Gave a tour of the Analytical Chemistry department to members of the New Haven Garden Club *May 2*

ELMER, WADE H.

- Spoke about *Fusarium* diseases with visiting plant pathologists from China *September 7, 2004*
- Participated in the meeting of the Connecticut Greenhouse Growers Association “Evening at the Greenhouse” at Casertano’s Greenhouse in Cheshire *September 15*

- Presented the paper “Fusarium wilt of *Hiemalis begonia* caused by *Fusarium foetens*” at the annual meeting of the Northeastern Division of The American Phytopathological Society in State College, PA *October 6-8*
- Presented the lecture/laboratory “*Fusarium*: Its ecology, taxonomy, and pathology” to a Plant Pathology class at The University of Connecticut in Storrs *October 13*
- Gave the presentation “Diseases of flowers and herbs” as part of the Federated Garden Club’s Garden Study School in Jones Auditorium *October 25*
- Spoke about “Plant parts and their diseases” to the first and second grade classes at Mile Creek Elementary School in Old Lyme *November 2*
- Spoke about “*Fusarium* diseases in Connecticut” to a Botany class from Quinnipiac University at the Station *November 8*
- Spoke about “Plant parts and their diseases” to the preschool, kindergarten, and first grade classes at Vincent Mauro Magnet School in New Haven *November 9*
- Moderated the Winter Meeting of the Connecticut Greenhouse Growers Association in Jones Auditorium *January 5, 2005*
- Spoke on “Management of Fusarium corm rot of *Gladiolus*” at the Annual Meeting of the North American *Gladiolus* Council in Kissimmee, FL *January 20*
- Presented a seminar on “Physiological and microbial mechanisms of suppressing Fusarium crown and root rot of asparagus with NaCl” to the Plant Pathology Department at the University of Florida in Gainesville, FL *January 25*
- Moderated and presented a talk entitled “Update on preventing, identifying, and managing bedding plant diseases” at the Bedding Plant Meeting in Jones Auditorium *January 27*
- Presented a talk entitled “Update on preventing, identifying, and managing bedding plant diseases” at the Bedding Plant meeting in Tolland *February 8*
- Spoke about “Growing asparagus” to the Hadlyme Garden Club in Hadlyme *February 23*
- Presented a lecture/lab entitled “Diagnostics of *Fusarium* diseases” to an undergraduate class at the University of Massachusetts in Amherst, MA *March 7*
- Moderated the afternoon session of the Perennial Plant Conference at UCONN in Storrs *March 9*
- Participated in the advisory Ph.D. Committee for Anuthep Pasura in the Department of Plant Science at UCONN in Storrs *March 30*
- Participated in a planning meeting for the Northeastern Division of The American Phytopathological Society in Geneva, NY *April 15*
- Gave a presentation on “Plant parts and their diseases” to first-grade students at Doolittle School in Cheshire *May 16*
- Presented the talk “Cultural and microbial amendments to suppress the replant disease in asparagus”, presented the poster “Does salt increase spear earliness”, and led the workshop presentation on “Overcoming the replant problem in asparagus” at the 11th International Asparagus Symposium in Venray, The Netherlands *June 15-22*

FENGLER, JEFF

- Participated in ICS 100 training in Jones Auditorium *February 14, 2005*
- Assisted with the Connecticut Invasive Plant Work Group display booth at the Hartford Flower Show at the CT Expo Center in Hartford *February 24*
- Participated in a Ramorum Blight survey training session at the University of Rhode Island in Kingston, RI *May 3*

FERRANDINO, FRANCIS J.

- Spoke about powdery mildew on cucurbits and tomatoes with visiting plant pathologists from China at Lockwood Farm *September 7, 2004*
- Gave the talk “Clumps, quadrats, and correlation: Size really does matter” at the annual meeting of the Northeastern Division of The American Phytopathological Society in State College, PA *October 8*
- Spoke about “Aerial spread of soybean rust” to a Botany class from Quinnipiac University at the Station *November 8*

- Presented a poster entitled “When the mean is meaningless: The role of episodic and/or aggregated behavior in epidemiology” at the 9th International Workshop on Plant Disease Epidemiology in Landerneau, France *April 11-15, 2005*
- Gave the talk “Proper pruning and training to minimize the effect of plant disease on the yield of tomatoes” at heritage village in Southbury *June 15*

GENT, MARTIN P.N.

- Presented a poster on “Effect of shade on quality of greenhouse tomato” at the American Society of Horticultural Science Meeting in Austin, Texas *July 17-20, 2004*
- Worked with students from the Sound School in taking down plants from a tomato experiment at Lockwood Farm *September 21*
- Presented a talk “Extending vegetable production” in the Discovery tent at the Durham Fair *September 25*
- Participated in the symposium “Function and Fate in Plants: Physiological Traits and Ecological Success” at Smith College *October 2*
- Presented a talk on “Phyto-extraction of field-weathered DDE by subspecies of cucurbita and exudation of citric acid from roots” at the 20th Annual International Conference on Soil, Sediments and Water in Amherst, MA *October 19*
- Chaired the graduate student presentation judging committee, and presented a poster on “Effect of shading on composition of fruit and leaves of greenhouse tomato at the Northeast Regional American Society for Horticultural Science meeting in Washington, DC *January 4-6, 2005*
- Participated in a New England Vegetable and Berry Growers Steering Committee meeting in Manchester, NH *January 18*
- Spoke on “Greenhouse vegetable production” to students from around Connecticut at Timothy Edwards Middle School in South Windsor *January 19*
- Participated in a meeting of Vegetable Growers sponsored by University of Connecticut in Tolland *January 20*
- Discussed winter salad greens production at a growers meeting held at David and Tye Zemelski’s farm in Durham *February 17*
- Participated in a steering committee meeting for the New England Vegetable and Berry Conference in Manchester, NH *March 7*
- Presented a short research summary to school teachers involved in the Farm City program during their tour of CAES *March 30*
- Attended a symposium and served as a panelist in a workshop on “Biotechnology Risk Assessment: Gene Confinement for Genetically Modified Grasses” held at the Omni Hotel in New Haven and sponsored by Yale University’s Interdisciplinary Bioethics Project and lifeedu.org *May 13-14*

HANNAN, ROLLIN

- Assisted Prism Communications, Inc. and Sussex Country Weather Network in the installation of the new weather station at Lockwood Farm (provided by the national Weather Service), which will provide online weather data in the spring of 2005 *December 2004*

HISKES, ROSE

- Displayed a poster reporting on the Connecticut Nursery and Landscape Association Discovery and Education Garden at the CNLA summer meeting in Bethel *July 14, 2004*
- Staffed the Station booth at the Connecticut Tree Protective Association’s summer meeting in Farmington *July 15*
- Gave a talk and walk on weeds to Advanced Master Gardeners in Storrs *July 17*
- Gave a talk on winter injury, garden rejuvenation, and insect pests of witchhazel, London plane tree and elm at the Nursery and Landscape Research Tour in Windsor *July 20*
- Participated in a symposium planning committee meeting for the Connecticut Invasive Plant Working Group in Windsor *September 2-22*
- Participated in training to identify invasive grasses in Mystic *September 16*

- Spoke on weeds and insect pests of ornamentals at Naugatuck Valley Community College in Waterbury *September 1, 8, 15, 22, and 29*
- Moderated an afternoon session and coordinated exhibitors at the Connecticut Invasive Plant Working Group Symposium in Storrs *October 7*
- Gave a talk on invasive plants in Moodus *October 16*
- Gave lectures on pesticides for use in ornamentals and turf at Naugatuck Valley Community College in Waterbury *October 6, 13, 20, and 27*
- Gave a talk on houseplants to the Greater New Haven Garden Club in Hamden *November 1*
- Team taught a pesticide training short course for Christmas tree growers in Windsor *November 9 and 18*
- Gave lectures on pesticides and diseases of ornamentals and turf at Naugatuck Valley Community College in Waterbury *November 3, 10, and 17*
- Gave lectures on diseases of ornamentals and turf at Naugatuck Valley Community College in Waterbury *December 1, 8, and 15*
- Displayed a CNLA Discovery and Education Garden poster at the annual meeting of the CT Nursery and Landscape Association in Stamford *January 11-12, 2005*
- Participated in a CT Tree Protective Association symposium planning committee meeting in Windsor *January 14*
- Answered questions at the Station's booth at the CT Tree Protective Association winter meeting in Southington *January 20*
- Gave a talk on invasive plants at Mitchell College in New London *January 27*
- Participated in a CNLA Education Committee meeting in Cromwell *February 16*
- Gave a talk on houseplants to the Shoreline Garden Club in Madison *February 22*
- Gave a talk on invasive plants at the Grange in North Stonington *February 25*
- Staffed the CNLA and CIPWG booths at the Flower Show in Hartford *February 25 and 27*
- Gave a talk on pests of the garden to the Sew-n-Reap Garden Club in Granby *March 3*
- Participated in a CNLA Education Committee meeting in Cromwell *March 10*
- Staffed a CAES booth at the Master Gardener Symposium in Manchester *March 19*
- Gave a talk on invasive plants to the public in Lyme *March 24*
- Participated in a meeting of the Connecticut Invasive Plant Working Group at the Peabody Museum in New Haven *March 28*
- Staffed a Station booth at the Family Science Expo in Hartford *April 9-10*
- Taught IPM at Farm-City at Lockwood Farm in Hamden *May 17-19*
- Gave a tour of the CNLA Discovery & Education Gardens and Valley Lab field plots to the Sew N Reap Garden Club *June 2*
- Worked on the insect team at BioBlitz in East Hartford *June 3, 4*
- Taught a class on "Trees and Shrubs for the Connecticut Garden" for Windsor Adult Education *June 2, 9, & 16*

HORVATH, RICHARD

- Spoke about "Practical aspects of pesticide and nutrient applications in the vineyard" at the Connecticut Vineyard and Winery Association meeting held in Windsor *March 19, 2005*

IANNUCCI-BERGER, WILLIAM

- Spoke about the functions of the Analytical Chemistry Department, the research in progress, and the instrumentation to conduct the work in the department with students and Dr. Gaboury Benoit from the Yale School of Forestry and Environmental Studies *September 24, 2004*
- Participated in describing work done in analytical chemistry to students from Branford High School who were touring the Station *February 17, 2005*

INMAN, MARY

- Gave a talk on general care of houseplants to members of the Partnerships Center for Adult Day Care in Hamden *August 25, 2004*

- Gave the talk “Pruning for the home gardener” to the Fairfield County Horticultural Society in Westport *October 14*
- Gave a talk entitled “Pruning for the home gardener” to the East Haven Garden Club in East Haven *January 20, 2005*
- Gave the talk “Basic techniques for propagating plants” to the Bethany Garden Club in Bethany *February 14*
- Gave a talk entitled “Pruning for the Home Gardener” to members of the West Haven Garden Club in West Haven *April 14*
- Gave a talk on “Basic Techniques for Propagating Plants” to the Heritage Village River Garden Club at Heritage Village in Southbury *April 20*

KACZENSKI, LISA

- Helped man the Station display booth at the CT Flower Show, greeting and talking to the public *February 25 and 27, 2005*
- Helped man the Station display booth at CPTV Family Science Day Expo, greeting and talking to the public *April 8 and 10*
- Set up and manned a Station display at Topmost Herb Farm HerbFest 2005 and greeted and talked to the public *June 4*
- From March throughout the summer created, maintained, and observed a Bluebird Trail at Lockwood Farm to encourage bluebird nesting and thereby raising the bluebird population. Lisa’s father, Bill Kaczenski, built ten boxes with wood donated from a local sawmill. He also repaired two existing boxes. As of June there was one pair of bluebirds nesting. *March-August*

KETTLE, IRA

- Presented a live honey bee demonstration hive at Family Day in Harkness Park, Waterford *September 12, 2004*
- Helped set up and man an exhibit booth in the Connecticut Building at the Eastern States Exposition, West Springfield, MA *October 2-3*
- Gave a bee demonstration at the Brookvale Fall Festival in Hamden *October 4*
- Set up an educational bee demonstration for a 2nd Grade class in Savin Rock School *October 18*
- Gave his annual presentation on diseases and bee problems during 2004 inspections to the Connecticut Beekeepers Association *October 31*
- Manned an exhibit, presented a live honey bee demonstration hive, and handed out information at the Connecticut Flower and Garden Show at the Expo Center in Hartford *February 24-27, 2005*
- Helped to set up an exhibit and greeted the public at the Annual Garden Expo at Fairfield Ludlowe High School, Fairfield *March 19-20*
- Helped set up Station displays and manned the booth at the CPTV Family Science Expo in Hartford *April 7-10*
- Set up and manned Station displays at the EarthPlace Earth Day Festival in Westport *April 30*
- Set up an educational live honey bee demonstration at the Children’s Learning Center in Old Lyme *May 5, 2005*
- Set up a live bee demonstration for students attending Farm City held at Lockwood Farm *May 17-19*
- Spoke at the Eastern Connecticut Beekeepers’ Association meeting on Varroa mites and treatments. Also spoke on the importance of registering colonies *June 12*

KROL, WALTER

- Spoke about the functions of the Analytical Chemistry Department, the research in progress, and the instrumentation to conduct the work in the department with students and Dr. Gaboury Benoit from the Yale School of Forestry and Environmental Studies *September 24, 2004*
- Participated in a 50 state conference call conducted by the FDA presenting a summary and overview of the Food Security Surveillance Assignment. The Department of Analytical Chemistry was one of only four state laboratories nationally to participate in this exercise and was specifically cited as a participant during the call *January 27, 2005*

- Participated in describing work done in analytical chemistry to students from Branford High School who were touring the Station *February 17*
- Gave a tour of the Analytical Chemistry Department to members of the New Haven Garden Club *May 2*

LAMONDIA, JAMES A.

- Was interviewed about tobacco history and culture in Connecticut by Elaine Morikawa for a documentary on tobacco for Japanese television *July 1, 2004*
- Was interviewed about research and services at the Connecticut Agricultural Experiment Station Valley Laboratory and tobacco disease research by Christine McCluskey and Jessica Hill of the Journal Inquirer *August 24*
- Was interviewed about the importance of nematode diseases in ornamentals for a crop protection report by Duncan Allison *August 28*
- Discussed plant pathology and nematology research and toured the Valley Laboratory field plots with visiting Chinese scientists *September 7*
- Participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven *September 8*
- Spoke about “The role of soil in plant disease” to the New Haven Land Trust Community Gardeners in New Haven *September 11*
- Spoke about the research and services at the Valley Laboratory and conducted a tour of the building and field plots for the Consulting Committee of the Federated Garden Clubs *September 16*
- Was interviewed about shade and broadleaf tobacco culture and labor requirements by Ray Lindner of the National Center for Farm Worker Health *September 23*
- Spoke on research results and chaired the annual meeting of the Northeast Regional Nematology Technical Committee (NE-1019) held at the US Vegetable Laboratory in Charleston, SC *October 13-15*
- Participated in the Connecticut Agriculture and Natural Resources Association meeting between growers and the Department of Agriculture Commissioner *October 26*
- Assisted University of Massachusetts student Jamie Meadows with a mycology project on blue mold of tobacco *October 28*
- Was interviewed about the effect of weather on the 2003 and 2004 shade and broadleaf tobacco crops and tobacco diseases by Marsha Bloomberg of the Springfield MA Sunday Republican *November 10*
- Presented a plant pathology lecture on nematology and laboratory on nematode identification at the University of Connecticut *November 10*
- Was interviewed about tobacco culture by Anne Brocker, industrial hygienist at the University of Connecticut Health Center *November 12*
- Was interviewed about tobacco culture by Anne Brocker, industrial hygienist at the University of Connecticut Health Center *November 17*
- Participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven *December 15*
- Spoke about “Plant disease development, impact and management” to 160 students attending the Future Problem Solving Program at Timothy Edwards Middle School in South Windsor *January 19, 2005*
- Participated in a special meeting of the Connecticut Tree Protection Examining Board at the Connecticut Tree Protective Association meeting in Plantsville *January 20*
- Presented the talk “All About nematodes” to an advanced “Master Gardener class in Bethel, CT *January 31*
- Participated in a meeting of the CAPS State Survey Committee held in Windsor *February 8*
- Spoke about management of tobacco diseases and progress in breeding for resistance to tobacco pathogens at the Tobacco Research Meeting held in Suffield *February 22*
- Was interviewed about Connecticut cigar wrapper tobacco by James O’Brien of the Cigar Association of America *March 4*
- Participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven *March 9*

- Gave a tour of the Valley Lab and discussed research with the research manager of the Prairie Turfgrass Research Centre in Alberta, Canada *March 11*
- Gave a tour of the Valley Lab and talked about strawberry black root rot research at the Valley Lab with Dr. Kenna MacKenzie, berry crop entomologist with Agriculture Canada *March 23*
- Conducted a tour of the Valley Lab and discussed research projects with Dr. Sandra Shinn R&D Scientist for Syngenta Crop Protection *March 28*
- Spoke on plant breeding and research on management of tobacco pathogens including sore shin, blue mold, cyst nematode and tobacco mosaic virus at the Crop Production Services Growers Meeting held in East Windsor *March 30*
- Spoke about Station history, research programs, and services to the public at the Valley Lab to students from Springfield College *March 31*
- Gave a tour of the Station and farm, and explained Station research programs and services as part of a job shadowing day for a high school student from Windsor High School *April 13*
- Spoke about the Experiment Station and agricultural research at a Career Day held at Central Connecticut State University in New Britain *April 22*
- Was interviewed about the effects of recent weather on strawberry diseases and the strawberry crop by Kim Soper of the Journal Inquirer *May 26*
- Participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven *June 1*
- Spoke about Station activities and research conducted by Valley Lab scientists to the Sow and Reap Garden Club of Granby, CT *June 2*
- Was interviewed about the presence of blue mold in Kentucky and implications for the Connecticut crop by Dana Whalen of WTIC radio *June 30*

LI, DEWEI

- Hosted a delegation of Chinese plant pathologists from Shandong Forestry Academy on a tour of the Valley Lab and the Plant Pathology Department at the Station in New Haven *September 7, 2004*
- Met with faculty members of the environmental Health Group of the UConn Medical School at the UConn Medical Center *October 28*
- Hosted Mr. Ding Xibin, Associate Director of Shandong Forestry Bureau at the Valley Lab and the Station in New Haven *November 15*
- Hosted a visit to the Valley Lab by Mr. Jim Ross, Research Manager of the Prairie Turfgrass Research Centre in Alberta, Canada *March 11*

MAGNARELLI, LOUIS A.

- Was interviewed about mosquitoes by Garret Condon of the Hartford Courant *July 7, 2004*
- Was interviewed about hemlock woolly adelgids by Erica Cohen of the Keene Sentinel *July 14*
- Participated in the Northeast Directors Association Meeting in Mystic *July 11-13*
- Spoke about ticks at the Connecticut Agricultural Fair in Goshen *July 23*
- Was interviewed about Lockwood Farm by Kathleen Greenleaf of the Hamden Chronicle *August 13*
- Participated in a Wine Council meeting in Colchester *August 27*
- Participated in a field trip and meeting of the Invasive Plants Council in Storrs *September 2*
- Spoke to the Spring Glen Garden Club about tick research and other Station programs *September 13*
- Was interviewed about ticks by Bill Heald of Northeast Magazine *September 14*
- Was interviewed about bees and wasps by Bob Miller of the Danbury News Times *September 15*
- Participated in a meeting of the Invasive Plants Council in Hartford *September 21*
- Participated in a meeting of the Invasive Plants Council in Hartford *October 12*
- Participated in a meeting on plant nematode control in Charleston, South Carolina *October 14*
- Was interviewed about Station Research by Veronique Greenwood for an article in Yale Science Magazine *October 19*
- Spoke about agriculture to growers at the Valley Laboratory *October 26*
- Spoke about McIntire-Stennis Research at the Station at a CSREES meeting in Washington, D.C. *October 27*
- Spoke about Station research to Experiment Station Associates in Uncasville *October 28*

- Participated in a Wine Council meeting in Windsor *November 1*
- Met with Elizabeth Moore of CT Farmland Trust at Lockwood Cottage *November 2*
- Participated in a meeting of the CT Environmental Protection and USDA/APHIS personnel in Hamden on developing an action plan for exotic pests *November 2*
- Participated in an Invasive Plants Council meeting in Hartford *November 8*
- Participated in a Farm Bureau meeting in Vernon *November 9*
- Greeted the Board members of the Federated Garden Clubs of Connecticut in Jones Auditorium *November 17*
- Was interviewed about Sudden Oak Death by Steve Grant of the Hartford Courant *November 29*
- Was interviewed about Sudden Oak Death by Paisy Chang of Channel 3 TV *November 30*
- Was interviewed about Sudden Oak Death by Jeff Holtz of the New York Times *November 30*
- Was interviewed about Sudden oak Death by Bob Miller of the Danbury News Times *November 30*
- Was interviewed about Sudden Oak Death by Frank Morrell of WICC Radio *November 30*
- Was interviewed about Sudden Oak Death by Fred Musante of the Hamden Chronicle *December 1*
- Was interviewed about Sudden Oak Death by Mike McKeon of the Hartford Courant *December 2*
- Was interviewed about Sudden Oak Death by Dominique Avery of CTN *December 3*
- Was interviewed about Sudden Oak Death by Brad McHee of the New York Times *December 9*
- Was interviewed about Sudden Oak Death by Brian Cable of Woodshop News *December 10*
- Was interviewed about Sudden Oak Death by Pammy Tradakis of the Litchfield County Times *December 10*
- Was interviewed about invasive plants by Bob Miller of the Danbury News Times *December 13*
- Participated in the Invasive Plants Council Forum in Hartford *December 13*
- Was interviewed about Sudden Oak Death by Joe Sinopoli of American Nurseryman Magazine *December 14*
- Gave a presentation on Sudden Oak Death at a meeting of the State of Connecticut Council on Environmental Quality in Hartford *December 15*
- Was interviewed about Sudden Oak Death by Calli Planakis of the New Haven Register *December 16*
- Was interviewed about Sudden Oak Death by Dana Whelan of WTIC Radio *December 30*
- Was interviewed about Sudden Oak Death by Jesse Smolin of the Record Journal (Meriden) *January 3, 2005*
- Welcomed the Connecticut Greenhouse Growers to Jones Auditorium for their Annual Meeting *January 5*
- Greeted members of the Federated Garden Club in Jones Auditorium *January 19*
- Gave an update on Station activities at the winter meeting of the Connecticut Tree Protective Association in Southington *January 20*
- Gave a report to Experiment Station Associates at their meeting held at Lockwood Farm *January 25*
- Greeted the bedding plant growers at their meeting held in Jones Auditorium *January 27*
- Was interviewed by Brian Saxton of the Danbury News Times about honey bees and Varroa mites *February 7*
- Participated in an Invasive Plants Council Meeting in Hartford *February 15*
- Welcomed students from Branford High School before they toured Station laboratories *February 17*
- Spoke to tobacco growers in Suffield about Station research programs *February 22*
- Spoke to nursery owners about Sudden Oak Death in Jones Auditorium *February 22*
- Was interviewed about federal formula funds for research by Peter Urban of the Connecticut Post *March 1*
- Was interviewed about biological control of purple loosestrife by Peter Martika of the Hartford Courant *March 7*
- Was interviewed about mosquitoes and ticks by Ed Kranter of the Connecticut Post *March 10*
- Spoke about the Station's budget to the Experiment Station Associates members at their annual meeting in Jones Auditorium *March 15*
- Was interviewed about Sudden Oak Death by Steve Grant of the Hartford Courant *March 21*
- Greeted the Federated Garden Club in Jones Auditorium *March 22*

- Spoke about Sudden Oak Death to the Commissioner of the Department of Environmental Protection and to other staff members *March 28*
- Spoke about the Station's research program to students in the Institute for Learning in Retirement at the Station *March 31*
- Spoke about Ramorum Blight, mosquito surveillance, and food safety program to tree wardens in East Haddam *March 31*
- Along with Dr. MaryJane Mattina, Vickie Bomba-Lewandoski and Michael Last, met with the head of Yale's Scientific Library System to discuss cooperative interaction between the Station and Yale *April 4*.
- Greeted members of the Federated Garden Clubs of Connecticut in Jones Auditorium and spoke about Ramorum Blight *April 6*
- Participated in a meeting of the Experiment Station Associates Board of Directors at Lockwood Farm and spoke about Ramorum Blight *April 7*
- Spoke about Station programs at a Farm Bureau meeting in Windsor *April 12*
- Greeted the Future Farmers of America in Jones Auditorium *April 25*
- Was interviewed about testing for Lyme disease by Lisa Sarah of the Journal Inquirer *May 4*
- Welcomed participants of the Connecticut Watershed Conservation Network in Jones Auditorium *May 13*
- Spoke about federal formula funds, Ramorum blight and the career of Donald F. Jones to the Experiment Station Associates at Lockwood Farm *June 2*
- Greeted members of the Federated Garden Clubs in Jones Auditorium and gave a report on Station activities *June 6*
- Was interviewed about invasive plants by Nancy Cohen of Public Radio *June 21*
- Was interviewed about gypsy moth by Nancy Cohen of Public Radio *June 24*

MAIER, CHRIS T.

- Was interviewed about cicada biology by Jeff Yates of the Wilton Bulletin *August 9, 2004*
- Introduced new entomological literature at a meeting of the Connecticut Entomological Society at Yale University *September 17*
- Presented a display on insect fossils and new entomological literature at a meeting of the Connecticut Entomological Society at Trinity College, Hartford *October 15*
- Presented a poster titled "Alien Insects Recently Discovered in Connecticut" at the annual meeting of the Entomological Society of America in Salt Lake City, Utah, *November 17*
- Presented a poster (Alien Insects Recently Discovered in Connecticut) and the Award of Merit to Dr. John Anderson at the Annual Meeting of the Connecticut Pomological Society in Glastonbury *December 7*
- Spoke on the emerald ash borer at the Annual Meeting of the Connecticut Tree Protective Association in Southington, CT *January 20, 2005*
- Presented displays on Connecticut cicadas and new entomological literature at a meeting of the Connecticut Entomological Society in Jones Auditorium *January 21*
- Spoke about the emerald ash borer and the small Japanese cedar longhorned beetle, displayed a synoptic collection of exotic insects, and presented a poster on "Alien Insects Recently Discovered in Connecticut" at a meeting of the Advisory Committee for the Cooperative Agricultural Pest Survey (CAPS) at the Valley Laboratory, Windsor *February 8*
- Introduced new entomological literature and displayed exotic insects found in Connecticut at a meeting of the Connecticut Entomological Society in Jones Auditorium *February 18*
- Spoke on the emerald ash borer and other exotic insects at the Forest Health Monitoring Workshop in Jones Auditorium *March 11*
- Displayed spiders and related arthropods on stamps, spider parasites (small-headed flies), and recent literature on spider parasites at a meeting of the Connecticut Entomological Society in Jones Auditorium *March 18*
- Displayed new European entomological literature and a European checkered beetle (Cleridae) recently trapped in New Haven *April 15*

- Spoke on invasion of alien insects during Plant Science Day in the Spring in Jones Auditorium *April 18*
- Spoke on the brown marmorated stink bug and wood-boring apple pests at a twilight meeting of the Connecticut Pomological Society at Buell's Orchard in Eastford *May 25*
- Spoke about problems with the NAPIS database and about exotic pests at a meeting of the Advisory Committee of the Cooperative Agricultural Pest Survey at the Valley Laboratory in Windsor *May 26*
- Spoke about Diptera (two-winged flies) diversity during the 2005 BioBlitz of the University of Connecticut at Two Rivers Magnet School in East Hartford *June 4*
- Spoke about upcoming meetings and fruit insects at a Twilight Meeting of the Connecticut Pomological Society at Bishop Orchards, Guilford *June 21*

MARRA, ROBERT E.

- Spoke about Sudden Oak Death and other *Phytophthora* diseases of trees with visiting plant pathologists from China *September 7, 2004*
- Gave the talk "Mixed mating in natural populations of the chestnut blight pathogen, *Cryphonectria parasitica*" at the annual meeting of the Northeastern Division of The American Phytopathological Society in State College, PA *October 8*
- Spoke about "Population biology of *Neonectria* on birch" to a Botany class from Quinnipiac University at the Station *November 8*
- Participated in the Second Sudden Oak Death Science Symposium in Monterey, CA *January 18-21, 2005*
- Spoke about *Phytophthora ramorum* and its potential threat to Connecticut to the Board of Directors of the Tree Wardens' Association at the headquarters of the Connecticut Forest and Park Association in Middletown *February 15*
- Participated in the CNLA Sudden Oak Death (*Phytophthora ramorum*) informational meeting in Jones Auditorium *February 22*
- Gave a talk entitled "Thoughts on *Neonectria*" and participated in a discussion about *Phytophthora ramorum* at the Forest Health Workshop in Jones Auditorium *March 11*
- Gave a talk about *Phytophthora ramorum* and Ramorum Blight to the Experiment Station Associates in Jones Auditorium *March 15*
- Spoke about diagnostic procedures for Ramorum Blight at the 2005 Northeast Forest Pathologists Workshop in Bretton Woods, NH *May 24-26*

MASTRONE, TIA

- Helped set up and man the Station's exhibits at the CPTV Family Science Expo in Hartford *April 7*
- Participated in a USDA-Forest Service Ramorum Blight survey training session for sampling of nursery perimeter areas *May 3*

MATTINA, MARYJANE INCORVIA

- Participated in numerous meetings in Hartford hosted by the Director of Laboratories at the Connecticut Department of Public Health as part of the Laboratory Preparedness Advisory Committee *July 2004-August 2005*
- By invitation of USDA and FDA, participated in numerous meetings and conference calls related to establishing a national Food Emergency Response Network for counter-terrorist activities *2004-2005*
- Organized a regional meeting for federal and Northeast state laboratory participants in FERN in Amherst, MA *July 27-28*
- Arranged for two New Haven Science Fair students to participate in summer internships in the Analytical laboratories during *July and August*
- Spoke about the functions of the Analytical Chemistry Department, the research in progress, and the instrumentation to conduct the work in the department with students and Dr. Gaboury Benoit from the Yale School of Forestry and Environmental Studies *September 24*
- Met with science teachers from Wilbur Cross High School to discuss the need of the school to get science fair mentors for their students. As a result of e-mail notification of Station staff, several potential mentors contacted the teachers to work out details of interaction *October 20*

- Presented a joint presentation with Dr. Brian Eitzer on Station research on the uptake of organic contaminants by plants at the 25th annual Society of Toxicology and Chemistry meeting in Portland, Oregon *November 14-18*
- Met with Dr. Brij Sawhney and Professors James Stuart and Cristian Schulthess, together with Karen Kinsella, a graduate student at UCONN, to discuss research cooperation between the two institutions *December 8*
- Met with Caren Wilcox, Special Advisor – Food Safety and Health to Congresswoman Rosa DeLauro to discuss the activities in the food safety arena in which the Department of Analytical Chemistry has robust ongoing programs *December 21*
- Presented a talk entitled “What’s new in analytical chemistry at The Connecticut Agricultural Experiment Station” at the annual winter meeting of the Connecticut Association of Sanitarians *January 19, 2005*
- Served as a judge at the Wilbur Cross High School Science Fair *January 20-21*
- Participated in a 50 state conference call conducted by the FDA presenting a summary and overview of the Food Security Surveillance Assignment. The Department of Analytical Chemistry was one of only four state laboratories nationally to participate in this exercise and was specifically cited as a participant during the call *January 27*
- Gave a talk about chromatography and spectroscopy theory and practice to students from Branford High School who were touring the Station *February 17*
- Met with officials from CT DEP and CT DCP to discuss expanded interaction and cooperation between the agencies *February 24*
- Met with staff of the Connecticut Post to discuss issues related to formula funding and work impacted by such funding in Analytical Chemistry *March 1*
- Met with officials of the Connecticut Department of Public Health regarding continued laboratory collaboration in areas of counterterrorism *March 17*
- Along with Dr. Louis A. Magnarelli, Vickie Bomba-Lewandoski and Michael Last, met with the head of Yale’s Scientific Library System to discuss cooperative interaction between the Station and Yale *April 4*.
- Spoke with several groups of citizens attending Plant Science Day in the Spring regarding analytical techniques and associated demonstrations and tours in our laboratories *April 18*
- Gave a presentation to the Station’s Board of Control on ongoing food safety work conducted in Analytical Chemistry *April 20*
- Met with staff from the Yale Office of Emergency preparedness to discuss food safety activities in Analytical Chemistry that intersect with activities at Yale *April 27*
- By invitation, participated on the Advisory Panel for Environmental Science and Toxicology Program at Gateway Community College *April 28*

MAYNARD, ABIGAIL

- Judged fruits and vegetables at the North Haven Fair *September 9, 2004*
- Gave a tour of Lockwood Farm and discussed Station activities with the second grade of Hamden Hall Country Day School *September 21*
- Gave a report on Station activities to the Council on Soil and Water Conservation in Windsor *October 21*
- Gave a tour and discussed Station activities with the PreK and Kindergarten classes of Hamden Hall Country Day School *September 27*
- Was interviewed about compost utilization research by Doreen Howard of the Mother Earth News *November 29*
- Represented the Station at a meeting of the State Technical Committee to discuss Farm Bill funding in Tolland *December 15*
- Spoke on composting and utilization of compost to students and teachers in the Future Problem Solving Program of Connecticut in South Windsor *January 19, 2005*
- Taught a course on “Composting and Utilization of Compost” for the National Organic Farming Association’s 4th Annual Course in Organic Land Care held in Jones Auditorium *February 9*
- Was interviewed about mulch by Paul Tukey from People, Places, and Plants Magazine *March 21*

- Spoke on Station activities at the quarterly meeting of the Council on Soil and Water Conservation in Windsor *April 21*

MCHALE, NEIL A.

- Attended a reception for teachers and their sponsors for the CBIA administered NSF funded summer externship program *September 30, 2004*
- Lectured on “Breeding Ornamental Plants” to the Garden Study School for the Federated Garden Clubs of CT in Jones Auditorium *October 26*
- Lectured on Experiment Station history, genetically modified organisms and current genetic research in the Department of Biochemistry and Genetics to an undergraduate Plant Biology class from Yale University *November 11*
- Lectured on “Genetic research in basic plant science” and conducted laboratory tours for students in a Plant biology course from Springfield College, Springfield, MA *November 16*
- Presented a seminar on “Overlapping functions for KNOX and HD-ZIPIII transcription factors in vascular meristems” in the Department of Cellular, Molecular and Developmental Biology at Yale University *February 24, 2005*
- Gave a presentation on “Functional Genomics in Plants” to students from Branford High School *March 17*
- Gave a presentation on “Functional Genomics in Plants” to the Farm City teachers *March 30*
- Gave a mini course on “Factors that Influence Plant Growth” in the Garden Study School for the Federated Garden Clubs of CT *April 6*

MERVOSH, TODD

- Presented a demonstration of proper use of backpack sprayers at the Connecticut Nursery and Landscape Association Summer Field Day in Bethel *July 14, 2004*
- Gave the field talks “Managing horsetail (*Equisetum*) in landscapes”, “Tolerance of herbaceous perennials to herbicides” and “Comparison of granular herbicides for residual weed management in containers” and set up a display of weeds at the Nursery and Landscape Research Tour *July 20*
- Spoke about weed management and displayed weeds at the Christmas Tree Twilight Meeting at the Valley Laboratory *July 20*
- Presented a display of weeds and wild plants at a meeting of the Sharon Garden Club *August 2*
- Led the symposium planning committee meetings for the Connecticut Invasive Plant Working Group at the Valley Laboratory *September 2, 22 and October 5*
- Spoke about Experiment Station activities and demonstrated 12 pumpkin varieties he grew at the Valley Lab to the Windsor/Windsor Locks Rotary Club *September 9*
- Was Program Chair, Morning Session Moderator, and presented the talk “Asiatic bittersweet, swallowwort, and phragmites control research” at the symposium “The Silent Invaders: Identification and Management of Invasive Plants” at the University of Connecticut in Storrs *October 7*
- Spoke about weed management at the Connecticut Christmas Tree Growers Association fall meeting in South Windsor *October 16*
- Spoke about weed management in corn at a meeting of the Litchfield County Dairy Committee in Torrington *November 9*
- Spoke about invasive plants at a meeting of the East Granby Land Trust *December 6*
- Presented research on “Comparison of granular herbicides for residual weed control in nursery containers” and “Tolerances of container-grown perennials to pre-emergence herbicides” and served as a section chair/moderator at the annual meeting of the Northeastern Weed Science Society in Washington, DC *January 3-6, 2005*
- Met with representatives of Connecticut DEP and The Nature Conservancy in Middletown to discuss management of Japanese stiltgrass *February 2*
- Participated in a Steering Committee meeting of the Connecticut Invasive Plant Working Group in Storrs *February 9*
- Spoke about weed control at a tobacco research meeting in Suffield *February 22*
- Participated in a meeting of the Connecticut Invasive Plant Working Group at the Peabody Museum in New Haven *March 28*

- Taught a class on “Plant taxonomy and identification” for the Federated Garden Clubs at Elizabeth Park in West Hartford *April 5*
- Presented a display of weeds and wild plants at Plant Science Day in the Spring at CAES in New Haven *April 18*
- Gave a guest lecture on “Herbicides” mode of action, environmental fate, use in weed management” for Plant Science 213, an ecology lab at the University of Connecticut in Storrs *April 19*
- Participated in a Cooperative Weed Management Workshop sponsored by the US Forest Service in White River Junction, VT *May 13*
- Presented the talk “Invasive plants: Control options, use of herbicides & environmental issues” to the Inland Wetlands Commission for the town of Ledyard *May 17*

MUSANTE, CRAIG

- Along with Dr. David Stilwell, presented a talk on heavy metals in community garden soils to the Science Club at Albertus Magnus College in New Haven *November 3, 2004*
- Participated in a workshop on advanced technologies for the cost-effective cleanup of brownfield properties in Rocky Hill, CT, sponsored by Regenesys Corp *December 7*

NAIL, WILLIAM

- From July 1, 2004 through June 30, 2005, made numerous visits to vineyards and wineries throughout the state, advising growers and owners on new plantings, checking for diseases and arthropod damage, advised on bird and other large animal control, advised on harvest decisions based on various factors, especially unripe fruit vs. rot and/or predation, advised on trellising and training choices, and helped with many other problems as they arose.
- Participated in a meeting of the New England Wine Grape Growers at Newport Vineyards in Middletown, RI *August 19, 2004*
- Presented a talk, “Current Perspectives of Wine Grape Research in Connecticut” at a meeting of the Connecticut Vineyard and Winery Association at Sharpe Hill Vineyard, Pomfret *August 21*
- Participated in a meeting of the Connecticut Farm Wine Council with Drs. John Anderson and Louis Magnarelli at Priam Vineyards in Colchester *August 27*
- Participated in a meeting of the Connecticut Farm Wine Council with Dr. Louis Magnarelli at the Valley Laboratory *November 1*
- Participated in a meeting of the Connecticut Vineyard and Winery Association at the Valley Laboratory *December 6*
- Participated in a meeting of the Connecticut Farm Wine Council at the Valley Laboratory *December 6*
- Participated in a meeting of the Connecticut Vineyard and Winery Association at the Valley Laboratory *January 10, 2005*
- Participated in a meeting of scientists and growers to discuss an ongoing SARE project for Southern New England grape growers at the University of Massachusetts Cranberry Research Station, East Wareham, MA *January 20-21*
- Participated in a meeting of the Connecticut Vineyard and Winery Association at the Valley Laboratory *February 7*
- Participated in a meeting of the Connecticut Farm Wine Council at the Valley Laboratory *February 7*
- Participated in a meeting of the Connecticut Vineyard and Winery Association at the Valley Laboratory *March 7*
- Participated in a meeting of the Connecticut Farm Wine Council at the Valley Laboratory *March 7*
- Presented a talk, “Strategies for Achieving Vine Balance” at the New England Grape Growers’ Spring Grape Grower Workshop in Westport, MA *April 20*
- Spoke on “Resources and Research in Viticulture at CAES” and participated in a roundtable discussion at a Litchfield Farm Bureau seminar entitled “Grapes- the Next Cash Cow?” *April 27*
- Participated in a meeting of the Connecticut Vineyard and Winery Association at the Valley Laboratory *May 2*
- Participated in a meeting for the Multi-state Research Project NE1020, “Multi-state Evaluation of Wine Grape Cultivars and Clones” in Davis, CA *May 25-26*

- Attended a meeting of the Connecticut Vineyard and Winery Association at the Valley Laboratory *June 6*
- Participated in a meeting of the Connecticut Farm Wine Council at the Valley Laboratory *June 6*
- Presented a talk, “Basics of Training Systems and Trellis Design” to the New England Grape Growers in Bolton, MA *June 16*
- Presented a poster entitled “Pruning and Training System Effects on Yield, Time of Harvest, and Fruit Quality of Concord Grapevines in Michigan” at the Annual Meeting of the American Society for Enology and Viticulture in Seattle, WA *June 22-24*

PIGNATELLO, JOSEPH J.

- Presented an invited keynote talk and was co-author of three other talks in a Symposium on Advances in Environmental Reaction Kinetics and thermodynamics: Long-Term Fate of Anthropogenic contaminants; Environmental Chemistry Division, at the 228th American Chemical Society National Meeting in Philadelphia, PA *August 22-26, 2004*
- Hosted the annual meeting of the CSREES W-82 Multistate Research Project *October 14-16*
- Gave an invited talk, “Bench-scale study of bioremediation of coal tar-contaminated soil: Addressing issues of inoculum requirement, bioavailability, nutrients limitations, and long-term persistence” at the Society of Environmental Toxicology and Chemistry, Fourth World Congress in Portland, OR *November 14-18*
- Presented an invited lecture on “Bioavailability of Pollutants in Soil and Sediment at the Center for Environmental Systems, Stevens Institute of Technology *December 11*
- Was the keynote speaker and gave the talk “Some fundamental issues in sorption related to physical and biological remediation of soils” at the NATO-OTAN Advanced Research Workshop 981071 on Viable Methods of Soil and Water Pollution Monitoring Protection and Remediation” in Krakow, Poland *June 25-July 2, 2005*

PYLES, MAMIE

- Participated in describing work done in analytical chemistry to students from Branford High School who were touring the Station *February 17, 2005*

RAMAKRISHNAN, UMA

- Was interviewed about ongoing deer research programs in Connecticut by Paul Fresman, State Office of Legislative Research *July 28, 2004*
- Gave a talk on the deer program at Lake Gaillard to the South Central Regional Water Authority *September 9*

RATHIER, THOMAS M.

- Attended the summer meeting of the Connecticut Nursery and Landscape Association in Bethel *July 14, 2004*
- Answered questions about tree problems at the Experiment Station’s booth at the summer meeting of the Connecticut Tree Protective Association in Farmington *July 15*
- Participated in a meeting of the faculty of the Arboriculture 101 course presented by the Connecticut Tree Protective Association in New Haven *August 17*
- Spoke about diagnosing plant problems to members of the Federated Garden Club as they toured the Valley Lab *September 16*
- Taught the Tree-Soil Relationship portion of Arboriculture 101 in Jones Auditorium *September 22*
- Presented a talk on container gardening at the Durham Fair *September 25*
- Organized the educational portion of the Connecticut Christmas Tree Growers Association annual fall field meeting and spoke about the importance of healthy soils at that meeting in South Windsor *October 16*
- Gave a talk on healthy soils to the Fellowship Dinner at Trinity Methodist Church in Windsor *October 16*
- Taught a hands-on laboratory session and review session of the Arboriculture 101 course presented by the Connecticut Tree Protective Association in Jones Auditorium *November 3*

- Taught a hands-on laboratory session and review session of the Arboriculture 101 course presented by the Connecticut Tree Protective Association in Jones Auditorium *November 9*
- With Rose Hiskes prepared and conducted a short course to help Christmas tree growers prepare for the private applicator pesticide license *November 9 and 18*
- Answered questions at the Experiment Station's exhibit booth at the Connecticut Tree Protective Association's winter meeting in Southington *January 20, 2005*
- Taught the Soil-Tree Relationship portion of Arboriculture 101 for the CT Tree Protective Association in Jones Auditorium *January 31*
- Participated in a meeting of the Cooperative Agricultural Pest Survey (Connecticut Committee) at the Valley Laboratory *February 8*
- Spoke on diseases of flowering shrubs at a seminar presented by the Connecticut Nurserymen's Foundation at the Valley Laboratory *February 9*
- Planned the educational portion of the Connecticut Christmas Tree Growers Association winter meeting and participated in the "Question the Experts" session in Middletown *March 5*
- Spoke on soil physical properties to an Agricultural Science Class at Suffield High School *March 9*
- Provided instruction on identifying and managing insect pests of trees in a hands-on laboratory session of Arboriculture 101 in Jones Auditorium *March 16*
- Spoke about tobacco cultural and fertility problems at a meeting of tobacco growers in East Windsor *March 30*
- Spoke on "Healthy Soil and Healthy Plants" to the Manchester Garden Club *April 11*
- Participated in a review session of Arboriculture 101 in Jones Auditorium *April 13*
- Participated in a planning meeting for the annual meeting of the Northeast Branch of the American Society of Agronomy in Storrs *May 24*
- Participated in a CAPS state committee meeting at the Valley Lab *May 26*
- Spoke about cultural practices at a twilight meeting for Christmas tree growers in Voluntown *June 21*

RIDGE, GALE

- Was interviewed about insect biology and morphology by Carol Johnson of the Girl Scouts of America *July 30, 2004*
- Was interviewed about some common insects and disease problems in the early spring landscape by Pamela Weil of Connecticut Gardener Magazine *February 17, 2005*
- Gave a talk on insects to students visiting from Branford High School *February 17*
- Was interviewed on insect population elevations in the state by Donna Whelan of WTIC Radio *April 1*
- Was interviewed about some common insect and disease problems in the Spring landscape by Pamela Weil for Connecticut Gardener Magazine *April 15*
- Was interviewed about Oak Horned Gall by Abram Katz of the New Haven Register *May 15*
- Was interviewed about bed bugs by Harlan Levy of the Journal Inquirer of Manchester *May 16*
- Was interviewed about Lilly Leaf Beetle biology by Bob Miller of the Danbury News Times *June 16*
- Was interviewed about Green June Beetles by Pamela Weil of the Connecticut Gardener Magazine *June 24*
- Was interviewed about fireflies and their biology by Mike McQuan of the Hartforded Courant *June 24*
- Was interviewed about deer fly in northwestern Connecticut by Bridget of the Republican American *June 27*
- Was interviewed about deer fly in northwestern Connecticut by Carolyn Freer of Channel 3 News *June 28*
- Was interviewed about Columbine Sawfly by Pamela Weil of the Connecticut Gardener Magazine *June 30*

RUTLEDGE, CLAIRE

- Presented a talk entitled "Plant waxes, insect attachment and aphid predators," coauthored with Dr. Sanford Eigenbrode of the University of Idaho in a symposium entitled "Influence of plant architectural and structural features on insects"; presented a poster entitled "Life history of soybean aphid *Aphis glycines* Matsumura in Indiana, USA" coauthored with Dr. Robert O'Neil and Dr. Ho

- Jung Yoo of Purdue University, Dr. David Voegtlin of the Illinois Natural History Survey and Dr. William Graves of Iowa State University in the Insect Invasions Section at the International Congress of Entomology, XXII in Brisbane, Australia *August 15-21, 2004*
- Presented the poster “Four Years of Soybean Aphid in Indiana: Patterns and Trends” with H. J. Yoo, R. J. O’Neil at the Entomological Society of America meeting of *November 13-17, 2004*
- Gave the talk “Soybean Aphid in the United States” at Lunch Club in Jones Auditorium *November 20*
- Gave the talk “Insects that Feed on Trees” for the Arboriculture 101 course sponsored by the CTPA in Jones Auditorium *March 1, 2005*
- Gave the talk “Asian Longhorned Beetle: the Carteret NJ Infestation” at the Forest Health Workshop held in Jones Auditorium *March 11*
- Gave the talk “Insects that Feed on Trees” at Hands-on Night of the Arboriculture 101 course sponsored by CTPA *March 24, 2005*
- Gave the talk “Double Trouble: Asian Longhorned Beetle and Emerald Ash Borer” for Arbor Day at Bartlett Arboretum *April 29*

SANDREY, STEVE

- Helped set up and man an exhibit booth at the Connecticut Building at the Eastern States Exposition, West Springfield, MA *October 2, 2004*
- Was a moderator for talks at the CNLA Winter Meeting at the Westin Hotel in Stamford *January 12, 2005*
- Participated in the Ramorum Leaf Blight Forum at the Station’s Jones Auditorium *February 22*
- Manned an exhibit and handed out information at the Connecticut Flower and Garden Show at the Expo Center in Hartford *February 26*
- Hosted a table at Agriculture Day at the Capitol in Hartford *March 23*
- Answered questions about beekeeping at the Southington Park and Recreation Nature Trails Day *June 3, 4*

SCHULTES, NEIL

- Presented a seminar on Plant Nucleobase transporters in the Department of Biology at Indiana Purdue University at Fort Wayne, IN *August 9-12, 2004*
- With Drs. Anderson and Magnarelli met with Veronique Greenwood, a student writer for the Yale Scientific Magazine who was writing an article on Yale Experiment Station History and Interactions. Dr. Schultes discussed the biology and history of Double Hybrid corn *October 19*
- Hosted Dr. Robert Evenson, Professor of Economics at Yale University and some of his students in his Agricultural Economics class. The group heard a short lecture on plant genetic modification in Jones Auditorium and then had a tour of the new laboratory facilities in the Johnson/Horsfall Building *October 20*
- Presented a short talk on his research in plant genetics to a group of Experiment Station Associates on a Behind the Scenes tour in Fort Shintok, Montville *October 28*
- Lectured on Experiment Station history, genetically modified organisms and current genetic research in the Department of Biochemistry and Genetics to a group of undergraduate students from a Plant Biology class at Yale University *November 11*
- Lectured on “Genetic research in basic plant science” and conducted laboratory tours for students in a Plant biology course from Springfield College, Springfield, MA *November 16th*
- Delivered lectures on Genetically Modified Plants in Agriculture to a Yale University course, Science 130, “Current Topics in Science” *February 11, 18, and 25, 2005*
- Hosted Dr. Thea Wilkins from the Department of Plant Science at University C. Davis at The Station and at the Yale Genetically Modified Plant Working Group at Yale University.

SELSKY, ROSLYN

- Met with residents living on Pinewood Lane in Trumbull to discuss concerns about aquatic plants in their lake *September 1, 2004*
- Worked with residents of a Wallingford condominium in removing an invasive water plant they had planted earlier and replacing the plants with native white water lilies *September 3*

- Participated in the Connecticut Invasive Plant Working Group Symposium at the University of Connecticut *October 7*
- Helped set up and man a table display to distribute information on the State's invasive aquatic plants and showed people live and preserved specimens of the most common invasive aquatic plants at Plant Science Day in the Spring *April 18*
- Designed and launched the website for the Invasive Aquatic Plant Program, which includes interactive maps of different species in each surveyed lake. She spoke about the website, explaining its features to attendees of Plant Science Day in the Spring *April 18*.
- Helped conduct the first of three workshops to train volunteers to identify invasive aquatic plants and to explain survey and boat-ramp surveillance procedures to be used as part of the volunteer lake monitoring program *April 30*
- Conducted a workshop with Dr. Robert Capers instructing volunteers in plant identification and the procedures to use in conducting surveys, held in Bolton *May 14*

SHEPARD, JOHN

- With Michael Thomas gave a laboratory presentation and display on mosquito biology and the Experiment Station's Mosquito/West Nile Virus Surveillance and Research Programs during Plant Science Day in the Spring *April 18, 2005*

SMITH, VICTORIA

- Displayed invasive insects at the CT Tree Protection Association meeting held in Farmington *July 14, 2004*
- Displayed non-native insect pests and diseases that are a threat to native trees at the Nursery and Landscape Research Tour held at the Valley Lab in Windsor *July 20*
- Met with officials of the Environmental Health Department of the City of Danbury at a mercury contamination remediation site in Danbury *August 11*
- Was interviewed about Sudden Oak Death in the Northeast by Bob Miller of the Danbury News-Times *August 13*
- Participated in Export Certification Training, held at New York State Agriculture and Marketing Headquarters in Albany, NY *August 23-27*
- Was interviewed about Asian Longhorned Beetle by Lisa Pearson of the Hour Newspaper (Norwalk) *September 28*
- Presented the talk "Connecticut beekeepers" to the Back Yard Beekeepers in Weston *September 28*
- Participated in a Cooperative Agricultural Pest Survey meeting held in Charleston, SC *October 15-18*
- Was interviewed about exotic beetles in Christmas decorations by Dave Krechevsky of the Waterbury Republican American *October 24*
- Gave a video presentation on Emerald Ash Borer at the CT Greenhouse Growers meeting in Jones Auditorium *January 5, 2005*
- Presented a display on non-native invasive insects and diseases, a video presentation on Emerald Ash Borer, and a PowerPoint display on the New Jersey Asian Longhorned Beetle infestation at the CT Nursery and Landscape Association meeting held at the Westin Hotel in Stamford *January 11-12*
- Was interviewed by Wayne Norman of WILI Radio (Willimantic) on Sudden Oak Death *January 18*
- Presented a display on non-native invasive insects and diseases and a PowerPoint display on the New Jersey Asian Longhorned Beetle infestation at the CT Tree Protective Association meeting held at the Aqua-Turf in Southington *January 20*
- Gave a presentation on current Station publications and information on Sudden Oak Death at the New England Plant Conservation Workshop held at CT Forest and Parks Association headquarters in Rockfall *January 25*
- Chaired (with Donna Ellis of UConn) the annual meeting of the Connecticut CAPS (Cooperative Agricultural Pest Survey) Committee, held at the Valley Lab *February 8*
- Presented a paper titled "Sudden Oak Death: A Potential new Threat to Connecticut Forests" at the meeting of the Nutmeg Chapter of the Society of American Foresters, held in Enfield *February 10*
- Coordinated with Ralph Scarpino and Kevin Grady of the DEP, and Incident Command System Training-100 (ICS-100) for Experiment Station Personnel, in the Jones Auditorium *February 14*

- Participated in the Official Briefing for the Green Industry on *Phytophthora ramorum*, held in Jones Auditorium *February 22*
- Presented the talk “Sudden Oak Death: A New Threat to Connecticut Trees” to the annual meeting of the Connecticut Groundskeepers Association, held at the Civic Center in Hartford *February 23*
- Presented the talk “Exotic Pests of Importance of CT Christmas Trees and Forests” to members of the Christmas Tree Growers Association at their annual meeting in Rockfall *March 5*
- Met with officials of DEP and USDA to expedite permitting procedures for regulated waste, at DEP Headquarters in Hartford *March 10*
- Coordinated, participated in and presented the talk “Update on Ramorum Blight” at the Annual Forest Health Workshop held in Jones Auditorium *March 11*
- Participated in a workshop held by USDA-APHIS-BRS in Frederick, MD and received certification in Biotechnology Regulatory Notification Inspections *March 14-17*
- Presented the talk “Ramorum Blight: A Potential Threat to CT Forests” at a meeting of the Shoreline Gardeners, held at Scranton Library in Madison *March 22*
- Hosted a table at Agriculture Day at the Capitol in Hartford *March 23*
- Participated in a workshop on protocol for exotic pest introduction held by conference call and hosted by the National Plant Diagnostic Network *March 29*
- Moderated sessions on invasive plant laws, and communications in emergency situations at the Eastern Plant Board Meeting held in Egg Harbor Township, New Jersey *April 4-7*
- Organized a meeting of the CT *P. ramorum* Task Force held at the Cottage at Lockwood Farm *April 14*
- Met with officials from DEP in Hartford to finalize expedited permitting procedures for regulated waste *April 15*
- Participated in a meeting of the CT Cooperative Agricultural Pests Survey (CAPS) Committee held at the Valley Lab in Windsor *May 26*
- Gave a presentation on winter moth and a report on apple scab at a meeting of the CT Pomological Society held at Bishops Orchard in Guilford *June 21*

STAFFORD, KIRBY C., III

- Was interviewed about 4-poster deer treatment stations for control of ticks by Nicholas Moorehead of the Shelter Island Reporter *July 1, 2004*
- Was interviewed about spraying and deer management for tick control by Alex Cody of the Ridgefield Press *July 12*
- Spoke on Lyme disease and West Nile virus at Northeast Utilities Corporate Office in Berlin, CT *July 13*
- Was interviewed about Lyme disease and other tick-associated diseases by Anne Underwood of Newsweek Magazine *July 22*
- Was interviewed about the incidence of Lyme disease by Nathan Duke of the Norwich Bulletin *July 26*
- Was interviewed about turkeys and ticks by Bill Heald for Northeast Magazine *September 13*
- Spoke about research during the community-based Lyme project at the Target Lyme Disease Advisory Board Meeting in Westport *September 17*
- Spoke about integrated tick management for the prevention of Lyme disease at the Society for Vector Ecology Annual Meeting in Boston, MA *September 27-29*
- Attended a reception for teachers and their sponsors for the CBIA administered NSF funded summer externship program *September 30*
- Participated in a meeting of the Advisory Committee for the community-based Lyme Disease Prevention Project in the Ledge Light Health District *October 12*
- Spoke on personal and property prevention techniques at the Lyme Disease Foundation Conference in Windsor *October 16*
- Was interviewed about Lyme disease reporting and tick activity by Bill Slokam of the New York Times *October 19*
- Spoke to the Greater Hartford Lyme Disease Support Group in Farmington *October 20*
- Spoke on the prevention of tick-associated diseases at the 19th Annual Pediatrics Update Conference at Danbury Hospital *November 4*

- Spoke on ticks and tick-borne illnesses at the annual meeting of the Connecticut Chapter of the Appalachian Mountain Club in Rocky Hill *November 6*
- Was interviewed about Lyme disease reporting by Bill Slokam of the New York Times *November 8*
- Presented a talk on Host-Targeted Control of *Ixodes scapularis* at the annual meeting of the Entomological Society of America *November 14-17*
- Spoke about ticks, Lyme disease, and deer at a meeting of the Ridgefield Deer Committee in Ridgefield *December 20*
- Spoke on activities of the Station at the Connecticut Nursery and Landscape Association meeting in Stamford *January 12, 2005*
- Participated in the Station's booth at the Connecticut Tree Protective Association meeting in Southington *January 20*
- Spoke on "Pest management: Tick and Lyme Disease" for the NOFA/Massachusetts Organic Land Care Course in Wellesley, MA *January 25*
- Spoke on ticks and Lyme disease at a meeting of the Westport Rotary in Westport *February 8*
- Participated in a meeting of DEP and USDA officials to expedite permitting procedures for regulated waste at DEP headquarters in Hartford *February 9*
- Spoke on Pest Management: Ticks & Lyme Disease at the NOFA annual course in Organic Land Care in Jones Auditorium *February 15*
- Provided an introduction and Station update to the Connecticut Beekeepers' Association in Jones Auditorium *February 19*
- Chaired a briefing on *Phytophthora ramorum* for the green industry in Jones Auditorium *February 22*
- Participated in a meeting of the Northeast Regional Association of Experiment Station Directors in Beltsville, MD *March 2-3*
- Participated in Affirmative Action training held in Hartford *March 8-9*
- Gave an introduction and Station update at the Forest Health Workshop in Jones Auditorium *March 11*
- Presented a talk on integrated tick management for the prevention of Lyme Disease at the Northeast Regional Community and Urban Integrated Pest Management Conference in Manchester, NH *March 15-16*
- Spoke on ticks and Lyme disease prevention at the Roaring Brook Nature Center in Canton, CT *March 24*
- Spoke on tick management and Lyme disease prevention at a pediatric nursing symposium at Danbury Hospital *March 29*
- Spoke to visiting teachers from the Farm/City program about research and activities in the Department of Entomology *March 30*
- Was interviewed about Maxforce rodent bait boxes by Dan Shapley of the Poughkeepsie Journal *April 1*
- Was interviewed about tick control by Sheila Maslie of Bottomline Health News *April 7*
- Participated in a meeting of the advisory committee for the Lyme project in the Ledge Light Health District in Groton *April 12*
- Spoke to physicians on tick management at Danbury Hospital *April 12*
- Participated in a meeting of the *P. ramorum* Task Force held at Lockwood Cottage *April 14*
- Participated in a meeting with officials from USDA and DEP on streamlining the procedure to dispose of plant and animal products *April 15*
- Spoke on tick management at a Lyme disease forum sponsored by State Senator Bob Duff in Norwalk *April 16*
- Was interviewed about tick activity, risk and prevention by Laura DeAngelis of News 12 TV *April 16*
- Was interviewed about tick control by Harold Cobin for The Hour *April 16*
- Was interviewed about bait box research by Garret Condon of the Hartford Courant *April 22*
- Spoke to visiting FFA teachers about activities in the Entomology Department *April 25*
- Was interviewed about tick activity by Bridget Ruthman of the Republic American *April 25*
- Was interviewed about landscape aspects of tick management and Lyme disease risk by Patrick White of Turf Magazine *April 27*
- Met with officials from CDC in Fort Collins, CO and the CT Department of Health to discuss a Lyme disease project and tick control research *April 27*

- Spoke on tick biology and management to the Orange Land Trust in Orange *April 27*
- Was interviewed about ticks and Lyme disease prevention by Cindy Barry of the Ledge Light Health District for their Health Watch television show *May 11*
- Spoke on ticks and Lyme disease at a meeting of the Killingworth Lane Trust *May 20*
- Participated in a meeting of the CT Cooperative Agricultural Pests Survey (CAPS) Committee at the Valley Lab in Windsor *May 23*
- Was interviewed about tick control studies by Garrett Condon of the Hartford Courant *May 31*
- Spoke to Ridgefield Park & Recreation staff about tick sampling *June 1*
- Was interviewed about formic acid treatment for *Varroa* mite by Carolyn Battista of the New York Times *June 7*
- Was interviewed about Bait Boxes for tick control by Garrott Condon of the Hartford Courant *June 7*
- Was interviewed for a cable program on Lyme disease prevention by Dr. Evan Pitteoff, Newtown School Superintendent and Donna Culbert, Director of Health of Newtown *June 9*
- Was interviewed about tick activity this year by Judy Benson of The New London Day *June 16*
- Spoke about ticks, deer, and Lyme disease prevention to the Weston Deer Committee in Weston *June 22*
- Was interviewed about tick activity by Pamela Weil of the Connecticut Gardener *June 23*

STILWELL, DAVID

- Presented a talk on lead and other heavy metals in New Haven community garden soils at a workshop on community gardening sponsored by the New Haven Land Trust *September 11, 2004*
- Spoke about the functions of the Analytical Chemistry Department, the research in progress, and the instrumentation to conduct the work in the department with students and Dr. Gaboury Benoit from the Yale School of Forestry and Environmental Studies *September 24*
- Participated in a workshop on Community Greenspaces and Gardens at the New Haven Town Hall *October 16*
- Along with Craig Musante presented a talk on heavy metals in community garden soils to the Science Club at Albertus Magnus College in New Haven *November 3*
- Was interviewed about lead in children's jewelry by Lisa Carberg of Channel 30, Hartford *February 15, 2005*
- Discussed work being done in analytical chemistry with students from Branford High School who were touring the Station *February 17*
- Met with staff of the Connecticut Post and discussed issues related to formula funding and work impacted by such funding in Analytical Chemistry *March 1*
- Gave a tour of the Analytical Chemistry Department to members of the New Haven Garden Club *May 2*

STONER, KIMBERLY

- Chaired a meeting of the NOFA Organic Land Care Committee at the Valley Laboratory *July 22, 2004*
- Participated in a meeting of the Board of Directors of NOFA at Capozzi's Farm, Durham *July 25*
- Presented a workshop "Learning by Example, Case Studies of Pest Management on Organic Farms" at the NOFA Summer Conference, Amherst, MA *August 14*
- Chaired a meeting of the NOFA Organic Land Care Committee at the Valley Laboratory *August 19*
- Chaired a meeting of the NOFA Organic Land Care Committee at the Valley Laboratory *September 16*
- Presented a workshop "Organic Management of Vegetable Insects" at the Common Ground Fair, Unity, ME *September 25*
- Hosted a seed cleaning workshop for farmers and other seed producers in Connecticut, with equipment from the Public Seed Initiative at Lockwood Farm *October 7*
- Presented a poster "What's Lurking in Your Cover Crops" presenting the results of SARE-funded research at the national SARE Conference, Burlington, VT *October 20-21*
- Participated in a NOFA Board of Directors meeting at Northford Farm, Northford *October 24*
- Taught a segment of the Garden Club Study School on organic management of insects on vegetables and herbs in Jones Auditorium *October 26*

- Gave a presentation “The NOFA Organic Land Care Program” at the Maine Organic Farmer and Gardener’s Association Farmer-to-Farmer Conference in Bar Harbor, ME *November 6*
- Was a Keynote Speaker at the annual meeting of CT NOFA on the subject “Organic Land Care, the Quiet Revolution” in Jones Auditorium *November 13*
- Chaired a meeting of the NOFA Organic Land Care Committee at the Valley Laboratory *November 16*
- Organized and facilitated a regional networking session at the Update Course for the NOFA Organic Land Care Program at the Tolland Agricultural Center, Vernon *December 2*
- Participated in a strategic planning retreat for the Organic Land Care Program, Mercy Center, Madison *December 10-12*
- Organized and led a strategic planning retreat for the Board of Directors of CT NOFA at Lockwood Farm Cottage *December 18*
- Chaired a meeting of the NOFA Organic Land Care Committee at the Valley Lab, Windsor *January 6, 2005*
- Gave a presentation on “Insect Pests of *Brassica*” and facilitated the discussing among farmers about their needs for research at a meeting of the project “Improving *Brassica* Production” in Deerfield, MA *January 10*
- Participated as a representative of Connecticut at the annual retreat of the NOFA Interstate Council, Old Chatham, NY *January 12-13*
- Gave a presentation on “Organic Management of Insect Pests” at the Organic Transition Conference, Windsor *January 15*
- Taught the session of “Principles and Procedures of the Organic Land Care Program” at the Massachusetts Organic Land Care Course, Wellesley, MA *January 18*
- Taught the session on “Pest Management in Organic Land Care” at the Massachusetts Organic Land Care Course, Wellesley, MA *January 20*
- Taught the session on “Principles and Procedures of the Organic Land Care Program” at the Connecticut Organic Land Care Course in New Haven *February 8*
- Taught the session on “Pest Management in Organic Land Care” at the Connecticut Organic Land Care Course in New Haven *February 10*
- Chaired a meeting of the NOFA Organic Land Care Committee, New Haven *February 15*
- Led a discussion of research needs among farmers in the SARE funded project “Expanding *Brassica* Production in New England” as part of a tour of winter productions of salad greens at Starlight Gardens, Durham *February 17*
- Participated in a meeting of the Board of Directors of CT NOFA, Berlin *February 20*
- Participated as a member of the training team and presented an economic analysis of three New England organic farms as part of the first session of “Advanced Organic Training,” a professional development program for Cooperative Extension and other agency personnel in the Northeast, funded by the Northeast Regional Sustainable Agriculture Program, Latham, NY *March 1-3*
- Chaired a meeting of the NOFA Organic Land Care Committee in Windsor *March 10*
- Presented a poster “Organic Land Care – Beyond IPM” and gave the talk “What the Citizens Need to Know: The View From Those Who Respond to Public Inquiries” and was co-organizer and moderator of a session on Agriculture in the Urban Interface at the Northeast Regional Integrated Pest Management Conference in Manchester, NH *March 15-16*
- Participated in a Board of Directors meeting for CT NOFA, Bethlehem, CT *March 20*
- Presented the talk “Insects of Vegetable Gardens” at the statewide Community Gardening Conference, Institute of Living, Hartford *April 2*
- Represented the Station at a meeting of the Statewide Advisory Committee for Agricultural Education, Stamford *April 11*
- Participated in a meeting of the Farm Transfer Working Group, Lockwood Cottage, Hamden *April 15*
- Participated in a Board of Directors meeting for CT NOFA in Hamden *April 17*
- Organized, publicized, and led a meeting “It’s Not Farmland Without Farmers” starting a network to assist and advocate for linking farmers with available farmland, Valley Laboratory, Windsor *April 26*
- Participated in a meeting of the Board of Directors of CT NOFA in West Hartford *May 12*
- Participated in a meeting of the Board of Directors of CT NOFA, Northford Farm, Northford *June 12*

- Organized a meeting of the “It’s Not Farmland Without Farmers” network at the Valley Laboratory, Windsor *June 13*
- Chaired a meeting of the NOFA Organic Land Care Committee at the Valley Laboratory, Windsor *June 14*
- Assisted in a tour of three organic farms: Hall Farm in Simsbury, Holcomb Farm in West Granby, and Town Farm Dairy in Simsbury *June 26*
- Made presentations on “Organic Management of Insect Pests” and “Tarnished Plant Bug: Biology and Management.” at a professional development program for Cooperative Extension and other agricultural agency personnel from all over the Northeast sponsored by the Northeast Sustainable Agriculture Research and Education Program (SARE), State College, PA *June 27-30*

STUBER, HEIDI

- Helped set up and man an exhibit on ticks and history of the Station at the Seth Haley Science Fair 2005 at the Seth G. Haley Elementary School, West Haven *April 14*

THOMAS, MICHAEL

- Presented a seminar on “The butterflies of Connecticut” followed by a tour of the bird and butterfly garden to the Woodbridge Garden Club held at Lockwood farm *September 15, 2004*
- With John Shepard gave a laboratory presentation and display on mosquito biology and the Experiment Station’s Mosquito/West Nile Virus Surveillance and Research Programs during Plant Science Day in the Spring *April 18, 2005*

TRENCHARD, PETER

- Moderated talks at the CT Nursery and Landscape Association Winter meeting at the Westin Hotel in Stamford *January 12, 2005*
- Participated in a Ramorum Leaf Blight forum in Jones Auditorium *February 22*
- Manned an exhibit and handed out information at the Connecticut Flower and Garden Show at the Expo Center in Hartford *February 24, 25*
- Participated in the Forest Health Monitoring Workshop at the Station in New Haven *March 11*
- Manned a table at Agriculture Day in the Capitol in Hartford *March 23*
- Spoke about Ramorum Blight in Connecticut in 2005-2005 at the 31st annual meeting of the Eastern Chapter of the Horticultural Inspection Society in Egg Harbor, New Jersey *April 4-7*
- Displayed honey bees and beekeeping equipment and talked about beekeeping practices to 2nd graders at Second Hill Lane School in Stratford *June 2*
- Displayed honey bees and beekeeping equipment and talked about beekeeping practices at Southington Trails Day, Panthorn Park, Southington *June 3*

VOSSBRINCK, CHARLES

- Presented an invited talk “Molecular phylogeny of the microsporidia: ultrastructural and ecological considerations” at a NATO Advanced Research Workshop “Emergent Pathogens in the 21st Century: First United Workshop on Microsporidia from Invertebrate and Vertebrate Hosts” held in Ceske Budejovice, Czech Republic *July 12-16, 2004*
- Gave a talk on spiders to a second grade class at the Savin Rock Community School in West Haven *November 15*
- Presented the talk “The World of Spiders” at the 437th meeting of the Connecticut Entomological Society *February 18*

WARD, JEFFREY

- Was interviewed about effects of hayscented fern on forest regeneration by Steve Grant of the Hartford Courant *July 5, 2004*
- Was an invited guest on WTIC AM-1080 radio talk show “Garden Talk” to offer advice on tree management *July 10*
- Spoke on “All about trees” for Wintergreen Magnet School Summer Program *July 13*

- Met with the Quinnipiac Valley Audubon Society at River Bottom Farm Preserve in Cheshire to advise on forest management alternatives *July 17*
- Spoke with officials at Hopkins School in New Haven to offer advice on mature tree care *July 30*
- Presided over the Connecticut Tree Protective Association, Board of Directors Meeting in New Haven *August 3*
- Spoke on “Diameter growth of northern red oak following crop-tree release and thinning” to University of Connecticut faculty and graduate students in West Hartford *August 18*
- Was interviewed about forest preservation and management by Brook Pielli of Connecticut Life Magazine *August 23*
- Presided over the Connecticut Tree Protective Association Board of Directors Meeting in New Haven *September 7*
- Spoke on “Tree biology” for the Arboriculture 101 class sponsored by the Connecticut Tree Protective Association in Jones Auditorium *September 8*
- Spoke on “History of the Connecticut forest” at the Avery Heights Retirement Community in Hartford *September 16*
- Spoke with officials from Grove Street Cemetery and advised them on tree management *September 21*
- Spoke on “Homeowner tree care” for the Greater New Haven Garden Club at Lockwood Farm in Hamden *October 4*
- Presided at the Connecticut Tree Protective Association’s Board of Directors Meeting in New Haven *October 5*
- Participated in the Connecticut Urban Forest Council Meeting in Middlefield *October 6*
- Participated in a Symposium of the Connecticut Invasive Plant Working Group in Storrs *October 7*
- Taught a field forestry class for Coop High School in New Haven *October 13*
- Was interviewed about old-growth forests in Connecticut by Steve Grant of the Hartford Courant *October 14*
- Participated in a DEP sponsored forest fire training in Burlington *October 28*
- Presided at the Connecticut Tree Protective Association Board of Directors meeting in New Haven *November 2*
- Participated in the 15th Annual Conference on Urban and Community Forestry in Connecticut in Wallingford *November 3*
- Participated in a “Trees and the Law” workshop in Burlington *November 9*
- Participated in the Connecticut Urban Forest Council meeting in Middlefield *November 16*
- Spoke on “Rehabilitating hemlock stands damaged by hemlock woolly adelgid” for Massachusetts Chapter of the Society of American Foresters in Pelham, MA *November 18*
- Was interviewed about deer browse damage by Steve Grant of the Hartford Courant *November 22*
- Spoke on “Cooperative fire research” to the Cooperative Fire Program Review Team in Windsor Locks *December 2*
- Spoke on “A short history of the Connecticut forest” to the Fairfield County Master Gardeners in Bethel *December 6*
- Presided at the Connecticut Tree Protective Association, Board of Directors meeting in Southington *December 8*
- Hosted a field tour of current forestry research by Adam Moore, Connecticut Forest and Parks Association, Middlefield *December 16*
- Was interviewed about the amount of oak harvested and employment in forest harvesting in Connecticut by Kelly Planakis of the New Haven Register *December 16*
- Was interviewed about the potential impact of Sudden Oak Death to the Connecticut forest by Jamie Muro of WTNH *December 28*
- Was interviewed about Douglas fir growing in Connecticut by Peter Davenport of the Stamford Advocate *December 28*
- Was interviewed about the potential impact of Sudden Oak Death to the Connecticut forest by Simon Gutierrez of WTIC Fox-61 *December 29*
- Spoke on “Tree biology” for the Arboriculture 101 class sponsored by The Connecticut Tree Protective Association, Jones Auditorium *January 5, 2005*

- Participated in a conference on “The Natural and Cultural History of the Connecticut Forest” sponsored by the Connecticut Chapter of the Society of American Foresters in Storrs *January 13*
- Participated in the Connecticut Urban Forest Council meeting in Middlefield *January 18*
- Spoke on “Guidelines to Minimize the Impacts of Hemlock Woolly Adelgid” at the third symposium on Hemlock Woolly Adelgid in the Eastern United States, in Asheville, NC *February 3*
- Spoke on “Tree and shrub pruning for home gardeners” for the Evening Garden Club in Branford *February 7*
- Spoke on “Stand development insights from research in Connecticut” at the Yankee Society of American Foresters annual meeting in Enfield *February 10*
- Spoke on “Browse resistance gardening” at the Flower and Garden Show in Hartford *February 26*
- Spoke to Fairfield County Municipal Deer Management Alliance about the impact of deer browse on forest ecosystems *February 14*
- Presided at the Connecticut Tree Protective Association Board of Directors Meeting in Southington *March 1*
- Lectured on “Prescribed fire and forest resources” for the Fire Management Class at the University of Connecticut in Storrs *March 2*
- Lectured on “Fire and stand development: some observations from Connecticut” for the Fire Science and Policy Class at Yale University in New Haven *March 3*
- Presented an invited talk on “Regeneration of the Southern New England Landscape” at the Rhode Island Natural History Survey 10th Annual Conference in Cranston, RI *March 4*
- Spoke on “Birch is the future: do not despair” at 10th annual Forest Health Monitoring Workshop *March 11*
- Presided at the Connecticut Tree Protective Association, Board of Directors Meeting in New Haven *April 5*
- Spoke on “Trees and shrubs: growth, care, and pruning” for the Sound School Adult Education Program in New Haven *April 6*
- Along with Dr. Sharon Douglas, advised New Haven Garden Club on management of Belt’s Triangle Park in New Haven *April 6*
- Spoke on “Forest regeneration practices in Southern New England” at Envirothon training in Middlefield *April 9*
- Served on the Goodwin Forestry Scholarship Committee in Middlefield *April 14*
- Hosted a visit by Dr. Mark Rudnicki and a graduate student from UCONN to examine research on stand development in hardwood forests *April 26*
- Represented the Station at the Arbor Day celebration at the state capitol *April 29*
- Participated in the Connecticut Urban Forest Council meeting in New London *May 17*
- Spoke on “Strategies for reducing deer browse damage” to the Heritage Village River Garden Club in Southbury *May 18*
- Assisted at the Connecticut Tree Climber’s Competition at Heritage Village in Southbury *May 21*
- Presented a poster on “Diameter limit cutting accelerates loss of oak in southern New England hardwood forests” at the Diameter-limit Cutting in Northeastern Forest Workshop in Amherst, MA *May 23*
- Was interviewed about weeping Sargent hemlock by Rob Varley of the New Haven Register *May 25*
- Spoke to officials at the Regional Water Authority about the impact of high deer densities on forest regeneration and wildflowers *June 1*
- Spoke on smells and tastes of the forests” to students from Kelly and Strong Elementary Schools at the Southington Trails Days *June 2*
- Presided at the Connecticut Tree Protective Association Board of Directors meeting in Farmington *June 7*
- Was interviewed by Ed Crowder of the Connecticut Post about the effect of heat on plant growth *June 13*
- Participated in the “Wetlands and Wildlife” workshop hosted by the Connecticut Chapter of the Society of American Foresters in Burlington *June 14*
- Participated in a Connecticut Forestlands Committee meeting in Middlefield *June 20*
- Participated in the Connecticut Urban Forest Council meeting in New Haven *June 23*

WELCH, KENNETH

- Was interviewed about yellowjackets for the New Haven Register *July 22, 2004*
- Was interviewed about voles by Pamela Weil of the Connecticut Gardener Magazine *August 23*

WHITE, JASON

- Hosted Christopher Collins of Imperial University, London who gave a Lockwood Lecture at the Station *July 28-30, 2004*
- Met with Catherine Ribeiro, Katy McNulty, and Krystyn Ledoux of Senator Joseph Lieberman's office to discuss funding for US-based program where graduate students from Middle Eastern Universities could train/study *August 2*
- Participated in a conference call with US EPA and other steering committee members for the planning of an International Phytotechnologies Conference in April 2005 *August 12*
- Met with consultants from Leggette, Brashear, and Graham to discuss phytoremediation field trials at a GE-owned site that is contaminated with dieldrin *August 10*
- Visited Bashan and Pickeral Lakes with a representatives from DAS and Congresswoman Rosa DeLauro's office and gave detailed presentations of the Invasive Weed Project at CAES *August 19*
- Participated in EPA-run conference call of the Steering Committee for the 2005 International Phytotechnologies Conference *October 7*
- Chaired a Phytoremediation session at the 20th Annual International Conference on Soils, Sediments, and Water at the University of Massachusetts in Amherst, MA *October 19*
- Participated in an Editorial Board Meeting of the International Journal of Phytoremediation *October 19*
- Presented a lecture entitled "The genetic diversity in uptake and translocation of pesticides and other organic compounds from soil by Curcubitaceae" at Cornell University's Agricultural Experiment Station in Geneva *November 4-5*
- Presented a talk entitled "Differential uptake of persistent organic pollutants (POPs) by agricultural species" at the Annual Meeting of the Society of Environmental Toxicology and Chemistry in Portland Oregon *November 15-16*
- Participated in a meeting with officials from DEP and the CT Federation of Lakes to discuss the Experiment Station's Invasive Aquatic Weed Program *November 30*
- Participated in a U.S. EPA conference call of the Steering and Planning Committee for the Third International Phytotechnologies Conference to be held in April in Atlanta, GA *December 14*
- Discussed the USDA Invasive Weed Project with Caren Wilcox, aide to Representative Rosa DeLauro *December 21*
- Participated in an EPA sponsored Steering Committee Conference Call on the organization of the 3rd International Phytotechnologies Conference to be held in April in Atlanta *January 4, 2005*
- Gave the talk "Phytoremediation: Using plants to clean hazardous waste" at Timothy Edwards Elementary School in South Windsor at the Future Problem Solvers of CT Symposium *January 19*
- Participated in an EPA sponsored Steering Committee Conference Call on the organization of the 3rd International Phytotechnologies Conference to be held in April in Atlanta *January 27*
- Presented an invited seminar "Phytoremediation of persistent organic pollutants with *Curcubita pepo*" at the University of Massachusetts, Boston *February 4*
- Presented a demonstration on electricity and currents to the 4th grade class at St. Bridgets Elementary School as part of their Science Fair *February 9*
- Chaired a session on Phytoremediation at the 15th annual West Coast Conference on Soils, Sediments, and Water *March 13-15*
- Discussed phytoremediation research and toured the Station with Professor Richard Meagher of The University of Georgia who was visiting Yale and the Station *April 14*
- Gave two talks "Mechanistic Investigation into the Uptake and Translocation of Weathered POPs in Soil by Curcubita Species" and "Enhancing the Accumulation of weathered DDE by *C. pepo*", and chaired a session on "Persistent Organic Pollutants" at the 3rd International Phytotechnologies Conference in Atlanta, Georgia *April 18-22*
- Chaired an Editorial Board meeting for the International Journal of Phytoremediation *April 20*
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- Hosted three scientists from the former Russian Republics of Kazakhstan and the Ukraine to discuss future collaborative efforts concerning the remediation of persistent organochlorine pesticides *April 24-26*
- Presented the talk “Phytoextraction of weathered PCBs and DDE from Soil” at Batelle’s 8th International In-situ and On-site Bioremediation Symposium *June 5-9*
- Presented the CAES Invasive Aquatic Weed Project to the Invasive Plant Council at DEP Headquarters in Hartford *June 14*

WILLIAMS, SCOTT

- Taught a “Deer capture techniques” workshop for University of Connecticut, North American wildlife class at Lake Gaillard in North Branford *December 2, 2004*
- Spoke to Fairfield County Municipal Deer Management Alliance about techniques for estimating deer population densities *February 14, 2005*
- Spoke on “Update on deer population studies” at 10th annual Forest Health Monitoring Workshop *March 11*
- Spoke on “Reducing deer browse damage to cultivated landscapes” for the Hadlyme Garden Club in Hadlyme *March 30*
- Gave presentations to middle school students from six different classes about southern Connecticut Wildlife for Farm City at Lockwood Farm *May 17*
- Spoke to authorities at the Regional Water Authority about the impact of high deer densities on forest regeneration and wildflowers *June 1*
- Participated in Dr. Uma Ramakrishnan’s Deer Management Workshop held at Juniata College in Huntingdon, PA. He gave a talk on non-lethal deer management and its applications, explained capture techniques, and demonstrated use of the dart rifle *June 7-9*

ADVANCES IN KNOWLEDGE

DEPARTMENT OF ANALYTICAL CHEMISTRY

Every staff member in the Department of Analytical Chemistry is involved in both service and research activities, making Analytical Chemistry unique among Station Departments. The activities are concentrated chiefly into two broad categories relevant to the mission of the institution and sustainable for the foreseeable future: food safety and environmental monitoring. Service functions include the analysis of samples submitted by State agencies, other Station departments, municipal agencies, and health departments throughout Connecticut. The research which we pursue is primarily service-driven, initiated, for the most part, by the required analyses of submitted samples. It consists of a variety of applied studies in Analytical Chemistry; in addition we are pursuing fundamental research in Environmental Chemistry.

Beyond the service and research activities referred to above, all scientists provide information to the citizens of Connecticut via telephone inquiries, tours of our laboratories for students, teachers and other interested citizens, and assistance directly to Connecticut businesses. More and more often inquiries from citizens in other states and nations are directed to us for response via the Internet. There are other examples of our outreach activities. On 18 April 2005 the Department participated in “Plant Science Day in the Spring.” We presented several groups of attendees, ranging from elementary school age to senior citizens, a slide introduction to the techniques of chromatography and spectroscopy. Each group then toured our laboratories to see demonstrations of these techniques, as well as the instrumentation based on these techniques used by our staff to conduct analyses. Our staff participates in many activities directed primarily to the surrounding, greater New Haven community. For example, Station Analytical Chemists have served as both mentors for student participants and judges for student projects as part of the New Haven Public Schools Science Fair. We have continued our expanded interaction with the New Haven Public Schools Science Fair beyond mentoring and judging activities to a summer internship program for two science fair student participants—Nick Olsen and LeeLyn Chong. Further, Drs. Eitzer and Stilwell serve on the Advisory Committee for the Sound School in New Haven.



Dr. Brian Eitzer gives a demonstration to a group of grade school students touring the Station

A noteworthy recognition of the quality of the analyses conducted by our Department was accorded to us this past year. By invitation of USDA and FDA, Dr.

Mattina participated in the formation and implementation of FERN, the Food Emergency Response Network. This is a national initiative, established in response to terrorist activities, and Dr. Mattina represented one of only four state laboratories across the nation to participate in its formation. In addition, along with a state colleague from New York and two colleagues representing federal labs in the Northeast, she organized a meeting for Northeast laboratory participants; this is the first such regional meeting within the FERN organization and will serve as the paradigm for the four additional FERN regions in the future. In a similar example of our participation in activities directed toward the security of our nation's food supply, Dr. Mattina has been participating in monthly meetings of the Laboratory Preparedness Advisory Committee chaired by the Connecticut Department of Public Health.

The Department is headed by Dr. MaryJane Incorvia Mattina and the staff consists of Drs. Brian D. Eitzer, Walter J. Krol, David E. Stilwell; Terri Arsenault, William Iannucci-Berger, Craig Musante, Mamie Pyles. During part of the period covered by this report, Dr. Mehmet Isleyen served as a post-doctoral affiliate in our laboratory.

Summaries of the Department's service and research activities and other highlights for the past year are described in detail below.

SERVICE ACTIVITIES

ANALYSES FOR DEPARTMENT OF AGRICULTURE

The Connecticut Agricultural Experiment Station traces its origins to 1875. That year it was established as the nation's first experiment station for the analysis of feed and fertilizer products on behalf of the agricultural community, a function envisioned by Agricultural Chemist, Dr. Samuel Johnson. Dr. Johnson was a scientist of national prominence, serving as an expert witness in several high profile criminal cases and one of the first presidents of the American Chemical Society. The Analytical Chemistry Department continues to conduct these state-mandated feeds and fertilizer analyses in order to assure that such products sold in Connecticut are in compliance with the label guarantees printed on the products. These analyses are performed by Craig Musante and Mamie Pyles under the supervision of Dr. David Stilwell.

Feeds: Feed samples analyzed include products for both household pets and agricultural operations. The samples are collected by the Department of Agriculture and submitted to the Analytical Chemistry Department for analysis. From 1 July 2004 to 30 June 2005 we analyzed 106 samples for parameters such as protein, fat, moisture, and fiber. We continue to analyze an increased number of feed samples for micronutrients such as calcium, copper, selenium, molybdenum, etc. Deficient samples, which totaled 37 (34.9%), are reported based on the analytical variations specified in the Official Publication of the Association of American Feed Control Officials.

Fertilizers: For the period 1 July 2004 to 30 June 2005 we analyzed 253 fertilizer samples collected by the Connecticut Department of Agriculture. This includes products intended for both commercial and residential applications. Analytical results for

macronutrients, such as nitrogen, available phosphoric acid, and potash, and increasingly for micronutrients, such as boron, sulfur, cobalt, magnesium, and iron, are compared with label guarantees. Samples with deficiencies in macronutrients or in one or more micronutrients numbered 58 (22.9%). Deficiencies are determined according to the investigational allowances outlined in the Official Publication of the Association of American Plant Food Control Officials.

IMPACT: The staff in Analytical Chemistry has an established reputation for accurate and rapid analysis of agricultural products. With the heightened potential for attacks on the nation's economy and the well-being of its citizens, this capability is of renewed importance. These analyses provide a route for our chemists to contribute to assuring protection from those persons focused on contamination of animal feed products and the concomitant injury to the agricultural industry.

ANALYSES FOR DEPARTMENT OF CONSUMER PROTECTION *FOOD and STANDARDS DIVISION*

Pesticide residues in food: During the period 1 July 2004 to 30 June 2005 inspectors from the Food and Standards Division submitted 196 samples of fresh and processed foods for pesticide residue analysis. The majority of samples represent Connecticut grown produce, although produce grown in other states, foreign grown produce, and organically labelled samples are also collected. Processed foods, such as juices, ciders, and baby food, are included in our survey as well. Dr. Walter Krol is assisted by Terri Arsenault in conducting these analyses. The results of our pesticide residue program are published in an annual Station Bulletin which is available online on the Station's web site. The most recent Bulletin presents an interesting summary of the data and a discussion of organic labeling laws.

The scope of our marketbasket survey prompted various research projects over the past several years. In addition this work, which forms the core of our food safety activities, was an essential stimulus for our laboratory's inclusion in the formation of FERN.

During the preceding twelve months Dr. Krol has detected and reported to the Connecticut Department of Consumer Protection and the US Food and Drug Administration 2 violations of misapplications of pesticides. In addition, in June our Department was called upon under emergency conditions to analyze several strawberry samples for possible contamination associated with pesticide drift from a fire in a storage shed adjacent to the strawberry field. Drs. Eitzer and Krol coordinated the work and we were able to report out our findings within eight hours of receipt of samples.

Other samples: In addition to the above food samples analyzed for pesticide residues, we received 165 samples from 1 July 2004 to 30 June 2005. Many of these samples originate from consumer complaints to the Department of Consumer Protection and involve potential product tampering or filth. Although most of these samples represent single incidents, some are indicative of widespread problems with the manufacturing or packaging processes. In one such complaint a yogurt product was

found to contain a compound formed by the inadvertent omission of preservative . After our determination similar findings were reported in other states.

For those samples containing foreign material such as plant or fungal substances, we rely frequently on the expertise of Dr. Sharon Douglas and Mary Inman of the Department of Plant Pathology and Ecology. Mr. Kenneth Welch and his associates of the Department of Entomology assist on a routine basis for identifications resulting from insect infestation.

PRODUCT SAFETY DIVISION

During the period 1 July 2004 to 30 June 2005 we analyzed 59 samples for the Product Safety Division. Most of these samples were imported children's jewelry and were found to contain lead.

LIQUOR CONTROL DIVISION

During the period covered in this record our department analyzed 2 samples to determine the authenticity of a product for potential mis-branding. The officers of this division have come to rely on our laboratory for information of this type.

IMPACT: The rapid and accurate response for the analysis of samples submitted to our laboratory is consistent with the level of training and experience of the staff in Analytical Chemistry. The eight-hour turn around time described above for the analysis of several strawberry samples associated with a pesticide storage fire indicates the type of response we can bring to emergency samples. Such response becomes critical in cases of intentional contamination or terrorist activities.

ANALYSES FOR DEPARTMENT OF ENVIRONMENTAL PROTECTION *WASTE MANAGEMENT BUREAU*

PCBs and pesticides: The Connecticut Department of Environmental Protection is charged with compliance monitoring in accordance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) within the state. In support of these activities, for the period 1 July 2004 to 30 June 2005 our laboratory analyzed 124 samples on behalf of the Connecticut DEP, including foliage, water, fabric, and air samples. Of these samples, 19 consisted of wipes, soils, water, and transformer oils, and were submitted for polychlorinated biphenyls (PCBs) analysis. These analyses were performed by William Iannucci-Berger under the supervision of Dr. Brian Eitzer.

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

ANALYSES FOR DEPARTMENT OF REVENUE SERVICES *EXCISE & PUBLIC SERVICES TAXES SUBDIVISION*

Beer and Wine: Distributors of alcoholic beverages must pay a tax on all sales of such beverages within the State of Connecticut. To assist Revenue Services with the levy of the tax, Dr. Walter Krol determines the alcohol content of beers, wine coolers, ciders, distilled liquors, and other alcoholic beverages sold in the State. From 1 July 2004 to 30 June 2005 we analyzed a total of 267 samples for alcohol content. It should be noted that several samples were submitted by brew pubs, microbreweries, and importers operating within the State of Connecticut. We have made a special attempt to complete and submit determinations for these start-up Connecticut businesses as rapidly as possible. Such accommodation has been duly noted by a number of such businesses, as well as out-of-state facilities which have made requests to our laboratory for particularly rapid determinations.

ANALYSES FOR OTHER MUNICIPAL AGENCIES

In the period 1 July 2004 to 30 June 2005 we analyzed 4 samples for municipal agencies. These samples were from a parcel intended as a ball field for the Town of Killingworth.

ANALYSES FOR OTHER STATION DEPARTMENTS

We actively support work done principally in other Station Departments. In the twelve month period 1 July 2004 to 30 June 2005 we analyzed 22 samples submitted by other departments. Samples were submitted by the Departments of Soil and Water, Entomology, and the Valley Laboratory in Windsor. Several of these samples were soils from planned community gardens in urban locations with potential contamination from heavy metals such as lead.

Dr. Eitzer is working with Claire Rutledge of the Department of Entomology with her research to find chemicals that attract the Bronze Birch Borer.

We continue to provide on-going assistance to other departments, in particular to the Department of Soil and Water, in relation to the operation of several pieces of analytical instrumentation in operation in their laboratories.

ANALYSES OF CHECK SAMPLES

The value of the data generated by the staff of the Analytical Chemistry Department depends on their accuracy and precision. While each scientist makes sure that the analyses for specific analytes as described in our in-house Standard Operating Procedures (SOPs) contain adequate quality control such as spiked and blank samples, we also participate in a variety of formal check and performance evaluation sample programs. Primary among these is the U.S. Environmental Protection Agency's performance evaluation samples, for which the check samples are purchased from a commercial source. We also participate in the Southern States Check Sample program. Analytical results from these programs confirm the reliability of our analyses.

RESEARCH ACTIVITIES

Studies of Persistent Organic Pollutants and Terrestrial Plants—Mechanisms of Uptake.

In 1990 we were intrigued by our observation of persistent organochlorine pesticide (POP) residues in certain crops. POPs such as DDT, chlordane, and heptachlor have not been permitted for use on food crops in the United States for more than 20 years.

Nevertheless, trace residues of these compounds have been found by us and others in produce, including some produce grown on farms which have not used any pesticides for more than a decade. The sources of the produce contaminated with POPs comprise not only Connecticut-grown crops, but crops from other states, as well as imported crops. Our marketbasket data anecdotally suggested that specific crops selectively uptake POPs from soil while other crops do not contain POPs in their edible tissues.

In 1997 we initiated experiments to investigate issues suggested by the anecdotal observations. Several components of our investigation have been completed and several new lines of research are in progress.

We began with a survey of chlordane concentrations in Connecticut soils including residential lawns/gardens, residential foundations, and agricultural soils. We have also used a site on the New Haven campus of The Connecticut Agricultural Experiment Station with a well-documented history of technical chlordane application. In 1999 these studies and their implications for the environmental fate of technical chlordane, including its weathering profile, its vertical and horizontal mobility, and its half-life in soil, were published.

We continued our studies of plant uptake of POPs in the fall and winter of 1997 and 1998 with greenhouse trials to elucidate the pathway of chlordane uptake by a selective uptaker, zucchini, and with field trials during the summer of 1998 on our New Haven campus at the site referred to above on which technical chlordane had been applied in high concentration in 1960. Our detailed study of the translocation of weathered technical chlordane from soil into twelve food crops was published in 2000.

We are continuing and greatly expanding our investigations into the cycling of chlordane through biotic and abiotic processes in the environment through several new approaches, including chiral gas chromatography with ion trap mass spectrometry detection. In July 2000 we received a competitive grant from the U.S. Environmental Protection Agency to pursue our enhanced study of the cycling of chlordane in the environment.

As part of this grant, Dr. WenYee Lee was hired as a post-doctoral associate. Together with William Iannucci-Berger they completed a study of the concentrations and chiral profile of chlordane residues in both commercial and municipal composts, which was published. The work continued with another post-doctoral affiliate, Dr. Mehmet Isleyen, who recently completed his tenure in our laboratories and returned to his native Turkey..

During the past year we have studied in detail the mechanisms of plant uptake of POPs. To facilitate these studies our experiments have moved from field to rhizotron based experiments which allow us to study processes within the rhizosphere of plants. We have examined whether plant root exudates such as low molecular weight organic acids facilitate the uptake of POPs. The first published data from the rhizotron studies

appeared in issue two of a new journal, *Environmental Chemistry*. Several additional manuscripts are ready for submission to peer-reviewed journals. This recent work is directly related to phytoremediation.

Phytoremediation remains a long term goal for the treatment of organic pollutant contaminated soil as it has the potential to be a less expensive *in-situ* treatment process. Achieving phytoremediation will require a greater understanding of the fundamental mechanisms of plant uptake of POPs. We are currently conducting studies to enhance our knowledge of these mechanisms.

We are studying the uptake of POPs from soil by Cucurbitacea in greenhouse rhizotrons. These mesocosms allow us to examine the rhizosphere soil, porewater, organic acid plant root exudates, xylem sap, and plant tissues on a very detailed basis. We have found that there are some correlations between low molecular weight organic acid plant root exudates and the release of POPs to the soil but these correlations do not appear to be causative. Once released to the soil porewater different species of Cucurbitacea have vastly different capabilities regarding the uptake and translocation of contaminants.

We have recently found that *Arabidopsis thaliana* can translocate POPs from soil to aerial tissue. This species is very well characterized genetically. It is therefore hoped that by studying the uptake of pollutants by different ecotypes of this species we can learn which genes are important in the uptake of pollutant chemicals. This in turn could lead to enhancements in the ability of plants to uptake and translocate pollutants, which could subsequently make phytoremediation a truly viable alternative for the treatment of contaminated soil.

Non-dietary pesticide exposure routes: Most of our pesticide studies to date have focused on the dietary impact of pesticide residues. Dr. Walter Krol together with Terri Arsenault has studied dermal exposure to pesticides. Working in collaboration with an inspector from the Connecticut Department of Consumer Protection, we examined dermal exposure under pick your own strawberry conditions. To simulate hand exposure during the act of harvesting strawberries, nylon glove liners are worn. Gloves from 28 separate pickings have been analyzed. A manuscript on this study has been accepted for publication in the *Bulletin of Environmental Contamination and Toxicology*.

Environmental Studies on the Use of Pressure Treated Wood: This project focuses on the environmental effects of the use of wood which has been pressure treated with chromated copper arsenate (CCA) preservative. The pressure treatment causes the preservative to penetrate deeply into the wood, typically, in concentrations of between 0.1-0.2 percent. As of January 2004 this formulation was phased out for residential uses. However, massive amounts of CCA wood are expected to remain in-service for many years, raising concerns that dispersal of these additives could impact the environment.

Arsenic uptake by plants grown near CCA wood structures is an area of potential concern. In gardens CCA treated wood is used for borders, raised beds, posts and stakes. Typically, plants are also grown around the perimeter of decks, patios and porches, all of which may contain CCA wood. Dr. David Stilwell is in the process of determining the major factors influencing plant uptake of arsenic from CCA contaminated soil.

During this twelve-month period trials were begun on the effect of coatings on leaching and subsequent arsenic uptake by plants. Planting boxes constructed using CCA wood were coated with various finishes, filled with soil, weathered for two years, and then planted with leafy vegetables. Opaque, film-forming finishes were found to form an effective barrier to arsenic leaching and subsequent plant uptake. The reduction in plant As ranged from 50-84% in plants grown next to the opaque finished wood, and by growing plants 6 cm away from the wood the reduction in arsenic ranged from 55-84% compared to plants grown next to the wood.

This ongoing work on the many aspects of the impact of the use of CCA-treated wood has been widely recognized. Dr. Stilwell served on the EPA scientific advisory panel (SAP) on the risk assessment of CCA wood, by invitation during 2001, 2003, and 2005, and presented a paper on this work (by invitation) at a symposium on the environmental effects of wood preservatives.

Dr. Stilwell is assisted in this project by Craig Musante.

Heavy Metals in Community Garden Soils: David Stilwell along with a New Haven Public Schools summer intern, LeeLyn Chong, conducted a survey on the amounts of lead and other heavy metals in community garden soils. Ninety samples from 10 gardens were analyzed. About a third of the samples were elevated in lead, and about 8% were elevated in arsenic. The other elements (cadmium, copper, chromium, nickel, and zinc) were not present in levels of concern. Extraction experiments showed that the bioavailable lead in these soils decreased with increasing phosphorus content. These results point to the need for a soil analysis program to be carried out prior to conversion of vacant urban land into garden use.

PUBLIC OUTREACH

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

Station Bulletins: Station Bulletins are typically published annually by our Department. These bulletins are available in printed form and on the Station's web site. They are also available at libraries throughout Connecticut.

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

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

New Haven Public School Science Fair: During the summers of 2002, 2003, and 2004, we hosted New Haven high school students for summer internships in our laboratories. The students worked with our staff, in particular Dave Stilwell, Craig Musante, Brian Eitzer, and Walt Krol. They presented posters of their work at Plant Science Day in August 2004, and at their schools.

DEPARTMENT OF BIOCHEMISTRY AND GENETICS

Leaf development:

Dr. Neil A. McHale in collaboration with Dr. Ross E. Koning (Eastern CT State University) continued work on the molecular biology of leaf development, with technical assistance provided by Regan Huntley. The current emphasis is on a recently discovered group of small, mobile RNA molecules which regulate the expression of developmentally important genes at the post-transcriptional level. MicroRNAs induce gene silencing in plants by guiding a ribonuclease complex to specific target mRNA molecules, resulting in their cleavage and subsequent degradation. Our focus has been primarily on the HD-ZIPIII family of transcription factors. Recent work on a semi-dominant mutation (*phv1*) disrupting miRNA regulation of the ZIP gene PHAVOLUTA (*NsPHAV*) revealed that the HD-ZIPIII/miRNA interaction is critical not only in the establishment of front/back polarity in emerging leaf primordia, but also in the formation of vascular tissue. Spatial regulation of three closely related HD-ZIPIII genes (PHABULOSA, PHAVOLUTA and REVOLUTA) controls the formation of leaf midveins, and subsequent vascularization of leaf blades, along with the eventual connection of leaf vasculature to the vascular cylinder of the stem. What this suggests is that silencing of HD-ZIPIII genes by miRNA molecules is a long sought regulator of the auxin pathway. If correct, this carries a broad set of implications for the eventual engineering of agriculturally important plant traits, including flowering time, fruit development, growth habit, and root formation.

To extend our knowledge of how and where miRNA molecules operate in the plant, we have designed a set of reporter transgenes that facilitate visualization of miRNA activity. The approach hinges on introduction of a miRNA recognition site from the *NsPHAV* gene into a GUSPLUS reporter gene which is driven by a constitutive 35S CaMV promoter. Normally, this 35S::GUSPLUS transgene is expressed throughout the plant, but introduction of the *NsPHAV* miRNA site leads to destruction of this mRNA in any location where the miRNA pathway is active. By inserting this 35S::GUSPLUS-miRNA transgene (*pRH178*) into wild-type plants, and then staining for GUS activity (dark blue precipitate), domains of miRNA activity are readily identified (colorless) throughout the plant at any stage of development. At the seedling stage, GUS staining in *pRH178* transgenics indicates that miRNA activity is present throughout the cortex of the root and hypocotyl, where it presumably restricts HD-ZIPIII expression to the vascular tissue. In young leaves, miRNA activity eliminates GUS staining on the underside of the midrib, but there is strong GUS staining throughout the vascular tissue (xylem and phloem) and in upper cortex of the rib. Although there is evidence in *Arabidopsis* and maize that miRNAs are transported through the phloem, our results suggest that they are

not actually active in that location. Leaf blades show a very similar pattern of up/down polarity for miRNA activity; GUS staining is nearly eliminated in all lower layers of spongy mesophyll and epidermis, whereas there is no evidence of miRNA activity in the middle mesophyll layer that generates blade vasculature. There is also no evidence of miRNA activity in the upper mesophyll (palisade) or in the upper epidermis. We are currently crossing the pRH178 transgene into several mutant backgrounds to look for alterations in domains of miRNA activity relative to wild-type. The focus here is on mutant strains with ectopic expression of the class I homeobox genes, where it appears that HD-ZIPIII expression is abnormally low. We are testing the possibility that this results from the movement of miRNA molecules beyond their normal boundaries in emerging leaf primordia.

Photosynthetic Genes:

Dr. Richard Peterson on the relation between function and structure of the 22-kilodalton photosystem II (PSII) antenna protein, the *Arabidopsis thaliana psbS* gene product (PSII-S), in collaboration with Dr. Neil Schultes and assisted by Carol Clark. Chlorophyll (Chl) *a* bound to PSII-S may divert excess excitation from the PSII antenna complex to the bound carotenoid zeaxanthin, safely converting the energy to heat. Removal of such essential Chl(s) should result in a loss of nonphotochemical quenching of Chl fluorescence (NPQ) *in vivo*. Putative Chl-binding ligands in two domains of PSII-S were replaced both individually and in combination. Specifically, two Glu-Arg ion pairs [Glu(195)-Arg(95) and Glu(90)-Arg(200)] that span helices I and III in PSII-S, and known to bind Chl in the structurally homologous PSII light-harvesting proteins LHCII and CP29, were replaced with non-binding Val-Leu. A stably transformed line of *Arabidopsis* (mut-2) was discovered in which Chl binding to the A1 site has been blocked. A near total loss of NPQ capacity was observed in these leaves. Current efforts are focused on isolation of Histidine-tagged versions of the mutant proteins to facilitate purification by affinity chromatography. In a related approach, use of the tobacco rattle virus vector system successfully silenced expression of *psbS* in leaves of *Nicotiana benthamiana*. This deletion phenocopy will greatly enhance efforts to screen effects of *psbS* mutation on NPQ capacity.

Application of multiple probes to systems that carry specific mutations provides a powerful means for studying how known regulators of light utilization interact *in vivo*. Two lines of *Arabidopsis thaliana* were studied, each carrying a unique lesion in the nuclear *psbS* gene encoding a 22-kilodalton pigment-binding protein (PS II-S) essential for full expression of photoprotective, rapid-phase, nonphotochemical quenching of chlorophyll fluorescence (NPQ). The PS II-S protein is absent in line *npq4-1* due to deletion of *psbS*. Line *npq4-9* expresses normal levels of PS II-S but carries a single amino acid substitution that lowers NPQ capacity by about 50%. A prior report [Peterson RB and Havir EA (2001) *Planta* 214: 142-152] described an altered pattern of redox states of the acceptor side of photosystem II (PS II) and donor side of photosystem I (PS I) for *npq4-9* suggesting that interphotosystem electron transport may be restricted by a higher transthylakoid Δ pH in this line. *In vivo* steady state fluorescence and absorbance measurements (820 nm) confirmed these earlier observations for line *npq4-9* but not for *npq4-1*. Thus, the prior results cannot be correlated simply to a loss of NPQ capacity.

Likewise, the kinetics of the 820-nm absorbance change did not indicate a substantial effect of *psbS* genotype on electron flow from plastoquinol to PS I. A simple model was proposed to relate linear electron transport rate (measured gasometrically) to a parameter (based on fluorescence) that provides a relative measure of the density of excitation available for photochemistry in PS II. Surprisingly, analyses using this model suggested that the *in vivo* midpoint potential of the primary quinone acceptor in PS II (Q_A) is lowered in both *psbS* mutant lines. This heretofore-unsuspected role for PS II-S is discussed with regard to: 1) numerous prior reports indicating plasticity of the redox potential of Q_A and 2) the basis for the contrasting regulation of quantum yields of PS I and II in *npq4-1* and *npq4-9*.

Plant Metabolism

Manipulating plant metabolism is central to future genetic enhancement of crops for increased yields and more efficient use of fertilizers. By reducing fertilizer use production costs will be lowered and the impact on the environment through excess nitrogen runoff will be lessened. Membrane bound transporter proteins act as metabolite-specific gatekeepers regulating traffic of metabolites between compartments in the cell. Understanding how plant transporters function is an important goal for eventual enhancement of crop productivity.

Nucleobase-Ascorbate Transporters

Dr. Neil Schlutes assisted by Regan Huntley investigates the transport and biochemistry of nitrogen based nucleobases (purines and pyrimidines) in plants. At least six different families of transporters (containing some forty-two members) are involved in the movement of nucleobases. Two transporter families - nucleobase/ascorbate transporters (NAT) and the 8-azaguanine-like transporters – are the focus of our research. NAT proteins transport purines, pyrimidines or vitamin C and are present in most living organisms. A large number of processes utilize nucleobases or ascorbate in plants including house-keeping functions, secondary metabolite synthesis, plant/pathogen interactions, oxygen radical biochemistry and carbon or nitrogen storage and transport. In particular purine metabolism and transport is central for ureide production. Ureides are the major nitrogen transport molecule in tropical N₂-fixing legumes such as soybeans. The Arabidopsis genome contains twelve NAT loci. We hypothesize that NAT proteins have distinct but overlapping solute transport specificities and that NAT loci have unique expression patterns. Such function/expression combinations often address sink-source relationships throughout the plant as has been shown for multi-gene sugar and amino acid transporter family members. Our long term research goals aim at determining the expression pattern and function of plant NAT genes and proteins.

Studies reveal NAT sink/source expression patterns

We routinely use four independent methods to monitor gene expression to ensure accurate spatial and temporal expression patterns. Superior spatial resolution is achieved through analysis of transgenic Arabidopsis harboring NAT promoter- β -glucuronidase (GUS) fusions. Northern blot and RT/PCR were used to monitor endogenous NAT gene expression in different tissues and stages of plant development. In addition *in situ*

hybridization analysis was employed to monitor tissue-specific expression of NAT genes and verify the spatial expression patterns observed with transgenic reporter plants.

We have gene expression data for ten of the 12 NAT loci. During the past year we have generated NAT promoter/GUS constructs in plant binary vectors for three of the four remaining NAT loci. Putative transgenic Arabidopsis lines exist for two of these constructs. Our results confirm that each NAT locus has a unique expression pattern. These patterns support the hypothesis that NAT proteins move nitrogenous compounds throughout the plant to serve the needs of developing “sink” tissues such as pollen, eggs and seed. The expression profiles display a preference for vascular localization and expression in 'sink' tissues (e.g. flowers).

NAT loci heterologous expression constructs

One method for determining NAT transporter function is through heterologous complementation studies in yeast. This procedure involves engineering arabidopsis NAT genes for expression in yeast. These constructs are then mobilized into mutant yeast lines deficient in the transport of various nucleobases. Transport function is monitored by the ability of these yeast lines to be grown on nucleobases as sole nitrogen sources or as gaining sensitivity to growth on toxic nucleobase analogs. We have obtained or isolated full-length cDNA clones for seven of the twelve NAT loci. Each of these cDNAs was engineered into yeast expression vectors. We have been unsuccessful in generating full length cDNA sequence for two NAT loci (At1g65550 and At5g25420), but are renewing our efforts to obtain these genes. Other expression data on these genes show that they are expressed at a very low level in floral tissues. We plan to engineer a total of ten NAT loci into yeast vectors. In collaboration with Dr. Mourad (see below) we will test these constructs in yeast systems.

Uracil transport in Arabidopsis

For1- an arabidopsis uracil transporter

We have an active collaboration with Dr. George Mourad in the Biology Dept. at the University of Indiana/Purdue at Fort Wayne Indiana. He has isolated and characterized a mutant arabidopsis line - called *for1*- that is resistant to higher concentrations of 5-fluoroorotic acid (5FOA). 5FOA is a toxic analogue of uracil. *for1/for1* plants take up of uracil at approximately only 25% the rate of wild type arabidopsis. This locus may represent a NAT gene or a gene that regulates uracil transporter genes. Our collaboration aims to find the locus responsible for the *for1* phenotype.

Linking genetic phenotype with molecular genotype

Using molecular markers (simple sequence length polymorphisms (SSLP) and CAPS) the *for1* locus has been mapped to an 81 kb interval on chromosome V. None of the six transporter loci on chromosome V that were candidates for *For1* – including three NAT loci (At5g25420, At5g49990 and At5g62890), a purine permease (At5g41160), an 8-azaguanine-like transporter (At5g50300) and one FUR4 -like transporter (At5g03555) - map within this interval. Of the 21 loci in the 81kb interval several encode for transcription factors, which may regulate the expression of uracil transporters. We will

obtain T-DNA insertion “knock-out” lines in these loci from the ABRC and test for ability to germinate and grow on 5FOA media as do *for1* mutant plants.

8-azaguanine-like transporters

A further collaboration with Dr. Mourad involves two Arabidopsis loci that encode for transporters very similar to the guanine transporter in *Aspergillus nidulans* AzgA.

Mutants in AzgA locus can grow on 8-azaguanine containing media. Dr. Mourad has generated 8-azaguanine resistant mutations in Arabidopsis. Our hypothesis is that his mutant lines have genetic deficiencies in one of the two 8-azaguanine –like transporter loci (At3g10960 and at5g50300) that we identified by homology in the Arabidopsis genome. We have placed the full length cDNAs from both At3g10960 and At5g50300 into yeast expression vectors and will test their ability in yeast heterologous systems for 8-azaguanine transport. In addition, we have obtained independent T-DNA insertion mutant Arabidopsis lines in each of these loci. Currently, we are identifying and generating homozygous mutant lines and will test their ability to grow on 8-azaguanine containing media.

Genetic Engineering of Paenibacillus Organisms

Dr. Douglas W. Dingman, assisted part-time by Cindy Musante, uses molecular techniques to investigate the disease processes utilized by the insect pathogen *Paenibacillus popilliae*. A better understanding of the mechanisms involved will provide insight into ways to better use this organism as a biological control agent against harmful insects.

A genomic map of *P. popilliae* NRRL B-2309 has been enhanced by the addition of several new genetic markers (i.e., catalase, superoxide dismutase, and aconitase). These new markers were isolated from the genome using shotgun PCR amplification and TOPO cloning. Southern hybridization analysis using the isolated gene markers has been performed on I-*CeuI* restriction blots to place the genetic markers on the genomic map. Continued enhancement of the genomic map will be performed as new genetic markers are identified and mapped. This map provides a genetic organizational foundation on which to direct focus on regions associated with disease processes.

Of the 43 *P. popilliae* and 3 *Paenibacillus lentimorbus* strains obtained from different insect hosts and geographical locations, 4 clearly separated phylogenetic clusters have been identified. The clustering indicated that *P. lentimorbus* and *P. popilliae* are different varieties of the same organism and not different species. An understanding of phylogenetic grouping provides insight into the evolution of the bacterium and helps to explain how disease causing traits were obtained and modified within this bacterium.

A DNA fingerprinting protocol to help identify *P. popilliae* and *P. lentimorbus* has been developed using PCR amplification of the 16S-23S rDNA ITS regions and agarose gel electrophoresis of this amplified DNA. Other *Paenibacillus* species, tested by this PCR-ITS DNA fingerprinting procedure, were found to have unique fingerprint patterns. This procedure can be used for differential identification of all *Paenibacillus* species. Utilization of this procedure will help scientists to rapidly and accurately identify *P. popilliae* and *P. lentimorbus*. DNA fingerprinting will prevent identification

mistakes; as has occurred in past scientific reports by investigators inexperienced with these organisms.

DNA sequence analysis of the *P. popilliae* plasmid pBP68 is in progress. Production of a complete DNA sequence for this plasmid will help explain how this plasmid contributes to the overall physiology of the bacterium. Additionally, sequence information will be needed for the development of this plasmid as a shuttle vehicle for genetic exchange experiments.

Collaborative work with Dr. Neil P. Schultes on development of genetic exchange and insertional mutagenesis procedures are in progress. This investigation is using the Tn916 conjugative transfer capabilities of *P. popilliae* to develop genetic exchange procedures and tools for randomized insertional mutagenesis. Insertion of the antibiotic marker for erythromycin resistance (*erm*) has been placed into the transposon Tn5 and this construct has been randomly inserted into the plasmid pBP68. The green fluorescent protein marker, fused to a *P. popilliae* promoter and ribosome binding site, has been linked to *erm* for placement into a suitable shuttle vehicle. Development of procedures for genetic exchange and insertional mutagenesis for *P. popilliae* allow for the full armament of molecular techniques to be available for molecular investigations on this bacterium.

DEPARTMENT OF ENTOMOLOGY

Hemlock woolly adelgid and soil-inhabiting insects: Field and laboratory studies continued on the control of hemlock woolly adelgids and soil-inhabiting insects. Accomplishments are reported in the Valley Laboratory section.

Community Program for the Prevention of Lyme Disease: A community-base program is being conducted for the prevention of Lyme disease in the Torrington Area Health District (TAHD) and the Ledge Light Health District (LLHD). Research elements continue in the Westport Weston Health District (WWHD), the location of the first national Lyme disease community project which formally ended in September 2004. Funded by the Centers for Disease Control and Prevention, these local intervention projects are a cooperative effort of the Connecticut Department of Public Health (DPH), Dr. Kirby Stafford of the Connecticut Agricultural Experiment Station, and the local health districts. Working closely with the local health districts, Dr. Stafford provides technical advice, site visits, and lectures on tick management for the projects. In the TAHD, research efforts are focused in the towns of Canaan, Cornwall, and Salisbury. In the LLHD, tick control studies have been focused in the community of Mumford Cove in Groton. With the assistance of Heidi Stuber and J.P. Barsky, and summer research assistants Christina Stoehr, Bert Nwadukwe, Sharon Cardona, and Angela Penna in 2004, Dr. Stafford is responsible for collecting data on tick abundance, determining the prevalence of infection in both the vector and reservoir hosts, and evaluating interventions in the community. The majority of Lyme disease cases (75%) are acquired in the residential landscape, primarily through the nymphal stage of the blacklegged tick, *Ixodes scapularis*. The blacklegged tick *Ixodes scapularis* (commonly known as the deer tick) is the vector for the Lyme disease spirochete (*Borrelia burgdorferi*), the protozoan

that causes human babesiosis (*Babesia microti*), and the agent of human granulocytic ehrlichiosis (HGE), which is now called anaplasmosis (*Anaplasma phagocytophilum*). The long term evaluation of the mouse-targeted, fipronil-based bait box in residential communities is an important aspect of Dr. Stafford's current research in the targeted communities. This research provides homeowners with information on the effectiveness of a commercial alternative to broadcast spraying for controlling blacklegged ticks.

Rodent-targeted tick control: White-footed mice (*Peromyscus leucopus*) are important hosts for larval and nymphal *I. scapularis* and are the principal reservoir for the three tick-borne pathogens. The Eastern chipmunk (*Tamias striatus*) is also an important host reservoir for the tick, the Lyme spirochete and *B. microti*. A fipronil-based rodent bait box system for treating white-footed mice and chipmunks to control ticks, initially tested by scientists from the CDC in cooperation with the Connecticut Agricultural Experiment Station on Mason's Island, Stonington, CT, is available commercially. Fipronil is the active ingredient in some flea and tick control products for dogs and cats (Frontline®). The commercial version of the bait box (Maxforce® Tick Management System, Bayer Environmental Science, Research Triangle Park, NC) continued to be evaluated in conjunction with the Lyme disease community intervention projects in the WWHD and TAHD. Working closely with the local health districts, Dr. Stafford established trials of the fipronil bait box in 2001 in inland residential neighborhoods in Westport and Weston, and with J.P. Barsky's assistance in 2002, in Litchfield County in Salisbury, Canaan, and Cornwall. The commercial Maxforce TMS box was used at all sites from 2002-2004. In spring 2004, the commercial boxes were distributed to the same homes used previously. A few additional homes were added in Westport and Weston in spring 2004. The impact of the boxes was evaluated by: 1) opening or weighing samples of the bait boxes to determine bait and box usage 2), tracking host-seeking populations of larval and nymphal *I. scapularis* at treated and control home sites, and 3) live trapping white-footed mice and Eastern chipmunks and monitoring feeding larval and nymphal *I. scapularis*. In Westport and Weston in 2004, 78 homes received 1,861 boxes distributed in two neighborhoods (36 in Weston and 42 in Westport) in two installations with half placed in May to control nymphal ticks on the rodents and half placed in July to control larval ticks feeding on the rodents. The same residences in the two untreated neighborhoods, one each in Weston and Westport, continue to serve as the control. Like 2003, good to excellent control was obtained on *Peromyscus* and chipmunks in most areas in 2004, despite some destruction of bait boxes by squirrels due to a change to more aromatic bait in the Maxforce boxes. Destruction by squirrels was scattered in the WWHD with only a few homes losing all or most of the boxes (CAES replaced 33 destroyed boxes with new boxes in WWHD during 2004). In the WWHD, 98.9% of a sample of undamaged bait boxes opened and examined (n = 187) were fully empty of bait. Mice were trapped at 12 bait box and 9 control properties 5 to 6 times, roughly biweekly, from mid-May through August in the WWHD. Of 67 animals captured in the WWHD control areas, 28 (41.8%) were infested with larval *I. scapularis* and 6 (8.9%) were infested with nymphal *I. scapularis*. By contrast in the bait box sites, only 4 of 50 (8.0%) trapped rodents had larval ticks and no nymphs were detected. This represents a highly significant (z-test, $P < 0.001$) reduction (80.3%) in the proportion of hosts infested with larval ticks (compared with a 72.5% reduction in 2003). Similarly, there was

significantly ($P < 0.001$, Mann-Whitney Test) fewer larvae per rodent host with a mean of 2.4 larvae per rodent in the control and 0.08 larvae per rodent in the bait box treated sites. Host-seeking nymphal ticks will be monitored in summer 2005 to see if there is a reduction at the treated properties relative to the untreated properties resulting from the significant larval reductions on host animals in 2003 and 2004.

In the three towns of the TAHD (Canaan, Cornwall and Salisbury), 70 homes (19 in Salisbury, 16 in Canaan, and 35 in Cornwall) received 1,826 boxes (two installations, one in May ($n = 924$) and one in July ($n = 902$)) in 2004. Unlike previous years, fewer ticks were recorded for all rodents captured in the TAHD bait box sites in 2004. Box usage was high with the majority of boxes opened and examined empty of bait. Mice were trapped at 17 bait box and 15 control properties 5-6 times through the season. Overall, 51.4% (of 74) and 34.4% (of 93) rodents were infested with larval ticks in the control and bait box treated sites, respectively – a significant difference at $P < 0.04$ (z-test). Due to low numbers, there was no significant difference in the proportion of animals infested with nymphal *I. scapularis* (13.5 and 10.7%, control and bait box, respectively). Viewed over time, there has been a steady decline in the prevalence of infestation by larval ticks on rodents in the bait box sites (77.8% in 2002, 61.3% in 2003, and 34.4% in 2004), while infestation levels in the control have been more consistent (45.5, 58.1, and 51.4% for 2002-2004, respectively). Again there was a significant difference in larval numbers on the rodents between the control and bait box sites (Mann-Whitney Rank Sum Test, $P = 0.044$), with a mean of 3.5 vs. 2.2 larvae per rodent in the control and bait box sites, respectively. In an analysis by town, the number of larvae on hosts were lower in the towns of Canaan and Cornwall, but the difference was significant (Mann-Whitney Rank Sum Test, $P = 0.022$) only for Canaan. The mean number of larvae per animal remained higher in the treated sites (1.72/animal) than the control (1.05/animal) in Salisbury, although the difference was less than in 2003.

Tick abundance and deer reduction: The study in Mumford Cove is examining the impact of deer reductions in the community conducted by the Connecticut Department of Environmental Protection in combination with some individual residential spraying for tick control. With the deer reductions in the community through controlled hunts, the proportion of mice infested with larval *I. scapularis* was lower in 2004 (40%) than 2003 (85.7%). However, the sample size in 2004 was small and infested rodents were recovered at areas within the residential community rather than just the forested area between Mumford Cove and Groton Long Point. No rodent bait boxes were placed in Mumford Cove in 2004.

Entomopathogenic fungi for tick control: Postdoctoral scientist Dr. Anuja Bharadwaj began studies on the survival and efficacy against *I. scapularis* and of the fungus *Metarhizium anisopliae* Strain 52 with Dr. Stafford in 2004. The fungus is now being developed commercially in both an oil-based emulsifiable concentrate (EC) and granular formulation for the control of a variety of pests, including the blacklegged tick under the label Tick-Ex® (Earth BioSciences, Inc., New Haven, CT). The purpose of the initial studies is to determine optimum dosage and length of viability under different conditions in the field. Earlier small scale field trials with a laboratory produced oil formulation of the fungal spores by Dr. Stafford in Westport and Weston in 2002 provided greater than 80% reduction of *I. scapularis* relative to the untreated sites in the same community. With new product provided by Earth BioSciences, bioassays of leaf

and grass material treated in woodlands and grassy areas with *M. anisopliae* in 2004 showed the fungus was viable for approximately 47 days under cooler fall conditions. However, high mortality in the bioassay was observed only from woodland samples for this length of time. Bioassay tests and germination tests began in July 2005 to determine fungal viability in the field under summer conditions when nymphal ticks are active. To date, laboratory tests with *I. scapularis* walking on a treated surface have been conducted with adult ticks for both the EC and granular formulations and with nymphal ticks with the granular formulation at different concentrations and exposure times. Against adult *I. scapularis*, a 30 minute exposure to 2.6×10^6 cfu/cm² (= field rate of 2.3×10^{12} /1,000 ft²) of *M. anisopliae* in the EC formulation for 30 minutes resulted in a mortality of 90.9% within 2 weeks. While a 10 fold higher concentration resulted in 100% mortality within 2 weeks at both a 3 minute and 30 minute exposure, the higher rate is probably not a realistic field application rate. Mortality with the current granular material was more variable. These and upcoming studies will provide information needed for the application guidelines for commercialization of *M. anisopliae* as a tick biopesticide. A commercial product with *M. anisopliae* will provide the first practical biological alternative to broadcast insecticides for residential control of the blacklegged tick.

Tick abundance and Lyme disease incidence: In 2004, Dr. Stafford continued to monitor populations of *I. scapularis* nymphs on the lawns and adjacent woods at several residences in Lyme, Old Lyme, and East Haddam, Connecticut, by dragging the vegetation with a square meter cloth 'tick drag'. Ticks have been collected at these residences since 1989. Tick activity was up slightly for June and July in 2004 in these three communities (97.1 nymphs per hectare) compared with 66.2 nymphs per hectare in 2003 and 132.5 nymphs per hectare in 2002. However, only 11.3% (of 62 available to be tested) were infected with *B. burgdorferi*. The risk index based on the abundance of infected ticks was only 11.0 vs. values in the 30s to 70s through the 1990s and 13.8 in 2003. Only 10 cases of Lyme disease were reported in East Haddam, Lyme and Old Lyme in 2004, just slightly more than in 2003 (7), and substantially less than in 2002 (54 cases). Statewide, the number of reported cases dropped to only 1,348 cases in 2004 from the earlier low of 1,403 in 2003. This is largely because of the dropping of required laboratory surveillance by the DPH in 2003. Comparisons on long-term trends in tick activity and prevalence of infection with reported incidence of Lyme disease will permit a better understanding of the relationship between tick abundance and disease.

Tick-borne infections: Dr. Louis A. Magnarelli, assisted by Tia Mastrone, and in collaboration with Dr. Erol Fikrig of Yale University, investigated antibody responses of horses to the bacterium that causes Lyme borreliosis. Utilizing highly specific recombinant or whole-cell antigens in enzyme-linked immunosorbent assays, antibodies to the Lyme disease spirochete (*Borrelia burgdorferi*) were detected in 82 (84%) of the 98 serum samples tested from ill animals. Of the 9 recombinant antigens evaluated in diagnostic analyses, protein 37 and VlsE antigens were particularly useful in confirming current or past infections. Therefore, antibody tests with either of these antigens can be used with conventional tests to improve laboratory diagnosis. Efficient diagnosis can lead to proper antibiotic treatment and improved health of horses.

With the assistance of Tia Mastrone, Dr. Louis A. Magnarelli, Dr. Sandra L. Bushmich of the University of Connecticut, and Drs. Jacob W. IJdo and Erol Fikrig of

Yale University confirmed Lyme disease and anaplasmosis infections in ill cats. New antibody tests were developed to measure animal immune responses to key outer surface proteins of both disease organisms. As found earlier in analyses of human and horse serum samples, VlsE and protein 44 antigens were suitable for laboratory diagnoses of cat infections. These new tests can be used with other methods to determine causes of certain tick-associated diseases. With improved diagnostic testing, there will be more effective antibiotic treatment and improved health of cats.

Emerald Ash Borer: In a 2004, Dr. Maier and his assistants, Julia Daigler, Steven Struble, and Shalyn Zappulla, surveyed for the exotic emerald ash borer, *Agrilus planipennis*, in Connecticut. In the Midwest, this eastern Asian beetle has killed about 6-7 million ash trees. The survey team visually inspected more than 6,200 ash trees in high-risk locations in 167 towns distributed in the 8 Connecticut counties. Inspectors also examined sticky traps on healthy and girdled ash trees for adults. Fortunately, none of the inspected ash trees had emerald ash borers. In 2005, the survey for this destructive beetle is continuing.

Small Japanese Cedar Longhorned Beetle: Dr. Maier and his assistants, Morgan Lowry and Tracy Zarrillo, are studying the seasonal abundance the small Japanese cedar longhorned beetle, *Callidiellum rufipenne*. The exotic cedar longhorned beetle, which was first found in Connecticut in 1998, bores into dead or stressed cedar and related plants in nurseries, garden centers, yards, and forests. Based on captures on sticky bands placed on the trunks of girdled eastern red cedars at Middletown, adults are actively seeking mates and laying eggs from mid-April to early June. Knowledge of the seasonal activity of adults is important for detecting and controlling this beetle of regulatory concern.

Spruce Needleminer: Caterpillars of the Eurasian spruce needleminer, *Batrachedra pinicolella* (Lepidoptera: Batrachedridae), feed upon the needles of spruces, causing cosmetic injury in most cases. Dr. Maier first discovered this moth in Connecticut in 1997; this was the first record from North America. Based on a 2004 survey with wing traps baited with a two-compound pheromone, the moth is widespread in the northeastern United States, being captured in New England, New Jersey, New York, Pennsylvania, and Michigan. In 2005, a distributional survey with pheromone traps is being conducted in other states and provinces in North America to determine additional localities with this pest.

In Orange, Connecticut, the adult males of *B. pinicolella* were captured in pheromone traps between early June and late July 2004. Knowledge of the distribution and flight times should assist stakeholders in developing strategies to cope with this new potential pest of Christmas, landscape, and forest trees.

Other Alien Insects: During 2004 and 2005, Dr. Maier and his assistants searched the state for new exotic insects to determine if and where they occur. They found that the European oak-bush cricket, *Meconema thalassinum* (Orthoptera: Tettigoniidae), is widespread in Connecticut. The metallic wood-boring beetle, *Agrilus cyanescens* (Coleoptera: Buprestidae), also from Europe, similarly occurs throughout the state where its larvae bore into the wood of honeysuckles. The European snipe fly, *Rhagio tringarius*

(Diptera: Rhagionidae), inhabits forests throughout the state. In the collection at the Experiment Station, Dr. Maier discovered a specimen of *R. tringarius* that was collected in 1915 by Max Zappe. This specimen is apparently the first collected in North America. Another new find was the European barberry fly, *Rhagoletis meigenii* (Diptera: Tephritidae), a widespread fly that is on the wing from late June or early July until mid-August. Larvae of this exotic fly eat the berries of pestiferous barberries; thus, this picture-winged fly may be a useful biological control agent for these invasive plants.

Other surveys in Connecticut revealed the presence of two exotic bees. The giant resin bee, *Megachile sculpturalis* (Hymenoptera: Megachilidae), was found in 6 of 8 counties. In Connecticut, the eastern Asian *M. sculpturalis* foraged on two floral hosts (sea-lavender, *Limonium carolinianum*, and goldenrod, *Solidago* sp.) not previously reported in the literature. The second foreign bee, *Anthidium manicatum*, occurred at two localities in New London Co. This Old World bee has the largest distribution of any species of *Anthidium*, having accidentally been introduced into several continents. In North America, adults are associated mainly with species of mints (Lamiaceae), although they sometimes use floral hosts in Asteraceae, Lythraceae, and Scrophulariaceae. The impact of these bees on native bees and on pollination of crop plants has yet to be determined.

Exotic Parasitic Wasps in Apple Orchards: In cooperation with Dr. Christer Hansson of Sweden, Dr. Maier determined that two common parasitic wasps, named by North American taxonomists, are actually the widespread European species, *Sympiesis acalle* and *S. gordius*. These two eulophid wasps, accidentally introduced from Europe, help to control exotic apple leafminers, *Phyllonorycter* spp. (Lepidoptera: Gracillariidae), now established in North American orchards. In addition, the Palearctic encyrtid wasp, *Holcothorax testaceipes*, released by Dr. Maier in 1988, continues to parasitize up to 20% of the tentiform leafminers in an unsprayed apple orchard at Lockwood Farm. The next phase of the research is to determine how to use *H. testaceipes* effectively to bolster biocontrol in low-spray orchards.

Case Studies of Organic Farms in the Northeast: As part of the Northeast Organic Network (NEON) project, Dr. Kimberly Stoner, working with scientists at Cornell University, the New England Small Farm Institute, and the Northeast Organic Farming Association chapters of New York and New Jersey, was responsible for collecting pest management information for all 11 exemplary, established organic farms studied, and for compiling the complete case studies for the 3 farms in New England (1 each in CT, MA, and VT). The case studies include the story of the farmer and the history of the farm, key distinctive issues for each farm, a nutrient budget of organic soil amendments and nutrients leaving in crops. For at least 3 focal crops on each farm, there are detailed analyses of practices and field measurements of results for soil fertilization and managing weeds, insects, and diseases; measurements of yield; and, for the 3 New England farms, economic analyses of production costs, break even points by price and production, and actual revenues by focal crop.

These case studies are currently being used for training Cooperative Extension agents and other agency personnel from across the Northeast in a Professional

Development Program on Organic Agriculture funded by the Sustainable Agriculture Research and Education Program.

Role of cover crops in pest management: In order to evaluate pest and beneficial insects and microbes in the soil and rhizosphere, Dr. Kimberly Stoner and Dr. Wade Elmer, assisted by Erin Amezzane, Tracy Zarrillo, and Elizabeth O'Dowd, grew a set of cover crops over three winter and spring seasons: planted in the fall were wheat, rye, rye + hairy vetch, crimson clover, oats, and, in one year, rape; planted in the spring, following fall oats, were annual ryegrass, spring oats, spring oats + field peas, and in one year, spring-planted rape. We also left an unplanted control for both the fall and spring plantings.

The survival of the cover crops over the winter and performance the next year varied depending on the minimum winter temperatures. Wheat and rye were consistent each year, producing 1-2 tons of dry matter per acre, over 50% ground cover, and suppressing weeds. Rye + vetch also consistently did well each year, but in the spring of 2002, after an unusually mild winter (low temperature of 11 degrees F), grew more vigorously than in the cold years, with close to 100% ground cover and 4 tons of dry matter per acre. Crimson clover varied greatly, with 97% ground cover and 4.7 tons dry matter per acre after a mild winter, but 46% ground cover and only 0.4 tons/acre after a colder winter (low temperature -5 F). Oats also varied, producing a good, winter-killed mulch in spring 2001, surviving the winter and re-growing after mowing in 2002, and dying and breaking down with no dead mulch in 2003. The attempt to follow oats with spring-planted cover crops was not successful, partly due to the variable performance of the oats. Rape did better when planted in the fall than in the spring, but this was over the mild winter, so it should be tested over a series of winter conditions.

In 2001, we studied insect populations as the cover crops re-grew during the month of June after mowing in mid-May. Under those conditions, the rye + vetch cover crop was attractive to the adults of two important species of vegetable pests, the tarnished plant bug and potato leafhopper, and also produced a substantial number of tarnished plant bug nymphs. Thrips (mixed species) were also active and caught in large numbers in wheat, rye, rye + vetch, and annual ryegrass plots.

In 2002 and 2003, we studied insect populations earlier in the season, from April through mid to late May, with the idea that most farmers would be killing and incorporating their cover crops by the end of May. In this part of the season, we found much lower numbers of potential pests, with tarnished plant bugs on rape in early to mid-April (but not producing nymphs) and thrips on wheat in one year in mid-May. We also found a surprisingly high level of activity of parasitic wasps during this period, and we are studying our collections of wasps in more detail to analyze what families and genera were present.

Sorting and analysis of vacuum samples, pitfall samples, and additional sorting of sweep samples is still continuing, so additional information about this experiment may be available in the future.

We did not find consistent patterns among potentially beneficial groups of microbes in the rhizosphere of the cover crops. In general, the numbers of bacteria of all kinds were higher in the roots of the grasses.

The most apparent impact of these results will be for farmers to consider carefully the consequences of allowing rye/vetch cover crops to re-grow after mowing. There have been several prominent organic farmers speaking about this practice as part of a system of weed management, but the information we have collected suggests that this practice might increase numbers of tarnished plant bugs and potato leafhoppers, both very serious pests on organic farms.

Cedar Beetles: Dr. Claire Rutledge investigated two aspects of *C. rufipenne*'s chemical ecology in collaboration with Dr. Lawrence Hanks of the University of Illinois, Urbana-Champaign and Dr. Jocelyn Millar of the University of California, Riverside and their students. *Callidiellum rufipenne* is native to eastern Asia and was discovered in live arborvitae in Connecticut in 1998 by Gale Ridge, Carol Lemmon and Dr. Chris Maier. The borer has since established in the southern half of Connecticut. *C. rufipenne* is found most frequently on plants in the families Cupressaceae and Taxodiaceae. We confirmed that the beetles follow the typical mating strategy of Cerambycidae; males recognize females by means of a contact pheromone in the female's epicuticle. The contact pheromone appears to consist of a single hydrocarbon. We also discovered that male *C. rufipenne* produce a volatile pheromone. This pheromone is consistent in chemical structure with recently discovered aggregation pheromones produced by males of two other cerambycid beetles; the red-headed ash borer (*Neoclytus acuminatus*(Fabricus)) and the red-oak borer (*Enaphalodes rufulus* (Haldeman)). In addition, the pores which release the volatile pheromone, and the glands which produce it were identified, and were consistent in location and structure with those of the other two cerambycids. The function of this volatile pheromone for *C. rufipenne* is under investigation, but could potentially be exploited as a monitoring tool.

Bronze Birch Borer – Dr. Rutledge examined the strategies by which the Bronze Birch Borer, *Agrilus anxius* Glory, a native insect, locates its hosts. The beetles require stressed living trees to develop, and thus, frequently attack birches in landscape and nursery settings. The beetles cause considerable aesthetic and financial damage to homeowners and nurserymen in Connecticut. In summer 2004, 27 pairs of Jaquemontii birches, one girdled and one healthy, were tested for attractiveness to naturally occurring birch borers. All borers chose girdled trees over healthy trees, suggesting that borers can discriminate between stressed and healthy trees. I have begun to sample and analyze the air surrounding healthy and stressed birches in cooperation with Dr. Brian Eitzer, CAES, to attempt to isolate the attractive compounds. In a separate assay, 3 commercially available birch extracts, white birch leaves (*Betula alba*), white birch 'tar oil' and sweet birch oil (*Betula lenta*) were tested for attractiveness to birch borers. None of the compounds were attractive. In spring 2005, 40 birch trees were received from nursery owners to establish an orchard at Lockwood Farm to facilitate future research.

Soybean Aphid in Connecticut – The soybean aphid, *Aphis glycines* Matsumara, was first found in the United States in Wisconsin in the summer of 2000. Since that time it has spread to 21 states, primarily in the upper Midwest, and 3 Canadian provinces. The predicted range of soybean aphid includes all of New England, but it had not yet been

reported from Connecticut and Massachusetts. I surveyed two sites in each state during the summer of 2004: Hamden, CT on 4 August, Cromwell, CT on 1 September, and Plainfield, MA and Conway, MA on 10 September. Soybean aphids were present at all four sites. This is the first report of soybean aphid for Connecticut and Massachusetts. Surveys are underway for summer 2005 to establish if the aphid is over wintering in Connecticut or migrating from out-of-state each year.

Requests for information: Kenneth Welch, Gale Ridge, and Rose Bonito answered questions from the public. The insect inquiry office served 4,109 people through the year, and 693 different insect and spider species were identified. Ants, termites, bees, wasps, hemlock woolly adelgids, and pantry pests continue to be the leading pests of concern. The office served private citizens, the pest control and real estate industries, nurseries, arborists, health departments and other medical professionals, museums, municipalities, libraries, state government, and the news media. Inquiries were made through 2,342 telephone calls (57%), 1,233 visitors (30%), 534 mail submissions (13%), and other miscellaneous submissions.

REGULATORY ACTIVITIES

Apple scab maturity evaluation: During primary scab infection season, samples are taken every week, starting at half-green-tip, consisting of at least 50 apple leaves that have overwintered on the orchard floor at Lockwood Farm. From these leaves, 50 pseudothecia of *Venturia inaequalis* are dissected, mounted on microscope slides in acid fuchsin, and examined using a microscope. Immature, mature, and empty ascospores are counted and tallied each week. Degree-days, using a 32-degree baseline and accumulated from half-green-tip, are determined. Weather data are taken from the weather station at Lockwood Farm. Phenology of the trees is also determined every week. Data on scab ascospore maturity, degree-day accumulation, and tree phenology is reported weekly to Lorraine Los at UConn, who broadcasts this information on her pomology list-serve. In 2005, the epidemic of apple scab progressed slowly, due to cool relatively dry conditions early in the primary scab season, and cool night-time temperatures later in the season.

Department personnel (Tim Abbey, Erin Amezzane, Jeff Fengler, Ira John Kettle, Gale Ridge, Stephen Sandrey, and Peter Trenchard) performed inspections and surveys during the past year under the supervision of Dr. Victoria Smith.

NURSERY INSPECTION AND CERTIFICATION

Three-hundred and twenty-eight nurseries were certified to conduct intra- and interstate business. There were 880 nursery inspections during the growing season. Eight-thousand, seven-hundred and thirty-eight acres of nursery stock were examined as well as plants growing under 32,587,875-sq. ft. of greenhouse space. The majority of plants were grown in hoop houses (28,264,900 sq. ft.), followed by plastic greenhouses (2,802,143 sq. ft.) and glass greenhouses (1,519,000 sq. ft.).

NURSERY INSECTS

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

JAPANESE BEETLE CERTIFICATION

We observed treatments of 260,623 plants at two nurseries and issued phytosanitary certificates to comply with states that quarantine nursery stock from Connecticut because of the Japanese beetle, *Popillia japonica*.

One nursery, which met the containerized nursery stock accreditation program requirements of the United States Japanese Beetle Harmonization Plan, shipped 22,012 plants to other states in 2004.

Four nurseries met other requirements of the United States Japanese Beetle Harmonization Plan and shipped 1,573 plants to states that quarantine plants from Connecticut.

JAPANESE BEETLE CERTIFICATION TO CANADA

Three Connecticut nurseries, which met the inspection requirements of the US/Canada Japanese Beetle Harmonization Plan, shipped 50,634 plants out of state in 2004.

NURSERY DEALER PERMITS

Nursery dealer permits were issued to 180 firms. One-hundred and fifty-nine of these companies operate individual outlets. The remaining businesses have more than one outlet each. In total, there were 464 outlets.

INSECT AND ENVIRONMENTAL PROBLEMS

We assisted nurseries and private citizens with the following problems in 2004:

1. Helped four nurseries to solve shipping and certification problems.
2. Inspected *Rhododendron* plants for 5 homeowners worried about the Ramorum blight problem.
3. Inspected wood lots in East Haddam, Waterford, and Bridgewater for woodland pests.
4. Inspected furniture for a private homeowner in Durham for insect exit holes.

PHYTOSANITARY CERTIFICATES

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

Plants	Number
Apples (Cartons)	11,114
Bulbs & Tubers (Dahlia, Liliun, Gladiolas)	619
Chestnut (Unrooted cuttings)	36
Chinese tree peonies (plants)	26
Greenhouse plants	25,861
Nursery stock (containers & plants)	25,634
Orchids (plants & flasks)	1,653
Perennials (plants in tissue culture)	100
(bare root plants)	26
(plants)	8,363
Seeds (Packets)	10
Rice Plants	145
Tobacco (bales, boxes, bundles & cartons)	110,756

SPECIAL INSPECTIONS

1. Thirty-eight inspections were made for 542 individual plants and bulbs to assist homeowners moving out of state.
2. One-hundred and fifty-seven inspections were made to assist nurseries moving the following plants interstate:

Plants	Number
Nursery stock (containers & bare root plants)	24,960
Perennials	254,506
Greenhouse plants	311
Christmas trees	2
Geraniums	841

3. Three tobacco growers had 173 acres inspected for the aerial application of pesticides.
4. Ten post-entry inspections were carried out on 7,128 plants at 3 locations. At one site, 126 plants were released from quarantine.

INSECT AND DISEASE SURVEYS:

FOREST HEALTH SURVEY

During the summer of 2004, we examined 51 permanent, one-acre forest plots that were established to monitor forest health in Connecticut. These plots are located on state, Nature Conservancy, and municipal water company properties. We considered 25 pathogens for monitoring and determined which trees served as host plants. Within each plot, 20 to 30 trees were tagged for long-term studies. We evaluated signs of defoliation and disease, such as dead tree branches, limbs and crowns. Descriptions and determinations are designed to reflect increasing damage or tree decline. We measure the trees at Diameter at Breast Height (DBH) as an additional way to monitor their health. We will continue to use these plots to monitor the forests over several years to assess whether our state forests remain healthy or are declining. In general, our forests remain healthy.

GYPSY MOTH

Our annual aerial survey for gypsy moth defoliation was conducted in early July 2004 and covered 1.8 million acres of urban/suburban forest in all eight Connecticut counties. Six-hundred and twenty-six acres of gypsy moth defoliation were found in two counties.

In November and December, a gypsy moth egg mass survey was conducted in 80-95% favorable host sites on a 7 -mile grid (102 sites) throughout Connecticut. At three sites, egg masses were found in numbers large enough to be considered a potential problem for the spring and summer of 2005.

ASIAN LONGHORNED BEETLE

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

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

Asian Longhorned Beetle Survey 2004

County	# Inspections	# Trees Inspected	# Infested Trees
Fairfield	9	1,301	0
New Haven	13	850	0
New London	5	975	0
Totals	27	3,126	0

RALSTONIA SOLANACEARUM RACE 3 BIOVAR 2

Ralstonia solanacearum race 3 biovar 2 was discovered on geranium cuttings from Guatemala during 2004. The cuttings were sent to rooting stations in the United States and then sent to greenhouses throughout the country. *Ralstonia* is a bacterium which causes wilt disease. It can be transmitted through soil, contaminated irrigation water, equipment, or by personnel. Some races of *Ralstonia solanacearum* are present in the U.S., but the *Ralstonia solanacearum* race 3 biovar 2 is considered a serious pathogen that could affect other important agricultural crops. *Ralstonia* wilting symptoms are similar to other pathogens on geraniums such as *Xanthomonas pelargonii* (the agent of Bacterial Blight). The primary symptom of the disease is wilting of leaves and/or abnormal yellowing (or “scorched”) leaves. This disease is deadly to geraniums.

Four greenhouse growers in Connecticut received 1,600 rooted geranium cuttings from the growing stations that had shipped plants infested with *Ralstonia*. The USDA and Connecticut Agricultural Experiment Station jointly inspected these plants. Twenty-six inspections were carried out on the greenhouses that had received the plants. Two greenhouses decided to incinerate the suspect and associated geraniums on site. The USDA and the Connecticut Agricultural Experiment Station observed the incineration of 1,832 plants. The other two greenhouses decided to take the suspect and associated plants to a landfill for burial. A total of 3,132 plants were taken to the landfill and the burial was observed.

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. On September 30, 2004, an aerial survey was conducted over Windham, New London, Tolland and Hartford Counties. Defoliation was found in Canterbury (261.5 acres) in Windham County.

PINE SHOOT BEETLE

One-hundred and five Christmas tree farms in 52 Connecticut towns were inspected for pine shoot beetles, *Tomicus piniperda*, during 2004. The inspections encompassed 1,238 acres of trees and the individual examinations of 70,608 Christmas trees. The trees were examined by walking along the rows looking for damage. Pine shoot beetles were not found in Connecticut.

In late November and December, we examined 35,652 Christmas trees owned by 137 dealers in 61 towns. The trees were inspected for over-wintering pine shoot beetle adults in the base of tree trunks or beetle damage. We were especially concerned about Christmas trees that were shipped into Connecticut from states with *Tomicus piniperda* infestations. Pine shoot beetles were not found in Connecticut.

Fifteen inspections were carried out on pine trees shipped from infested states to housing developments in Connecticut.

DAYLILY RUST

A rust fungus (*Puccinia hemerocallidis*) was found on daylilies in a southeastern U.S. nursery for the first time in the summer of 2000. It was found in Connecticut in 2001 and 2002 on daylilies owned by private citizens. It is now confirmed to occur in three counties. During 2004, we surveyed daylilies in nurseries and garden centers for signs of this rust. One-hundred and thirty-one inspections were carried out on 493,393 plants. No signs of *Puccinia hemerocallidis* were found.

HEMLOCK WOOLLY ADELGID

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

During 2004, we required all hemlock nursery stock that was being shipped out of Connecticut to be treated for Hemlock woolly adelgid. Two nurseries shipped hemlock trees out of state. Our inspectors observed treatments and issued phytosanitary certificates to cover 812 plants in these shipments.

RAMORUM LEAF BLIGHT

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

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

During 2004, we surveyed for symptoms of Ramorum Leaf Blight. We inspected plants in nurseries and garden centers and plants being shipped to interstate and Canadian destinations. A total of 227 inspections were carried out on 116,449 *Rhododendron*, 18,026 *Pieris*, 7,617 *Viburnum*, and 4,436 *Vaccinium*. No signs of sudden oak death were found.

As part of the National Nursery Survey we inspected 20 nurseries during the Spring 2004. During this survey 35,500 plants were inspected and leaf samples from symptomatic plants were submitted for lab analysis. Nine samples were ELISA positive for *Phytophthora ramorum*. Positive samples were sent to Beltsville for PCR confirmation; all samples were found to be negative by the Beltsville lab after gene sequencing tests were performed.

A nursery forest environs survey was done in conjunction with the US Forest Service. The perimeter survey was done on three large wholesale nurseries. One woodland plot was also surveyed. Four one hundred meter transects were measured using GPS along nursery perimeter. The starting and ending trees marked with GPS readings and tape. The woodland plot transects measured from one starting point tree. All host species along the transects were examined for possible symptoms of *Phytophthora ramorum*. No infected leaves or tree cankers were found.

RAMORUM LEAF BLIGHT - Trace forwards During 2004, our office investigated nine different trace forwards:

Trace Forwards	First Notified	Last Activity	Number of sites	Number of Plants Imported	Number of Plants remaining	Number of Plants Destroyed
1	3/12/04		111	116	50	0
2	3/13/04	4/13/04	2	79	55	0
3	5/4/04	7/22/04	2			
4	6/23/04	7/16/04	5	5,244	3	0
5	9/16/04	9/21/04	1	5	5	0
6	9/16/04	9/24/04	1	350	0	0
7	10/25/04	11/30/04				
8	10/27/04	2/11/05	55	7,305	161	1,380
9	12/22/04	12/30/04	2	40	0	0
Totals			179	13,139	274	1,380

CHRYSANTHEMUM WHITE RUST

During 2004, we continued to survey for *Chrysanthemum* white rust disease, caused by the fungus, *Puccinia horiana*. We inspected 965,011 chrysanthemums raised by 446 growers and dealers for the presence of chrysanthemum white rust. No chrysanthemum white rust was found.

SMALL JAPANESE CEDAR LONGHORN BEETLE

Based on surveying with trap-logs and on rearing insects from dead wood, the exotic small Japanese cedar longhorned beetle, *Callidiellum rufipenne*, is established in 58

Connecticut towns distributed in Fairfield, Hartford, Middlesex, New Haven, and New London Counties. The beetle successfully developed on 9 species of ornamental and wild plants in the family Cupressaceae. In the wild, the principal host was dead eastern red cedar, but *Callidiellum rufipenne* also infested dead common juniper and Atlantic white cedar. In garden centers, the main hosts were stressed balled and burlaped arborvitae and other cupressaceous landscape plants.

During 2004, we inspected 27,346 plants for *Callidiellum rufipenne* at 77 nurseries in 52 Connecticut towns. No infested plants were found.

WAREHOUSE SURVEY FOR WOOD BORING INSECTS

In early 2004, we conducted a trapping survey of 15 Connecticut warehouses in 5 counties to detect the possible presence of exotic wood boring insects. Lindgren funnel traps, with a chemical lure, were placed in the warehouses and checked bi-weekly for insect activity. A bark beetle predator, *Thanasimus formicarius*, was found for the first time in Connecticut at a New Haven County lumber storage yard in April 2005. A single adult beetle was captured in a Lindgren funnel trap at the warehouse during a survey for exotic bark beetles and longhorned beetles.

The beetle was collected by Erin Amezzane (Sturgis) and Gale Ridge and identification was confirmed by Dr. Chris Maier, all from The Connecticut Agricultural Experiment Station

This occurrence represents new state and county records for Connecticut. Data have been submitted to the NAPIS database.

BUTTERNUT CANKER

Butternut Canker (*Sirococcus clavigignenti-juglandacearum*), a phyto-pathogenic fungus, was first found in the United States in 1967, and since then, it has spread rapidly and extensively through the butternut (*Juglans cinerea*) populations in our country. The fungal spores are aerially dispersed long distances during cool temperatures and overcast skies, thus having the ability to reach isolated trees. The fungus infects the tree through any openings in the bark, such as leaf scars, natural bark cracks, and wounds. The resulting cankers can expand to the point that they girdle branches, and as more cankers develop and coalesce, they can even girdle the main trunk, which kills the tree. The fungus is usually spread on an already infected tree by rainfall, which washes the spores to new openings in the bark. There is still no known cure for this disease.

During Summer 2004, we visited the 100 largest butternuts in our survey and took diameter measurements. We are going to continue the survey with just these trees, measuring the diameter growth and health.

APIARY CERTIFICATION

Three-hundred and six beekeepers registered 2,374 colonies in 2004. Our bee inspector opened and inspected 759 colonies in areas known to have foulbrood disease. American foulbrood was found in 7 colonies and European foulbrood was found in one colony. These colonies were destroyed.

County	Colonies Opened & Inspected	Varroa Mite Positive	American Foulbrood Positive	European Foulbrood	Wax Moth	Dysentery
Windham	199	20				
New London	104	4	2	1	2	
New Haven	215	1				
Hartford	69	5	3			5
Middlesex	67	27	2			
Litchfield	3					
Fairfield	88	15				
Tolland	14	2				
Totals	759	74*	7	1	2	5

*Varroa mite totals represent infestations that were not controlled. These colonies were in the final stages of their existence.

Varroa mites are present in all colonies, treated or untreated.

During 2004, 400 honeybees from 3 apiaries in the towns of Easton, Wethersfield and Fairfield were examined in the laboratory for the tracheal mite, *Acarapis woodi*. Two apiaries in Wethersfield were infested with tracheal mites.

DEPARTMENT OF FORESTRY AND HORTICULTURE

Connecticut has a strong link to the forest. Approximately 60% of Connecticut's land area is classified as forest. In addition to valuable non-commodity amenities (watershed protection, wildlife habitat, passive recreation), the forests are a valuable part of the local economy. Connecticut has a \$500 million wood product industry of 350 firms that provide employment to 3,600 loggers, millworkers, and others. Many of these forests were established around 1900 and have become economically valuable assets. The unbalanced age class distribution of the oak-hickory forest, and most individual forest stands, presents a challenge to both private and public forest landowners wishing to implement sustainable forest management. Three factors are driving the necessity of developing innovative alternatives to “high-grading” or initiating regeneration harvests in these stands: obtaining a more balanced age-structure, increased public desire for partial cutting, and increased parcelization of ownership. Crop-tree management has been proven successful in younger oak stands and could be a viable alternative in older oak

sawtimber stands where maintaining high forest cover and non-commodity attributes are important considerations.

Crop-tree management: In 1995, Dr. Jeffrey Ward began a study of crop tree management for black birch (*Betula lenta*) and northern red oak (*Quercus rubra*) in cooperation with CT DEP-Division of Forestry, Northeast Utilities, Regional Water Authority, and the Metropolitan District Commission. Black birch is an increasing component of the southern New England. In Connecticut, black birch cubic-foot volume has increased 64% since 1972. Because it had been a minor component of the forest until recently, there have been few studies that have examined its growth rate following release. Five black birch stands were selected for this study. The stands were from 20-99 years-old, and mean crop-tree diameters ranged from 4.8 to 13.8 inches. Growth of crop-trees was monitored for eight years. Over the eight-year period, diameter and volume growth of completely released poles (4.6-10.5 inches diameter) was twice that of unreleased poles. Increased growth was noted the first year after release and showed no indication of decreasing after eight years. Release did not affect diameter growth of small sawtimber crop-trees (10.6-13.5 inches diameter) until the third year after release. However, after eight years, diameter and volume growth was nearly forty percent greater than for unreleased trees. Release had negligible effect on diameter and volume growth of large sawtimber crop-trees (> 13.5 inches diameter). If crop-tree management was initiated in young stands of black birch poles (mean diameter of upper canopy trees was 4.5 inches), then the time require to grow those trees to diameters of 13.5 inches could be reduced by nearly 50%.

The oak crop tree study found that complete crop-tree release increased annual volume growth of younger northern red oak sawtimber trees by 3-9%. It is unknown whether crop tree release would also increase growth of older sawtimber oaks. A modest 1% annual increase would increase the value of the older oak sawtimber stands by nearly \$7 million per year. This would provide forest owners with an incentive to retain large sawtimber while simultaneously providing a number of additional benefits including increased habitat diversity and aesthetic appeal.

A new study was begun in 2003, with the additional partnership of the Torrington Water Company, to determine if crop tree management would increase growth of large, mature oak sawtimber (> 18 inches diameter) without a loss in bole quality and stand growth rates. Six study sites have been established in fully-stocked, mature oak forests. Each study site has three treatment areas of approximately 5 acres. Treatments are 1) an uncut control; 2) crop trees released from upper canopy competition on three or four sides, no other trees cut; and 3) crop trees released on one or two sides as part of a crown thinning to 60 ft²/acre of basal area. Treatments were randomly assigned after crop tree selection. At least twenty-five crop trees (~10/acre) were selected on each treatment area. Selection criteria for crop trees was: red oak group (*Quercus rubra*, *Q. velutina*, or *Q. coccinea*), codominant or dominant crown class, at least 17 ft to first fork, diameter > 18 inches, and potential grade 1 buttlog. Crop trees were banded with orange paint. Tree measurements were completed following the 2004 growing season. A 50x50m plot was located within each treatment area to monitor changes in stand volume growth. All trees with diameters > 4 inches were banded with red paint. A total of 2613 trees have been measured. Harvesting has been completed on four of the study areas. Tree measurements will be

completed following the 2005 growing season and it is anticipated that preliminary results should be available in 2009.

Behavior and influence of prescribed burning: The near-elimination of the historic fire regime (occasional to frequent low-intensity surface fires) of the mixed-oak forests of Connecticut has wrought several undesirable changes to ecosystem function. One of these is the inability of oaks to regenerate themselves, especially on productive sites. There is growing interest in restoring fire to some semblance of its past regime in mixed-oak forests to help restore ecological function, especially the oak regeneration process. However, there is a lack of basic fuels and fire behavior knowledge/information for this forest type. This dearth of basic information also impacts wildfire control efforts, especially in the expanding urban/wildland interface. The primary objective of this study is to evaluate the appropriateness of the existing hardwood fuel models to these fuel conditions through a series of computer simulations and intensely monitored prescribed fires. By doing so, some of the fuels/fire behavior knowledge gap will be filled, making prescribed fire planning/implementation and wildfire control more effective and safer. Dr. Jeffrey S. Ward and J.P. Barsky established eight prescribed burn sites on state lands in cooperation with CT DEP - Division of Forestry. The sites represent a wide variety of fuel conditions that typically occur in mixed-oak forests such as: blueberry, huckleberry, and mountain laurel thickets, recent and older logging slash in both clearcuts and shelterwoods, and dense fern glades. One site was burned in 2002. Fuels and regeneration data were collected in eight stands preparatory for the 2002 spring fire season. Four of these sites were burned during the spring of 2003. Three additional sites were burned during the spring of 2004. Temperatures ranged upwards of 1000°F. Inventory of regeneration that returned following the fires was completed in 2005.

Impact of prescribed fire on residual trees: While prescribed fire may be beneficial to enhance oak regeneration, little information is available on damage to larger trees by a fire. In 2004, we tallied all woody species (except brambles) that were at least 140 cm tall were tallied within plot corners. The inventory was delayed for one full year after the fire because many stems, although completely girdled, had live tops the first growing season after the fire. Nearly all stems less than two meters tall, and all stems with diameters > 1 cm, were still present. A total of 862 stems were examined.

Not unexpectedly, the hotter the fire the higher the mortality. Mortality decreased with size classes – nearly 100% of stems with diameters less than 1 cm (~0.4”) died in all fires, and nearly all stems > 30 cm (12” dbh) survived. It appears that mortality follows as a logistic mortality model. In other words, for a fire of a given intensity, mortality is near 100% until a critical diameter is reached. Mortality then falls sharply and very little mortality is noted for stems slightly larger than the critical diameter. This will be explored further after mortality for the 2004 fires are examined. For a given diameter, there was little difference among species in the amount of girdling. There was little difference in the proportion of oak and red maple that sprouted in response to severe girdling (very few birch sprouted). Heights of oak and maple sprouts were similar. These results suggest that the interaction between oak and fire is complicated. Perhaps, repeated fires would ultimately decrease overstory maple densities as multiple wounding increases basal rot and mechanical collapse. Relative to oak, maple is poor at compartmentalizing wounds.

Each year, more and more Nutmeggers have the opportunity to watch deer in their own backyard and gardens. Unfortunately, this increasingly common sight has a cost. Many gardeners know the frustration of waking up to find prized roses, perennial plant beds, or vegetable gardens damaged by deer browse. In 2001, it was estimated that deer nationwide were the cause of \$407 million in losses to field crops, vegetables, fruits, and nuts. Little research has been done on the total losses of ornamental and landscape plantings due to deer browsing statewide, but these numbers are likely to be substantial. Deer damage is not limited to plants. Deer are a host species for the ticks that transmit pathogens that cause Lyme disease. Connecticut also reports approximately 3,300 vehicle collisions with deer annually, but the Department of Environmental Protection estimates that the total number is closer to 10,000. Nationwide, an estimated 1.5 million vehicle collisions with deer occur annually and result in approximately \$1.1 billion in damages, 29,000 human injuries, and 200 human fatalities.

Severe browsing by large deer herds has seriously impaired natural regeneration of some Connecticut forests. Forest understories have become dominated by browse resistant species such as hophornbeam, blue beech, and striped maple along with exotic invasives, such as Japanese barberry, ailanthus, oriental bittersweet, and winged euonymus. Unfortunately, these browse resistant species often have lower economic, aesthetic, and wildlife values than the species they displace. The damage caused by browsing is not limited to trees. At least 98 threatened or endangered plants are browsed by white-tailed deer. Many spring wildflowers (lilies, trilliums, orchids, lobelias, and buttercups) and flowering shrubs (dogwoods, viburnums, roses, and rhododendrons) are favored by deer. Change in forest structure caused by deer browse can have a negative impact on bird species that nest in the understory.

White-tailed Deer and Forest Regeneration: Scott C. Williams and Dr. Jeffrey S. Ward have been conducting a study on white-tailed deer as dispersers of exotic seeds. A total of 514 deer pellet groups have been collected over three years (2002-2004) in the towns of Guilford, North Branford, Cheshire, and Norfolk. Each pellet group was collected and placed in individual sampling bags that were vernalized at 5°C for 60 days. After 60 days, pellets were removed and placed on, and lightly covered with, a growing medium. Planted samples were kept in a temperature controlled greenhouse with a minimum temperature of 21°C. Samples were watered as needed, fertilized to encourage flowering for identification purposes, and retained in the greenhouse for approximately six months. Germinants were allowed to grow until they could be identified, at which time they were removed from the tray and discarded. Species exotic to Connecticut included 7,648 germinants of 37 species. Some of the most abundant exotics included purslane (*Portulaca oleracea*) with 7,030 germinated seeds, Carolina horsenettle (*Solanum carolinense*) with 224 germinated seeds, lambsquarters (*Chenopodium album*) with 204 germinated seeds, wine raspberry (*Rubus phoenicolasius*) with 140 germinated seeds, and common plantain (*Plantago major*) with 29 germinated seeds. We determined deer on the research site had the potential to disperse approximately 2,000 exotic seeds per mile² per day throughout summer and autumn. As white-tailed deer numbers in Connecticut continue to grow, so will the number of exotic seeds dispersed into woodland settings, altering forested ecosystems by displacing native species.

Another method to study the impact of deer on natural ecosystems is to compare growth rates and species diversity of vegetation protected from deer browse to unprotected plots.

As part of a new cooperative research project with Connecticut Chapter – The Nature Conservancy, four deer enclosure plots were expanded in 2005. Deer enclosures are six-foot tall wire mesh fences that prevent deer from browsing vegetation. Short-term observations suggest that both woody and herbaceous vegetation within enclosures has increased growth rates without the pressure of browsing deer.

Fertility Control of White-tailed Deer: The Connecticut landscape is a quilt of medium to high-density housing, fields, and forests. This fragmented landscape has created ideal conditions for white-tailed deer and their population has exploded over the past few decades. Hunting to control deer populations in many, if not most, areas of medium to high-density housing is not feasible because of resident's safety concerns and the general opposition to any form of lethal control.

In response to this conundrum, research was initiated to examine alternative, non-lethal methods of controlling deer populations by Dr. Uma Ramakrishnan and Scott Williams in 2001. A novel technique to sterilize male deer (bucks), injecting a scarring agent directly into each cauda epididymis, was tested using thirty-seven captured bucks. Treatment involved the capture of animals with a dart rifle and a subsequent hand injection. Little medical equipment was necessary for treatment as it requires a simple injection through a syringe, which is beneficial as postoperative care would not be possible on a free-ranging animal. Analysis of semen from previously treated animals indicated the procedure led to azoospermia (sterility) in animals the year of treatment and one year post-treatment. Animals remain in the population, grow and shed antlers annually, and continue to engage in mating behavior. The procedure appears to be permanent.

Analysis of Deer/Vehicle Collisions: Information from the Connecticut Department of Environmental Protection's Deer Kill Incident Reports is being entered into a database for 2003. This information will be added to a database containing similar information for 2000, 2001, and 2002. Location of accidents is indicated on reports; latitude and longitude coordinates were obtained using DeLorme Street Atlas USA. Analysis of data thus far indicates collisions are most likely to happen in October, November, and December. Collisions often occur during morning and evening hours, corresponding to peak traffic and animal activity. Using spatial analysis of data in the geographic information system ArcView 3.3 and extension CrimeStat 2.0, it was determined that male deer are more likely to be involved in collisions in urban and suburban areas rather than female deer. Further analysis will examine the influence of land use, vegetation cover, and regional deer population densities on predicting hotspots for deer/vehicle collisions. This will assist in taking measures to increase human health and safety.

Effect Of Shade On Fertilizer Use And Composition Of Greenhouse Tomato: Farmers produce tomatoes in greenhouses to capitalize consumer demand for fresh, native vegetables with improved taste and nutritive qualities. Typically plants are started in spring, but much of the production occurs during the hottest months of summer. Dr. Martin P. N. Gent began experiments in 2003 to compare the yield and quality of various cultivars of tomatoes grown in greenhouses that were cooled by covering with reflective aluminized shade cloth. Houses that were compared had either no shade, or the shade cloth reduced light transmission into the greenhouse by 15%, 30% or 50%, compared to greenhouses only covered with the usual double-layer of clear polyethylene film. These

treatments are referred to as 0, 15%, 30% or 50% shade, respectively. The shade was applied in early June, corresponding to the start of fruit production, and the start of the first warm weather. The houses remained shaded for the rest of the summer, and fruit was picked into August. The tomato plants were grown from seeds germinated in January, and the seedlings were transplanted into the greenhouses in March.

Shade tended to increase the fraction of fruit that was marketable in these experiments, Total yield was reduced by shade, but marketable yield was affected less. Cracked skin was the defect most affected by shade. About one third of the fruit produced in non-shaded greenhouses had cracked skin, whereas only one quarter of the tomatoes from greenhouses with 50% shade had cracked skin. Increased shading also slightly decreased to proportion of fruit blossom end rot.

Shade is likely to also affect the composition of the fruit, because it will alter plant growth and transpiration, and the uptake of water and nutrients. These aspects were examined to see if the supply of water and/or nutrients should be altered for plants grown under shade, in order to improve or modify composition and quality of tomato fruit. Tissues were sampled a month or more after the application of shade in 2003 and 2004 and analyzed for elemental composition, carbohydrates, and dry matter content.

The primary effect of shade on composition of fruit was to decrease the soluble solids, i.e., the fraction of fruit weight in dry matter. When analyzed as a linear trend, dry matter content of the fruit decreased from 6.0 percent in a house with no shade, to 5.7 percent in a house with 50% shade. When analyzed as a linear trend, there was no effect of shade on the various elemental nutrients in the fruit such as potassium, calcium, or magnesium. Fruit from the intermediate shade treatments had the highest concentration of phosphorus in both years. In summary, shade decreased slightly the dry matter percentage of fruit tissue, but it did not affect the elemental composition.

Shade is likely to have greater effect on composition of leaf blades, compared to other tissues, as leaves are the chemical factory of the plant; the site of photosynthesis and transpiration. Shading the greenhouse affected the concentration of most elements in leaf blades. The concentration of total nitrogen, nitrate nitrogen, and potassium increased in leaves in proportion to the degree of shade. Although the general trend was an increase of magnesium and phosphorus with shade, in both years the unshaded treatment resulted in higher concentrations than 15% shade. Shade affected nitrogen differently in the two years; the increase of nitrogen with shade was much greater in 2004 than in 2003. In part this was because there was substantial change from year-to-year in concentrations of total nitrogen, calcium, and magnesium in leaf blades. Concentrations of these elements were 25% greater in 2004 than in 2003. This could be due to the use of different cultivars, sampling at a different time in the crop cycle, or a choice of leaves of slightly different physiological age in the two years.

The petiole is the part of the transport pathway in the plant that connects the leaf to the stem. It is likely to be sensitive to the concentration of nutrients moved in the transpiration stream from roots to leaves. Shade affected the concentration of total nitrogen, nitrate nitrogen, potassium, and magnesium in petioles. Petioles had about half the total nitrogen found in leaf blades, and the concentration in petioles increased only slightly with shade, by 10 percent over the unshaded condition. Petioles had about three times as much potassium as leaves, and the potassium increased with shade far more in petioles than in leaves. Magnesium in petioles decreased slightly with shade. It is

interesting to note that shade had no effect on calcium in either leaf blades or petioles. Movement of calcium is known to be affected by rate of transpiration, which presumably was affected by shade. Total nitrogen, potassium, calcium, and magnesium in petioles varied from year to year. Potassium and total nitrogen decreased from 2003 to 2004, while magnesium increased.

Within each year, there were variations in nutrient content by cultivar. In particular, there was less potassium in fruit of Buffalo than in fruit of Quest in each year. Quest also had a high amount of calcium in fruit. In 2004, the concentration of nitrogen in leaf blades was less in Buffalo and Quest than in Cabernet and Jet Star. Leaf blades of Buffalo had more calcium and phosphorus than did leaf blades of the other cultivars.

One would expect shade to affect the uptake of water and nutrients into plants, as it affected the composition of the vegetative tissues. We kept records of the daily supply of water and the volume of solution drained from each trough of plants. We also measured the concentration of nutrients in the solution supplied to the plants, and in the solution drained from the troughs. The daily average volume of solution supplied and drained was calculated over the period of shading in each year. This corresponded to the months of June and July in 2003. In 2004, it corresponded to the period from mid-June until the end of August. The uptake per plant per day of water or nutrients was calculated from the difference between the amount supplied and the amount lost in water drained from the plants. The duration of each watering was modified for each shade condition so the supply of water matched the uptake by the plants.

Increasing shade decreased the uptake of water per plant in both years. There was no effect of shade on electric conductivity, a measure of the sum of salts dissolved in solution. This indicated that the plants had a similar ratio of water to nutrient uptake under all shade treatments. Shade decreased the uptake of both nitrogen and potassium in both years, and in both years shade had a greater effect on uptake of potassium than on uptake of nitrogen.

The uptake of water and nutrients varied from year to year. Plants took up more water and nutrients in 2003 than in 2004. The water supply per plant per day varied from 2.4 to 1.9 L in 2003, and from 2.4 to 1.7 L in 2004, depending on the shade treatment. The uptake of water per plant per day varied from 2.1 to 1.7 L in 2003, and from 2.0 to 1.5 L in 2004. The nitrate concentration in the solution supplied to the plants was higher in 2003 than in 2004, and the uptake of nitrogen was slightly higher in 2003 than in 2004. Nitrogen uptake per plant per day ranged from 0.28 to 0.23 g in 2003, and from 0.24 to 0.18 g in 2004, depending on the shade treatment. Potassium uptake ranged from 0.40 to 0.33 g in 2003, and from 0.39 to 0.30 g in 2004. In part, plant uptake differed between years because the schedule for measurement of the drainage and slab solutions differed between years. In 2003, the analysis was restricted to the months of June and July when the plants were still growing vigorously. In 2004, the analysis continued into August when there was less vigorous growth, and plants took up less water and nutrients due to declining sunlight.

There are about 50 growers in Connecticut who use greenhouses to extend the production season of tomatoes. Whereas they can sell unblemished tomatoes at retail for up to \$3/lb, those fruit with cracked skin or other defects have to be discarded or sold at a low price. The effort to pick the crop increases with the total yield, regardless of how marketable it is. Labor for picking is the most significant single cost of production for

greenhouse tomatoes in the summer. Shading will decrease this labor cost to the extent that it decreases the amount of fruit that is picked but unmarketable. Thus, shading will reduce the labor cost of picking and culling a crop of tomatoes, in proportion to the decrease in the fraction of unmarketable fruit. From my experience, shade could reduce by 10% the cost of picking greenhouse tomatoes.

The New Crops Program: The network of farmer's markets in Connecticut's major cities and densely populated suburbs, and the numerous roadside stands that dot the Connecticut landscape, continue to provide opportunity for growers to sell directly to the consumer and receive higher retail prices for their produce. The "New Crops Program" continues to provide growers with information about profitable production of niche crops, especially those that are prized by the burgeoning immigrant population. In 2004, emphasis was placed on onions, leeks, heirloom tomatoes, cauliflower, jilo, calabaza, Japanese plums, and pawpaws.

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

To help answer this question, Dr. Abigail 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 1994-2003 and incorporated into the soil by rototilling. Yields of lettuce, peppers, and edible soybeans were compared to yields from the control plots where no leaves were added. All plots received the same amount of 10-10-10 fertilizer applied at the recommended rate for vegetable production (1300 lbs/A). In 2004, lettuce yields were virtually the same, averaging 1.3 lbs/head, for plots amended with oak leaves and the control plots. Plots amended with undecomposed maple leaves averaged 1.2 lbs/head. The greatest pepper yields were from plots amended with oak leaves (5.4 lbs/plant) compared to plots amended with maple leaves (5.2 lbs/plant) and the control plots (5.0 lbs/plant). Plots amended with maple leaves and the control plots averaged the greatest soybean yields (16 lbs/plot) compared to plots amended with oak leaves (15 lbs/plot). It appears that applications of oak or maple leaves are not deleterious to vegetable production but the experiment will be continued to determine the effect of repeated applications of oak or maple leaves.

Utilization Of Compost In Onion And Leek Production: Previous studies have shown that soils amended with compost increase onion yields as much as 40%. However, little research has been done determining the effectiveness of compost when used as a mulch. Compost mulch could eliminate the need for herbicides for weed control or reduce the need for mechanical cultivation. In leek production, soil is usually mounded to

blanch the lower portion of the shank. Using compost would blanch the leek and also improve the soil. In this experiment, conducted at Lockwood Farm and at the Valley Lab in Windsor, Dr. Maynard determined the effectiveness of compost (incorporated and surface mulch) in onion and leek production. The four treatments included: compost incorporated into the soil, compost as a surface mulch, incorporated compost plus compost mulch, and an unamended control. All plots received the same amount (1300 lbs/A) of 10-10-10 fertilizer. Yield of both crops from the various compost treatments were compared to the unamended control plots. In addition, the length of the blanched shank in the leeks was measured. Two cultivars of leeks (Jersey and Primor) and two cultivars of onion (Corona and Daytona) were grown. At Windsor, in 2004, plots amended with compost plus a compost mulch and plots amended with compost and no mulch averaged 14 oz/leek (cv. Jersey) compared to 12 oz/leek for plots mulched with compost. Leeks from the unamended control plot averaged 11 oz/leek. For cv. Primor, plots with compost incorporated and no mulch had the greatest yield (12 oz/leek) compared to plots mulched with compost and the unamended control plots (11 oz/leek). Plots amended with compost plus compost mulch averaged 10 oz/leek. The longest blanched shanks of cv. Jersey were from the mulched plots (some with incorporated compost, some without) (7.5 inches) compared to 7.4 inches from the incorporated compost plots and the unamended control plots. For cv. Primor, the longest blanched shanks were from plots mulched with compost (10.7 inches) compared to plots mulched with compost with incorporated compost (8.8 inches) and plots amended with incorporated compost only (8.5 inches). The unamended control plots averaged 8.2 inches. There were no differences in the average diameter of the leeks between the treatments.

For onions (cv. Corona), the greatest yields were from plots amended with compost and compost mulch (8.3 oz/onion) compared to 7.7 oz/onion from plots mulched with compost. Plots amended with incorporated compost averaged 5.5 oz/onion compared to 6.8 oz/onion from the unamended control plots. For cv. Daytona, the greatest yields were from the compost mulch plots (14.8 oz/onion) compared to the incorporated compost plots plus mulch (12.3 oz/onion) and the incorporated compost plus mulch plots (12.0 oz/onion). The unamended control plots averaged 10.8 oz/onion. For both cultivars, the mulch treatments had a higher percentage of the marketable Jumbo and Colossal sizes (> 3 inches in diameter) compared to the incorporated compost plots and the unamended controls. Results from Lockwood Farm followed the same trends. Thus, the mulch treatments could increase income from onion production by increasing production of higher quality, marketable onions. To determine any cumulative effects of the compost additions, this experiment will be continued annually on the designated plots for one additional year.

Heirloom Tomato Trials: Interest and sales of heirloom tomatoes have increased dramatically in the past 10 years. More and more consumers are willing to forego appearance for that real old-fashioned tomato taste. Knowledge of high yielding cultivars and cultural details would benefit growers, especially those who serve inner city consumers who purchase these vegetables at local farmers markets throughout the Northeast. But growing heirloom tomatoes can be a challenge. Heirlooms tend to have poor disease resistance and have lower yields when compared to hybrid tomatoes. They are also more susceptible to cracking due to their tender skin. In 2004, Dr. Maynard

evaluated ten cultivars of ethnic heirloom tomatoes for yield and quality at Windsor and Mt. Carmel. Average yield at Windsor was 34.8 lb/plant compared to 21.4 lb/plant at Mt. Carmel. At Windsor, yield of Mortgage Lifter was greatest (41.2 lb/plant) with Pineapple, Giant Belgian, and Old German exceeding 38 lb/plant. At Mt. Carmel, yield of Pineapple was greatest (26.5 lb/plant) with Old German, Giant Belgian, and Abraham Lincoln exceeding 22 lb/plant. Omar's Lebanese produced the largest fruit at both sites, averaging 13.8 oz at Mt. Carmel and 27.0 oz at Windsor. These trials will continue in 2005.

Cauliflower Trials: Recent developments in the fast-food industry to provide low-carbohydrate foods to diet-conscious consumers, prompted a replacement of mashed potatoes with mashed cauliflower. Research between 1986-1994 tested forty-seven cultivars of cauliflower for yield and quality. Most of the cultivars tested are no longer available from seed companies. To evaluate yield and quality of cauliflower cultivars, released since 1988, Dr. Maynard evaluated 19 cultivars for spring and fall harvest at Windsor and Mt. Carmel. In spring, average yield of 19 cultivars at Windsor was 9.1 T/A compared to 5.6 T/A at Mt. Carmel. At Windsor, spring yield of Attribute was greatest (14.1 T/A) compared with Freedom, Wentworth, and Symphony (11 T/A). At Mt. Carmel, spring yield of Freedom was greatest (9.2 T/A) with Attribute, Cumberland, and Wentworth exceeding 7.5 T/A. In fall, average yield of 10 cultivars at Windsor was 10.2 T/A compared to 7.6 T/A at Mt. Carmel. At Windsor, fall yield of Freedom was greatest (14.0 T/A) with Minuteman, Attribute, and Rovella exceeding 10.9 T/A. At Mt. Carmel, yield of Minuteman was greatest (11.3 T/A) with Freedom, Majestic, and Early Dawn exceeding 9.8 T/A. In spring, plants of all cultivars required tying of leaves to insure blanching of the rapidly expanding curd. In fall, most cultivars had tightly furled wrapper leaves that did not require tying. In fall, plants of late-maturing Absolute, Apex, Artica, Cumberland, Phoenix, and Wentworth produced less than 30% marketable heads at both sites. This suggests that an earlier planting date in mid-July for late-maturing cultivars would be required to ensure maturity rather than the August 1st planting date for the 2004 crop.

Jilo – Moisture Conservation Trials: Jilo (*Solanum gilo*) is a solanaceous plant related to eggplant. This tropical vegetable is grown principally in Nigeria. Its culture was transported to central and southern Brazil where it has become a minor crop. Its principal use is in a vegetable stew (ratatouille) and sweet and sour mixes with chicken and pork. In 1998, a Bethel grower obtained seeds from a member of the Brazilian community in the Waterbury-Danbury area (estimated population 4500). The Connecticut Department of Agriculture obtained some of the seeds and sent them to the Experiment Station for further testing. We found that jilo grows well in Connecticut's climate and can produce up to 11 lb/plant when mulched with black plastic to warm the soil. We also found that jilo flowers abort when subjected to moisture stress. In this experiment, use of plastic mulch or drip irrigation to improve the moisture content of the soil throughout the growing season to prevent fruit abortion was compared to untreated controls. Average yield of fruit from cv. Comprido Verde Claro was 10.6 lb/plant in plants grown with black plastic mulch and 9.7 lb/plant with drip irrigation compared to 8.6 lb/plant in control plots. Black plastic mulch not only significantly increased total yield/plant compared to the controls, but also increased early yields in the first 4 weeks of the harvest period.

Calabaza – Selection for Early Maturity: Calabaza squash, also known as tropical pumpkin, is mostly grown in tropical and semi tropical climates. Calabaza is highly prized by Hispanic consumers. It was identified by the Connecticut Department of Agriculture as one of the most sought-after vegetables at Connecticut's 65 farmers' markets. In 2003, one plant of La Estrella produced mature fruit in only 90 days on twelve foot long vines. Early maturing fruit are generally found on the vine within two feet of the planting site. Fruit that mature in 90 days is appealing to northern growers because the majority of fruit can mature before frost. With a traditional maturity of 120 days, some fruit that form late on the vine do not reach maturity. We saved the seeds from the fruit planted them at Mt. Carmel and Windsor in 2004. At Windsor, 38% of the plants produced early-maturing fruit (90 days), while only 4% produced early fruit at Mt. Carmel. The greater success at Windsor may be due to an adjacent cover crop of buckwheat, a known bee attractant, which helped to pollinate early forming female flowers. At Mt. Carmel, the adjacent cover crop of soybeans did not attract bees.

Specialty Fruit Variety Trials: As wholesale marketing of major tree fruits becomes unprofitable, many Connecticut growers are turning to retail sales of their fruit. For a retail operation to be successful, there must be a diversity of products. Thus, many growers are interested in adding minor specialty fruits to their operations. In response to this grower interest, Dr. Maynard in 2001 expanded the New Crops Program at the Station to include fruits. This trial, also repeated at the Valley Laboratory in Windsor, includes 12 cultivar/rootstock combinations of Japanese plum and 4 cultivars of pawpaws. In their first year of production, the Japanese plum Shiro had the greatest yields (3.2 lb/tree) with Fortune averaging 2.9 lb/tree. In addition, in Spring 2003, 210 beach plum seedlings were planted at Lockwood Farm and 96 at the Valley Lab. These seedlings were raised at Cornell University from seeds collected from 35 sites from Maine to Delaware. The trees will be evaluated annually and select elite individuals will be propagated as possible cultivars in the future. In their second growing season, seedlings from Broadkill Beech, Delaware averaged the greatest growth (24.8 inches) at Lockwood Farm while seedlings from Cape May, New Jersey averaged 22.4 inches. At Windsor, seedlings of a named cultivar (Ocean Side) averaged the greatest growth (29.7 inches).

Wine Grapes: Studies were initiated by Dr. William Nail in 2004 and 2005 to help determine cultural practices for growing high quality wine grapes profitably in Connecticut. The wine grape industry in Connecticut has rapidly expanded since the first Farm Winery in the state opened in 1979. There are currently 17 wineries with a Farm or Commercial Winery license, with 2 or 3 more scheduled to open in 2005. The existence of these wineries adds substantially to local economies, as local restaurants, hotels, bed and breakfasts, and others close to wineries receive increased business. The Connecticut Wine Trail brochure, published by the Connecticut Farm Wine Council, is the most popular brochure in Department of Tourism travel offices.

Wine grape growers and Farm Wineries face several challenges. Farm Wineries are required to include a minimum of 25% state-grown fruit in their total output, but are having trouble meeting this standard. Consecutive very cold winters in 2003 and 2004

resulted in significant plant loss on less cold hardy varieties, and have driven up prices for purchasing out of state fruit. Little information is available to growers regarding cultural information for growing more cold hardy and disease resistant hybrid varieties in Connecticut. Disease management is critical during the growing season due to Connecticut's warm, humid summers. The industry requires increased production via better management practices in existing vineyards and improved variety selection in newly planted vineyards.

Cultural practices in Vitis vinifera: Dr. Nail established a planting of 300 Pinot Gris vines at Lockwood Farm in summer 2004. Two different rootstocks were used: 3309C, the most commonly planted rootstock and 101-14, which may tend to ripen fruit earlier and have better tolerance to severe winter freezes. The first (small) crop of grapes from this plot is anticipated in 2006, and various cultural experiments will be initiated to determine better strategies for optimum yield and fruit quality.

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

A planting of Seyval Blanc, Chambourcin, Villard Blanc, and Villard Noir at Lockwood Farm was rejuvenated in 2004, and vines were either cordon or cane pruned in 2005 to compare the relative efficiencies of these pruning methods. Yield and fruit quality parameters will be determined beginning in the 2005 harvest season.

Cultivar and clonal evaluation: Previously established experimental plots at two private grower's vineyards and the Valley Laboratory were evaluated beginning in 2004. One vineyard had been established to compare Cabernet Franc, Merlot, and Cabernet Sauvignon. Cabernet Sauvignon has displayed high vine mortality and poor fruit quality due to lack of ripeness. Cabernet Franc and Merlot both produced good quality fruit, although yields in Merlot were slightly lower. There may be differences in performance of different clones and/or rootstocks for these two varieties, but data will have to be collected through the 2006 growing season before any conclusions can be drawn. Another vineyard compared several *V. vinifera* and hybrid varieties. Hybrids yield more than most *vinifera* varieties. Data from this vineyard will also be collected through the 2006 growing season. In 2004, Riesling fruit was considerably less mature at harvest than any other white variety, indicating the need to harvest it later than other varieties or, if all varieties are treated the same to consider not planting it.

A new study will be established at Lockwood Farm to compare cultivars of *V. vinifera* and hybrids. This study will be coordinated with researchers from other states throughout the country, which should help answer the questions “What are the criteria for selecting a particular variety?” and “What cultivar(s) is most suited to my situation?”

PLANT PATHOLOGY AND ECOLOGY

Ramorum Blight/Phytophthora ramorum:

In collaboration with Dr. Sharon Douglas, Dr. Marra has been performing the USDA-mandated assays for detection of *P. ramorum* on nursery material shipped from California, Oregon, or Washington. The process begins with a serological test called ELISA (enzyme-linked immunosorbent assay), which detects all *Phytophthora* species. If a sample tests positive by ELISA, DNA is extracted from it and then analyzed for *P. ramorum*-specific nucleotide sequences using a nested PCR assay. The nested PCR assay, and the real-time PCR assay that will supplant it, are used to determine whether or not the *Phytophthora* species detected in the ELISA is *P. ramorum*. Although the nested and real-time PCR assays are currently done at a USDA facility in Beltsville, Maryland, we are in the process of having our labs certified by USDA for *P. ramorum* diagnostics.

Dr. Marra has also routinely attempted to culture *P. ramorum* from ELISA-positive material, and as a result of these efforts, he succeeded in isolating *P. ramorum* from three rhododendrons that had been sampled from Connecticut plant centers in November 2004, constituting the first isolation of *P. ramorum* in New England. Perhaps more importantly, *P. ramorum* was successfully re-isolated from the same infected plants in January 2005, after the plants had been outside and exposed to night-time temperatures as low as -15°C. This constituted the first evidence suggesting that *P. ramorum* may be able to overwinter in the northeastern United States.

Drs. Douglas and Marra have been successful in obtaining USDA-APHIS-PPQ permits for limited handling of *P. ramorum* cultures. Dr. Marra is awaiting results from an application for a permit to use *P. ramorum* for research purposes, including performing leaf inoculations.

Dr. Marra has worked with Dr. Douglas in readying their labs, in addition to a new lab (see below), for inspection and certification by USDA-APHIS-PPQ as a regional laboratory for *P. ramorum* diagnostics. This has involved the development of a Standard Operating Procedure (SOP), conforming to guidelines outlined by PPQ in order to guarantee the veracity of results and minimize the potential for accidental escape of the pathogen. Central to this effort has been the creation of a new laboratory, designed by Dr. Marra and adjacent to his current laboratory, that will be used for nested PCR, real-time PCR, and electrophoresis. This “Molecular Plant Diagnostics Laboratory” will incorporate state-of-the-art equipment, and along with Dr. Marra’s and Dr. Douglas’ current labs, will be equipped with air-handling equipment that will minimize the chances for pathogen escape.

In the past year, Dr. Marra has processed 185 nursery samples for the 2004 National Survey and 56 nursery samples for the Trace Forward survey. While none of the ELISA positives from the National Survey proved to be due to *P. ramorum*, five of

the ELISA positives from the Trace Forward survey were confirmed by USDA to be *P. ramorum*, based on the nested PCR assay. Dr. Marra cultured *P. ramorum* from three of these nested PCR positives. Nursery inspectors obtained perimeter soil samples from the infected nurseries, but none could be shown to harbor *P. ramorum*.

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

Chestnut research:



Pamela Sletten pollinating chestnut trees.

Nutrients in chestnuts: Dr. Anagnostakis has found that nut weight of chestnuts is determined by the genotype of the female (nut bearing) parent, and weight varies little no matter what the pollen source. However, when she analyzed nuts from controlled crosses of chestnut trees for protein, total fat, carbohydrate, and fatty acid content, she found that none of the levels of any of these nutrients were dependent on the female parent. Amounts were different in reciprocal crosses, indicating that the pollen parent strongly influences these components. Other studies have reported that fat and protein levels are important in food acceptance, and levels of individual fatty acids affect food storage life and flavor. American chestnuts had the most unsaturated fats and the most oleic acid

(reported to be a flavor component), but also had high levels of linoleic acid which reduces shelf life. The hybrid combination with the most oleic acid had little linoleic acid, which would be desirable for marketing.

Impact: The Connecticut (and the national) chestnut industry has been steadily growing, providing additional income for farmers with small and large orchards. Finding ways to increase nut value is important for maximizing income. These results will provide growers with information to help them make decisions about which cultivars to plant or graft in their orchards and which to plant as pollenizers.

Butternut pathogen studies:

Sirococcus clavigignenti-juglandacearum is the fungus that kills butternut trees and is now widespread within the U.S. range of the tree. Dr. Anagnostakis has grown eight strains of this pathogen in the laboratory and tested them for the presence of viruses that might affect their virulence. The strains (from MN, WI, AR, TN, and NC) were quite different in their temperature requirements for growth, and seven of them had viruses. These will now be tested for virulence in butternut seedlings in the greenhouse. In addition, 55 seedling butternuts from Tennessee were planted in the Mattatuck State Forest under three large (diseased) native butternut trees. These will be monitored for presence of the disease.

Impact: Although few butternut trees have survived in Connecticut, a biological control such as that used against chestnut blight disease could allow this important hardwood species to be replanted in our state.

Aerobiology:

Corn pollen dispersal: The recent introduction of genetically modified (GM) corn into agricultural production has sparked renewed interest in quantifying the aerial dispersal of corn pollen. Off-site movement of pollen makes possible crosses of GM varieties with corn in non-GM organic and conventional production fields. Maize is a wind-pollinated, outcrossing species for which the transfer of genetic information via pollen depends on several processes including: pollen production, atmospheric transport, deposition on silks, and successful fertilization. Of central importance is the ability of pollen grains to reach the silks and fertilize the ovules, which will become the kernels of corn. Drs. Aylor and Boehm are developing a mathematical model for maize gene flow that incorporates all of the major biological and physical processes.

Data were collected during 2003 and 2004 to help validate the transport part of the model. Maize pollen was sampled at altitudes up to 80 m above ground level (AGL) over cornfields using airborne, radio-controlled, remote-piloted vehicles (RPVs) outfitted with remotely operated pollen samplers and at 3, 5, and 9 m AGL near the center of the fields using tower-based Rotorod samplers. Usually, two RPVs were flown simultaneously at heights of about 30 m and 60 m AGL, while a third RPV was flown upwind of the source to sample for incoming pollen. Maximum measured maize pollen concentrations at 30 m and 60 m AGL were 24.6 and 2.5 grains m⁻³, respectively. The

LS model was used to calculate pollen movement in the corn canopy and adjacent atmospheric surface layer. Wind statistics used in the LS model were based on Monin-Obukhov similarity theory. To compare predicted and observed concentrations across all sampling days, values of C were normalized by u_* and Q to form the dimensionless grouping Cu_*/Q . The agreement between modeled and measured values of Cu_*/Q was highly significant ($r = 0.41$, $P < 10^{-5}$, $n = 136$). The high degree of variation indicated by the correlation coefficient largely reflects the natural variability in the pollen release and atmospheric transport processes. Overall, the mean modeled value of Cu_*/Q was only 3.4% greater than the measured mean, and there was no significant difference between them. These results indicate that the LS model can accurately predict maize pollen transport on the on-farm scale. In addition, the model can serve as an important tool for deriving realistic boundary conditions for modeling longer distance transport using models of the convective boundary layer.

The LS model described in the preceding paragraph is limited to the atmospheric surface layer, which involves altitudes of about 100 m AGL. The entire atmospheric boundary layer is frequently unstable during periods of pollen release, when pollen transport above the crop canopy will be dominated by convective updrafts and downdrafts in which altitudes of 1,000 to 2,000 m AGL are important. Drs. Boehm and Aylor are developing a Lagrangian stochastic (LS) model of transport in the convective boundary layer (CBL) to be combined with our current surface-layer model to study pollen transport over a broad range of distance scales. In the CBL model, the trajectories of a large number of individual particles are simulated based on the turbulence properties of the CBL, as represented by a vertically varying probability density function (PDF) of vertical velocity. We have modified the transport equations in an existing CBL LS model for weightless tracer particles to allow simulation of particles with non-negligible fall velocity, such as corn pollen. The modification involves: 1) subtracting the fall velocity in the calculation of the vertical particle displacement, and 2) making a new adjustment to the deterministic acceleration term in the vertical velocity increment equation to account for the effect of the fall velocity induced change in particle altitude on the calculation that maintains a particle's relative position along the vertically varying vertical velocity PDF. These modifications significantly affect the model results compared with previous LS models of the CBL that ignore these processes. In particular, near a source at the bottom of the CBL the vertically integrated particle concentration decreases rapidly as a significant number of particles are deposited before they have a chance to enter an updraft. In addition, the importance of the local minimum in near-surface concentration found at downwind distances on the order of several km is increased. Our current data cover only very short downwind distances and low altitudes, and measurements at greater distances and higher altitudes are required. This coming summer, we will be collecting data from near-surface sensors and aircraft-based instruments at greater downwind distances and higher altitudes than we have previously employed. Due to the intrinsic variability of turbulent transport in the atmosphere and the relatively small pollen concentrations at higher altitudes, we will require long averaging times involving many replications to validate our CBL LS model.

Effective pollen transport (gene flow) depends on viable pollen reaching and fertilizing the ovules on target plants. Our earlier studies have shown that maize pollen can survive in the atmosphere for 2 to 3 hr. Therefore, pollen survival does not appear to

be a major limitation to gene flow for distances up to several km, but may enter significantly into future calculations based on convective boundary layer (CBL) models. Pollen deposition is the primary process limiting transport in the surface layer, which underscores the importance of coupling an accurate surface layer model, such as the LS model presented herein, with a CBL model to examine pollen transport over longer distances important for off-farm (trans-boundary) gene flow. The LS model being developed will give a method for doing this and, thus, should be an important part of an overall model of gene flow in maize.

Impact: Maize (*Zea mays* L.) is one of the world's most important crops, with 80 million acres, annually worth about \$21 billion dollars, grown in the U. S. alone. Several useful traits have been incorporated into the genome of corn using genetic engineering, and today more than 40% of the U.S. corn acreage is planted to GM corn (mostly BT corn and Roundup-Ready corn). The widespread adoption of these engineered crops has sparked interest in quantifying the potential for gene flow in the environment. Maize is a wind-pollinated, outcrossing species for which genetic information is transferred between maize plants via pollen dispersal in the atmosphere. The mathematical model of aerial dispersal of corn pollen and maize gene flow being developed by us will allow for objective evaluations of the risks of off-site pollen movement, and will provide a framework for improving strategies for regulating off-site gene flow, estimating the potential off-target effects of GM pollen, and determining the impact of off-site movement of GM pollen on the potential marketability of non-GM corn. Applications of the model include establishment of isolation guidelines for field testing new genetic traits incorporated into open-pollinated plants and evaluation of regional cropping plans where conflicts might arise between conventional and organic farm communities. Having the means for a better resolution of gene flow in maize will have an impact on expanding U. S. exports to foreign markets and on the improved purity of hybrid seed produced by U. S. companies.

Asparagus disease management:

Biocontrol with earthworms: The failure to re-establish asparagus in abandoned fields is a worldwide phenomenon called the "replant problem." Three factors have been identified as causal to the replant problem: 1) high soil densities of the *Fusarium* pathogens that cause Fusarium crown and root rot (*Fusarium oxysporum* f. sp. *asparagi* and *F. proliferatum*), 2) decaying residues from the old crowns and roots that are toxic to young plants and cause stunting and poor growth, and 3) the toxic effect that these residues have on beneficial microbes such as vesicular-arbuscular mycorrhizae (VAM) and fluorescent pseudomonads. Through their feeding, earthworms have the ability to quickly break down crop residues and concentrate beneficial microbes in their castings. Dr. Elmer established greenhouse experiments to determine whether or not earthworms cohabitating in the soil with asparagus transplants could affect disease in replanted soil. In the first greenhouse study, cohabitating earthworms with asparagus plants in infested soil resulted in a 42% increase in fresh weight, a 70% increase in root weight, a 50% reduction in root lesions, and a ten-fold increase in fluorescent pseudomonads in the

rhizosphere. Field plots have been planted to examine the role of introduced earthworms under field conditions.

Role of earthworms in increasing biocontrol agents: Earthworms concentrate naturally occurring beneficial microbes in their castings, and it has also been suggested that they can distribute and increase the number of introduced biocontrol agents (BCA). Plantshield®, a commercial preparation of *Trichoderma harzianum*, and a nonpathogenic *F. oxysporum* (CWB 318) can reduce *Fusarium* disease. Our objective was to determine if the earthworms could more effectively distribute the BCA. Earthworms increased the fresh weight of the tomato plants by 108% and reduced vascular discoloration in the stem by 55%. No further benefit was obtained with the BCA. The study will be repeated in 2005-2006.

Impact: *Fusarium* diseases are extremely difficult to control when host resistance is absent. The fungus persists in soil for long periods and can be re-introduced at any time on seeds and infested transplants. At present, only repeated applications of expensive fungicides and fumigants are effective in suppressing the disease. Given the lack of practical management options, efforts to enhance soil health, and thus disease suppressiveness, remain the most viable solution for long-term management of *Fusarium* diseases. The long-term use of specific winter cover crops grown in infested soils can affect disease severity. Similarly, the introduction of earthworms and earthworm compost (vermicomposts) holds much promise for promoting plant health in infested soils. The current research is designed to demonstrate the usefulness of cover crops with earthworms in infested fields to reduce damage from *Fusarium* disease. In addition, efforts to decipher the mechanism(s) for disease suppression will enhance our understanding of the possible action of biocontrol and/or induced resistance. Recent technological advances in rearing earthworms have increased the likelihood of implementing this practice on a commercial basis.

Fusarium ecology:

Basil herb studies: *Fusarium oxysporum* is a very common strain in soil. One strain can be pathogenic on one host, but not on another, while other strains may not have a known susceptible host and are labeled as nonpathogenic. Very little is known about the ecology of *Fusarium oxysporum* in soil because the species comprises so many morphologically identical but otherwise diverse strains, it is difficult to follow any one specific population. To follow specific populations, Dr. Elmer introduced *F. oxysporum* f. sp. *basilici* in soil in June 2001 and planted basil seedlings. All plants became symptomatic. Plots were seeded with canola, crimson clover, rye/vetch, or left bare for the winter cover crop and then with nonsusceptible herbs during the summer. In 2005, all plots will be planted to basil to determine if densities have dropped sufficiently to allow a healthy crop of basil to be grown.

Corn stubble survey: *Fusarium* head blight of wheat is caused by *Fusarium graminearum*, a fungus that produces carcinogenic mycotoxins in grain. The fungus can infect other hosts, most notably corn. Since wheat is not grown in Connecticut, Dr.

Elmer questioned whether *F. graminearum* would persist at levels reported for regions where wheat and corn are cropped in close proximity. Six corn farms were selected and sampled using a fractal sampling scheme. Between 45 and 50 pieces of corn stalks were removed in March 2004 from each farm. Five pieces of tissue were surface disinfested and placed on selective agar. Colonies were subcultured and identified. Of the 1465 pieces assayed, 1289 (88%) were colonized by a *Fusarium* sp. Of 1289 colonies, single conidia were subcultured from 770 colonies (60%) and identified to species. The total distribution was 33.5% of the colonies were *F. graminearum*, 21.0% were *F. subglutinans*, 14.0% were *F. avenaceum*, 9.9% were *F. sporotrichioides*, 9.6% were *F. equiseti*, 9.61% were *F. proliferatum*, 4.81% were *F. acuminatum*, 2.73% were *F. sambucinum*, 1.82% were *F. crookwellenses*, and 0.52% were *F. oxysporum*. Dr. Ferrandino will analyze the spatial arrangement of these species in and among the six fields. The study was repeated in 2005, but one field was deleted and another one was added. Over 850 colonies were subcultured and identified to species. Although the study is still in progress, the trends reflect the 2004 distribution. Dr. Ferrandino will analyze the spatial arrangement of these species in and among the six fields. Sixty isolates of *F. graminearum* have been sent to Dr. Kerry O'Donnell (USDA scientist in Peoria, IL) for molecular analysis to determine whether the Connecticut isolates represent a group capable of producing more toxic compounds than the isolates from the Midwest and Northwest regions.



Wade Elmer sampling corn stubble

Impact: Toxicogenic *Fusarium* species can affect human and animal health by contaminating grains and producing toxins. Outbreaks resulting in levels harmful to humans are very rare, but the majority of corn acreage grown in Connecticut is for animal feed and knowledge of whether or not toxicogenic *Fusarium* species occur regularly on corn stubble was not known. A two-year survey of Connecticut farms sampled in early spring revealed that corn stubble is heavily colonized by *Fusarium* species and that 30-40% of the species are toxicogenic, however, analysis of the over-wintered stubble revealed no detectable toxins. Surveys and analysis of the grain during the growing season will complement these data to determine the potential threat of toxicogenic *Fusarium* species in Connecticut on grain and silage corn.

Ornamental disease research:

Fusarium wilt of China asters: Seeds of 44 cultivars of China asters were evaluated twice in the greenhouse for resistance to *Fusarium oxysporum* f. sp. *callistephi*.

Dr. Elmer found that most plants were susceptible to some degree, but eight cultivars were not significantly different from the control plants grown in noninfested soil. These eight cultivars are being evaluated along with susceptible cultivars in field plots at Lockwood Farm and the Valley Lab in Windsor for their resistance to *Fusarium* wilt. Plots were either inoculated with the pathogen or left untreated to serve as non-inoculated controls. Disease severity rating and flower production will be determined in August 2005.

Fusarium corm rot of gladiolus: *Fusarium* corm rot of gladiolus is caused by *Fusarium oxysporum* and is the most destructive root disease of gladiolus. To determine if disease could be suppressed by combining a product that activates defense mechanisms (acibenzolar-S-methyl (Actigard 50 WP)) with chemical fungicides as a corm dip, Dr. Elmer conducted an experiment at Lockwood Farm with ten treatments. Symptoms of stunting and yellowing became evident in mid-July. There were significant interactions ($P < 0.02$) among the fungicides and Actigard 50WP treatments for the variables area-under-the-disease-progress-curve (AUDPC) and percent vascular discoloration (%VD). Plots treated with Heritage 50WP emerged poorly and never recovered, but if Heritage 50WP-treated corms were simultaneously treated with Actigard 50WP, then all deleterious effects of Heritage 50WP on the AUDPC and %VD did not develop. Conversely, the inclusion of Actigard 50WP with Cleary's 3336 50WP exhibited a trend toward more disease and %VD than with Cleary's 3336 50WP alone. Averaging across all treatments, both fungicides and Actigard 50WP decreased the AUDPC and the %VD while only Actigard 50WP increased the number of flower spikes. The number of flowering spikes was inversely correlated with the AUDPC ($R = -0.70$, $P < 0.001$) and with %VD ($R = -0.55$, $P < 0.001$). While no single treatment was significantly greater than the control, the AUDPC value was lowest, %VD was among the lowest, and quantity of flower spikes was greatest when Actigard 50WP was combined with Terraguard 50WP. This treatment combination might provide significant protection from *Fusarium* corm rot in soils with less disease pressure than in the current study. In 2005, the role of Actigard 50WP with biological and chemical fungicides is being reexamined at Lockwood Farm.

Fusarium wilt of cyclamen: Dr. Elmer evaluated acibenzolar-S-methyl (Actigard 50 WP[®], Syngenta Inc.) in the greenhouse for its ability to suppress *Fusarium* wilt of cyclamen. Increasing concentrations of acibenzolar-S-methyl were inversely correlated with AUDPC values and dry weights were proportionally increased. Disease symptoms were never eliminated, however. When inoculum concentrations of *Fusarium oxysporum* f. sp. *cyclaminis* were increased, plants treated with 50 µg/ml had significantly less disease and had dry weights that did not differ from untreated controls. The major benefit of acibenzolar-S-methyl was that it delayed the onset of wilt symptoms for up to 3 weeks. Foliar sprays had no visible phytotoxicity up to 50 µg/ml, but fresh weights declined proportionately. Acibenzolar-S-methyl may be useful as a component in an integrated management program that includes other strategies for disease control.

Impact: Commercial floriculture has increased in Connecticut over the past 20 years, but root diseases caused by species of *Fusarium* have caused major losses for many

growers. Crops such as China asters, cyclamens, and gladiolus are so damaged by *Fusarium* pathogens that many growers have discontinued their production. Several growers will “finish off” near-market plants produced out of state for considerably less profit. Regaining the ability to produce quality cut and potted flowers is essential to maintaining the economic health of many growers. Identifying sources of resistance in the commercially acceptable germplasm has revealed several promising cultivars of China asters. Furthermore, our efforts to determine specific combinations of biological control agents with fungicides and with compounds that induce disease resistance have improved management for production of cyclamen and gladiolus.

Spatial patterns of disease: Dr. Ferrandino has examined a number of procedures for sampling disease. These include samples on a regular grid, randomly selected samples, and samples specified by a nested fractal design. The performance of these various sampling schemes was examined using simulated binary epidemics with varying degrees of spatial aggregation over different length scales. A modification of spatial correlation analysis specifically geared to binary epidemics was shown to be equivalent to a Chi-square test which compared the number of infected plant-pairs to that expected from a spatially random epidemic. This analysis was used to analyze the data obtained using the various sampling patterns. For the same number of sampling points, the fractal design is most efficient in the detection of contagion and provides spatial information over a larger range of distance scales than the other sampling schemes tested. However, the regular grid sampling scheme consistently yielded an estimate of average disease incidence which had the smallest variance. Sampling patterns consisting of randomly selected points were intermediate in behavior between the two extremes.

Dr. Ferrandino also demonstrated that the current quadrat-based methods of evaluating the spatial aggregation of disease are strongly dependent on the relative size of the quadrats used and the inherent length scale of disease spread. This length scale cannot be determined once the disease data are bulked. This brings into question the practice of fitting quadratted disease data to a beta-binomial distribution since the resultant fitted parameters are highly dependent on relative length scales.

Impact: Sampling fields for the presence of pests or disease is becoming a critical aspect of the monitoring of the spread of invasive organisms. Currently, the spread of two introduced plant diseases, soybean rust and Ramorum blight, threaten potentially great economic losses. Monetary and time constraints limit the number of plant samples that can be obtained. Thus, a detailed knowledge of the nature of the statistical behavior of data obtained by different sampling strategies is necessary to make an informed decision as to where to place sample points and under what circumstances such data should be pooled.

Milk as a biocontrol for powdery mildew of cucurbits: Dr. Ferrandino has shown that weekly foliar applications of a 50% by volume aqueous solution of either whole, skim milk, or prepared powdered milk delayed the onset and severity of powdery mildew on pumpkins and muskmelon. Milk sprays were twice as effective as 1% baking soda sprays but lactose sprays had no effect on disease. In addition, in-field and postharvest

fruit rot of pumpkin was reduced from 20% of the harvested fruit to less than 8% by the use of either milk spray.

Impact: The use of alternate environmentally-friendly powdery mildew controls can reduce the number of chemical sprays needed to maintain yield and quality under moderate disease pressure. This is especially important for organic growers and home vegetable gardeners for which the chemical control of disease may not be an alternative.

Black birch canker: Black birch (*Betula lenta*), highly prized for use as a veneer, is becoming an increasingly important component of Connecticut forests (~27% of the stems). However, deformations along the trunk caused by *Nectria* cankers (*Nectria galligena*) can effectively render the lumber valueless for anything but firewood. Dr. Ferrandino is working in concert with Drs. Ward (Forestry and Horticulture) and Anagnostakis (Plant Pathology and Ecology) to understand the epidemiology of this disease and to estimate the present impact of this disease on Connecticut forests. In late April 2001, seven infected trees out of sixty in a 0.4-hA plot on Water Company land near Lake Saltonstall were cut down and forty cankered logs were left on the ground. In addition, 20 of the infected trees were girdled. Monthly observations of perithecia development have been made for over 200 cankers from June 2001 to May 2005. No fruiting bodies were observed in hot summer months (mid June – mid September). For the first two years, cankers on cut and girdled trees continued to produce 2-3 times the perithecia as cankers on control trees. After 28 months, there was a sharp reduction in the production of fruiting bodies on cut stems as logs became colonized by various rotting organisms. Sporulation within cankers on girdled trees continued for 36 mos. but by 47 mos. there was a marked decline in perithecia production as girdled trees died and became infected with other wood-rotting fungi.

Impact: Black birch is an ever-increasing component of Connecticut forests, comprising 25% of the total wood volume and representing over 50% of the trees less than 12" in diameter. *Nectria* canker defaces birch logs and reduces the value of the birch timber to that of firewood. It is common practice among foresters to girdle or cut-down infected birch trees. The results of our study may have a major impact on these control strategies since girdling has been shown to be counterproductive due to the resultant increase in the amount of disease inoculum produced.

Neonectria ditissima (previously N. galligena): The species delimitation, natural history, and population structure of the ascomycete fungus causing target canker on birch (*Neonectria* canker; also previously known as *Nectria* canker) are poorly understood. Birch, especially black birch (*Betula lenta*), is valued for its use in producing veneers, although cankers caused by *N. ditissima* can render the tree and its wood virtually useless in this regard. Black birch has become the dominant hardwood in eastern forests, including those in Connecticut, and concurrent with the tree's increasing frequency is the increasing frequency of *Neonectria* canker.

Dr. Marra's research on *Neonectria* canker focuses on the ecology and genetics of this fungal pathogen, with the goal of gaining a fuller understanding of the evolution and population biology of the organism and its interactions with its hosts, and using this

knowledge to develop effective biocontrol strategies. The groundwork for this research involves developing a system of genetic markers that will permit fine-scale analysis of mating patterns and population structure. It also requires the ability to routinely extract high-quality DNA from cultures, a goal which Dr. Marra achieved this past year.

Developing informative genetic markers requires a set of isolates from as wide a distribution as possible. Therefore, in addition to sampling cankers from a variety of locations within the state, Dr. Marra is also obtaining from colleagues cultures from Canada, Europe, New Zealand, and other parts of the U.S. In October and November of 2004, Dr. Marra sampled *Neonectria* cankers from trees in the following areas in Connecticut: Housatonic State Forest, Meshomasic State Forest, Mohawk State Forest, Nipmuck State Forest, Pachaug State Forest, Pootatuck State Forest, Rocky Neck State Park, Saltonstall Lake (Regional Water Authority), Seth Low Pierrepont State Park, Tunxis State Forest, and West Rock Ridge State Park. A total of 103 canker samples were taken, the majority of them from *B. lenta*, with a small number from *B. alleghaniensis* (yellow birch), and one sample from sassafras (*Sassafras albidum*). Under the assumption that these isolates represent maximum genetic diversity, they will be used to screen candidate genetic markers for their usefulness in distinguishing heteroallelism from homoallelism.

A thorough understanding of *Neonectria*'s population biology also requires an understanding of its mating system. To that end, Dr. Marra has made two kinds of isolations from the canker samples mentioned in the preceding paragraph. Cultures obtained from infected bark and wood are being grown to pure culture and analyzed microscopically for key morphological characters (hyphae, microconidia, macroconidia). These bark samples constitute the "maternal" isolates, i.e., parents to the ascospore progeny contained in the fruiting bodies found in nearly all canker samples. The ascospores are used for identification purposes (the red fruiting bodies and their contents distinguish the genus, though not the species), but their DNA will also be analyzed using the aforementioned markers, in order to determine (1) if they are the result of outcrossing or self-fertilization, and (2) if outcrossed, the extent to which they are inbred or outbred. Understanding this aspect of the mating system will also shed light on the fungus' dispersal patterns, and will be critical to development of a biocontrol program.

Dr. Marra is coordinating his work on *Neonectria* with fungal systematists at USDA in Beltsville, who are revisiting the entire Order Hypocreales, to which the genus *Neonectria* belongs. During 2004, Dr. Marra sent to colleagues in Beltsville 8 isolates, whose sequences at three genes--EF1-alpha, RPB2, and beta-tubulin--were compared with those of other *Neonectria* species from a variety of hosts and from numerous continents. The systematists now feel strongly that the species obtained by Dr. Marra from birch trees in Connecticut, assumed to be *Neonectria galligena*, is actually *N. ditissima*, the type host of which is European beech (*Fagus sylvestris*), from Germany. Interestingly, no other isolates of *N. ditissima* that have been sampled in North America have come from *Betula* spp., coming instead from tulip-tree (*Liriodendron tulipifera*), *Acer* sp., and *Fagus* sp.

Dr. Marra has also been experimenting with various culturing methods (including different media) in order to perform laboratory matings and study the vegetative incompatibility system. A laboratory-based mating assay will be an important tool in evaluating markers and vegetative incompatibility groups.

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

Noteworthy plant health problems: Diseases of conifers were of particular concern this season. In spring, spruce needle rust, caused by the fungus *Chrysomyxa weirii*, was unusually widespread and severe throughout the state. This disease is also commonly known as repeating spruce needle rust, Weir's rust, and autoecious spruce needle rust. Although in past years this disease had been predominately a Christmas tree plantation problem, this season it was diagnosed with great frequency in many settings including Christmas tree plantations, production nurseries, and landscape plantings. Hosts of the pathogen include white, black, and Colorado spruce, but the latter is the most susceptible. This rust was first described in Connecticut in 1996 but was probably present in the state for several years prior to its initial detection. Although at least ten other needle rust fungi (*Chrysomyxa* spp.) have been reported on spruce in the United States, until 1996, only the needle rusts caused by *C. ledi* and *C. ledicola* had been of concern for Christmas tree growers in Connecticut. Unfortunately, the rust caused by *C. weirii* represents a particular challenge for growers, landscapers, and arborists since unlike the other needle rusts, it is autoecious and does not require any additional hosts in order to complete its life cycle. *C. weirii* has also been reported in Pennsylvania, Vermont, New York, and New Hampshire and appears to be on the increase throughout the Northeast.

Infected trees are rarely killed but the primary damage results in extensive needle discoloration and drop, which disfigures landscape trees and reduces the marketability of infected trees in production nurseries and Christmas tree plantations. Symptoms first appear as yellow spots or flecks on needles in late winter and early spring. These spots eventually develop into pustules or blisters (telia) and burst open to reveal masses of yellow-orange spores (teliospores). The teliospores then produce another type of spore (basidiospores) which is readily blown by wind and splashed by rain onto needles of the same tree or onto those of adjacent trees. Infection occurs when needles first emerge and are tender and immature. The following spring, yellow spots and blisters develop on the infected needles and the disease cycle starts again. Blisters of *C. weirii* can appear on both first- and second-year needles and heavily infected trees can appear distinctively yellow-orange from a distance. Autoecious spruce needle rust can be distinguished from the heteroecious rusts by the timing of symptoms. Symptoms of the former are evident in late winter and early spring whereas the latter develop in mid to late summer. However, accurate diagnosis still requires microscopic examination since symptoms may easily be confused with those caused by other needle rusts. As with most diseases that are not fatal but result in needle drop, repeated defoliation may retard growth and reduce marketability.

Another conifer disease of note this season was *Uredinopsis* needle rust. Also known as fir-fern rust, this disease is caused by the fungus *Uredinopsis pteridis*. The primary coniferous hosts are true firs, particularly grand and white fir. The alternate host is bracken fern. Although this needle rust is an occasional problem in Connecticut, several outbreaks were recently diagnosed on Concolor fir in plantations and isolated landscape trees throughout the state. This heteroecious rust occurs when true firs grow in close proximity to ferns, the alternate hosts. Symptoms on firs consist of chlorotic to yellow blotches on the upper surfaces of infected needles. These can appear in spring on one-month-old to several-year-old needles. Diagnostic symptoms develop on the undersurface of the infected needles and appear as white, tubular projections through the stomates. White-colored spores are produced in these structures and are dispersed to the alternate fern hosts, particularly bracken ferns. Infected needles dry out and drop prematurely, often in quantities that render the trees unmarketable.

Symptoms on bracken ferns, the alternate host, appear as elongated chlorotic spots. These are most apparent on the upper surface of the frond and are often located between the veins. The undersurfaces of the fronds often appear white due to abundant sporulation of the rust fungus. Unlike most rust fungi whose spores are rusty brown, spores of fir-fern rust are white. The fungus overwinters in dead bracken fern fronds. In spring, spores are produced in the fern debris and are carried by wind and rain to infect newly developing needles of true firs in the vicinity. About one month after infection, inconspicuous fruiting bodies develop on infected needles but symptoms usually don't appear until the following year. During late winter and early spring, white, tubular structures are produced on the undersides of infected needles. White spores are released and carried by wind and rain to young, unrolling fronds of bracken ferns and the cycle begins once again. Although spore production is most prevalent in spring, it can continue into the summer and fall. Infected needles can produce spores for 3-4 years or until they dry up and die.

Additional conifer diseases diagnosed this season were *Rhabdocline* needlecast of Douglas-fir and *Rhizosphaera* needlecast of spruce. Significant outbreaks of *Rhabdocline* needlecast, caused by *Rhabdocline* spp., were detected in plantations, production nurseries, and landscape plantings throughout the state. *Rhizosphaera* needlecast, caused by *Rhizosphaera kalkhoffii*, is a disease of blue spruce and occasionally white spruce. This disease is also considered to be a plantation problem, but was prevalent in both plantations and landscapes, especially on stressed trees. Both diseases caused substantial drop of one- and sometimes two-year-old needles and infected trees showed considerable thinning.

Last year we reported an unusual problem with Eastern red cedar, *Juniperus virginiana*. Dramatic and conspicuous damage was observed on trees in all age and size classes, care regimes, and locations, including natural stands and managed landscapes. Severely affected trees appeared distinctly off-color from a distance. Upon close inspection, a range of symptoms was observed, which included needle browning and drop, primarily of older, inner needles, tip and twig dieback, and dead branches. In extreme cases, entire trees were brown. These symptoms were not distinctive or diagnostic. As the 2004 season progressed, some trees appeared to recover, as evidenced by new, healthy growth. Unfortunately, other trees continued to decline and eventually died. In spring 2005, we responded to additional inquiries about continued problems

with red cedar. In some cases, newly affected trees were reported and in others, trees that had appeared to be recovering from the problem last year were once again developing symptoms. To date, no pathogens, insects, or mites have been directly associated with these symptoms and our efforts to further characterize and identify the cause(s) are ongoing.

Disease survey: Dr. Douglas and Ms. Inman diagnosed a wide range of plant health problems for homeowners, commercial growers, plant care professionals, and government, state, and cooperative extension personnel during the past year. Weather extremes provided challenges for many plants. These included prolonged periods of extremely cold temperatures in January and February 2005, severe snowstorms, strong winds, and bright sun reflected off snow. Additionally, May 2005 was unusually cool and this resulted in prolonged budbreak for most plants. During this period, there was limited measurable precipitation but dew provided optimum conditions for many fungal, foliar diseases to develop. This situation was particularly problematic since high levels of overwintering inoculum from 2004 were available to cause infections in spring 2005. The cool May weather was followed by record high temperatures and extremely dry conditions during June 2005. The effects of these conditions were problematic on many woody and herbaceous plants since these weather conditions normally occur in late July and August when plants are in a very different physiological state. As a consequence, many of the disease problems diagnosed by Dr. Douglas and Ms. Inman were associated with these spring weather extremes.

Winter conditions resulted in high levels of damage to needled evergreens such as arborvitae, spruce, pine, and hemlock as well as broadleaved evergreens such as rhododendron, andromeda, holly, boxwood, and mountain laurel. Most of the symptoms appeared in early spring but in some cases, the damage did not appear until later in the season. Symptoms included leaf or needle browning, premature drop, tip dieback, and branch death. In extreme cases, plant death was reported. As was the case in 2004, unusually high transplant failure was reported for woody ornamentals planted in late October and November 2004 as evidenced by extensive dieback and death in spring and continuing into summer 2005.

Powdery mildews were unusually heavy on dogwood, oak, maple, forsythia, rhododendron, azalea, lilac, and many herbaceous perennials such as phlox, monarda, and verbena. Powdery mildew was also identified on peony and was unusually early and severe. Roses had very early and very heavy infections of both powdery mildew and black spot and many cultivars were defoliated by mid-June. Last fall, maples throughout the state were affected by significant levels of tar spot, caused by both *Rhytisma acerinum* and *R. punctatum*, and many trees dropped symptomatic leaves prematurely.

Particularly noticeable this spring were symptoms of the related fungal diseases oak leaf blister, azalea leaf gall, and peach leaf curl. The cool temperatures in May prolonged budbreak and created optimum conditions for infection. Anthracnoses of maple, ash, and oak were all prevalent during spring 2005 although anthracnose of sycamore was unusually severe. Although sycamore trees typically recover from spring infections, this season, recovery was slower than normal and some trees continued to exhibit symptoms of infection into midsummer. Dr. Douglas and Ms. Inman examined many samples of junipers of all species and cultivars that were exhibiting extensive,

unexplained dieback as well as typical tip blight symptoms caused by *Phomopsis* and *Kabatina*. Decline of ash (especially white ash) continued to be a problem throughout the state and prompted many questions from homeowners and arborists. Dutch elm disease also continued as a significant and serious problem throughout the state.

Unusually high incidences of *Verticillium* wilt continued to be problematic for several tree species. Symptoms were particularly severe on Japanese maple and infections often led to tree death. Numerous instances of *Verticillium* wilt of impatiens were also diagnosed by Dr. Douglas and Ms. Inman. In most cases, impatiens had been planted in the same locations for many years and this resulted in the buildup of the soilborne fungus in these sites.

Many crabapples, hawthorns, and amelanchiers were nearly defoliated by July as a result of scab, leaf spot, and *Gymnosporangium* rust infections. The *Gymnosporangium* rusts were particularly severe and noteworthy this spring as the bright orange, gelatinous spore-horns of these fungi became evident. These distinctive diseases, caused by several species of the fungal genus *Gymnosporangium*, were widespread throughout the state in areas where apples, crabapples, and other related members of the Rose family grow in close proximity to *Juniperus* species such as Eastern red cedar and juniper. These fungi require these two different types of hosts in order to complete their two-year life cycles.

Volutella blight of pachysandra continued to be the key problem of groundcovers throughout the state. It resulted in extensive dieback in young as well as established plantings throughout the state. Symptoms developed in late summer and fall and were prevalent again this spring. Plants weakened by stress or those growing in marginal sites (e.g., full sun) appeared to be most susceptible to this fungus. Although diagnostic, concentric lesions were present on leaves, stem cankers posed the most important problem since they resulted in total plant collapse.

The cumulative effects of the weather extremes of the past few years were evident on many woody ornamentals in the landscape as they exhibited dieback, cankers, and root problems. An unusually high number of these problems was caused by fungi that are often considered opportunistic pests: cankers and diebacks were associated with *Botryosphaeria*, *Phomopsis*, and *Cytospora*, while root problems were associated with *Armillaria* and *Phytophthora*.

Tree and small fruit had a number of disease problems and it appeared that many homeowners missed critical, early-season sprays because of the difficult weather. Brown rot appeared on peaches, cherries, and plums once fruit began to ripen. High levels of black knot were also reported on both domestic and wild cherries and plums. In spring of '05, Dr. Douglas examined pear leaves from several commercial orchards with leaf spot symptoms that mimicked *Fabraea* but determined they were associated with spray damage. Bacterial leaf spot was identified in several commercial peach and nectarine blocks. Fungal canker diseases caused by *Botryosphaeria dothidea* and *B. obtusa* were of particular and unusual concern for commercial plantings of peach. These are normally considered significant pathogens of apple but were recently identified by Dr. Douglas as the cause of extensive dieback in peach trees. Blueberries exhibited extensive winter damage, dieback associated with *Phomopsis* canker, and fruit loss due to mummy berry. Very high levels of downy mildew, powdery mildew, and black rot were also diagnosed on backyard plantings of grapes.

The unusually cold temperatures of winter '04-'05 also had an adverse effect on greenhouse crops since many commercial growers had problems maintaining nighttime temperatures above 50°F. Chilling and freezing injuries as well as cool temperature nutrient problems were diagnosed on many of the temperature-sensitive bedding plants such as New Guinea impatiens.

Vegetables were affected by a variety of disease problems. In addition to powdery mildew, noteworthy outbreaks of Septoria leaf spot, blossom-end rot, early blight, bacterial canker, bacterial spot, and catfacing were reported on tomato. Additional tomato problems included poor fruit set, uneven ripening, and excessive internal white tissue, which appeared to be associated with the weather. Problems with fruit set due to the predominance of male flowers, a phenomenon associated with the weather, were reported on cucurbits. Downy mildew and powdery mildew appeared very early and very heavy on summer squash and pumpkin. Powdery mildew was also detected on many culinary herbs.

Dr. Douglas worked with Drs. Victoria Smith and Robert Marra, CAES nursery inspectors, and USDA-APHIS PPQ personnel to assess the presence of the Ramorum Blight (Sudden Oak Death) pathogen, *Phytophthora ramorum*, in Connecticut. She and Ms. Inman are also developing a collection of cultures of *Phytophthora* species isolated from samples submitted to the Plant Disease Information Office for diagnosis. This collection will assist in work aimed at refining techniques used for detecting various species of *Phytophthora*, including *P. ramorum*.

Sphaerobolus stellatus, the artillery fungus, continued to be a significant concern for property owners and was frequently identified as the source of persistent brown to black spots on house-siding, cars, plants, and other surfaces during the '04-'05 season. Dr. Douglas responded to questions and emails about this fungus from residents and insurance companies in Connecticut and throughout the United States. Slime molds were also identified on many types of mulch. These types of fungi can appear dramatically overnight as large (up to 12-16 inches in diameter), brightly-colored masses. These masses then turn into masses of brown, powdery spores. Although both problems are certainly eye-catching, they do not represent serious threats to plant health. However, slime molds were of particular concern when they developed in mulches of playscapes in daycare centers and schools. These fungi are not considered human pathogens, although there was concern that some individuals could be sensitive to exposure to spores of the fungus.

The quirky spring weather resulted in a number of turf problems. These were associated with the cool, moist May followed by an unusually hot, humid, and dry June. Pythium blight, typically a mid- to late-summer disease, was identified for several golf courses in June and resulted in extensive damage to greens. Last season's wet summer caused significant stress on many lawns throughout the state. The predominant diseases diagnosed by Dr. Douglas and Ms. Inman were brown patch, necrotic ring spot, summer patch, rust, and anthracnose. Common "grassy" weeds identified in lawns were bulbous bluegrass and bentgrass. The predominant lawn weeds were ground ivy, henbit, nutsedge, wild violet, and speedwells. Identification and control of poison ivy continued to be of major concern to homeowners and plant care professionals as this plant continues to spread and thrive throughout the Connecticut landscape.

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

Seed testing: During 2005, the Bureau of Regulation and Inspection of the Connecticut Department of Agriculture submitted to Dr. Douglas 342 vegetable seed samples for germination analysis, 16 lawn grass seed samples for purity and germination analyses, and 5 crop seed samples for purity and germination analyses. Four vegetable seed samples did not meet germination claims. Two samples were retested and failed the second test. Two samples were not retested because of insufficient numbers of seeds. Of the 16 lawn seed samples tested, one met label claims for both purity and germination. Three samples failed label claims for both purity and germination. Twelve samples passed label claims for germination but did not meet claims for purity. Vegetable and lawn seed samples were also examined for prohibited noxious weed seeds and none of these samples contained weed contaminants. Of the five crop seed samples, four met label claims for germination and purity. One sample passed label claims for germination but did not meet label claims for purity because of excessive weed seed. In addition to germination and purity tests, samples were also examined for prohibited noxious weeds. No noxious weed seeds were found in crop seed samples.

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

Samples for Analytical Chemistry and the Connecticut Department of Consumer Protection: During this year, Dr. Douglas and Ms. Inman examined 40 samples from the Connecticut Department of Consumer Protection at the request of the Department of Analytical Chemistry of the Experiment Station.

Meetings sponsored:

January 5, 2005: Wade Elmer was the CAES sponsor for the Connecticut Greenhouse Growers Association Winter Meeting in Jones Auditorium. Approximately 80 growers were present.

January 27: Wade Elmer was the CAES sponsor for a UCONN Extension Outreach Meeting for bedding plant growers in Jones Auditorium. Approximately 30 growers were present.

February 8: Wade Elmer was the CAES sponsor for a UCONN Extension Outreach Meeting for bedding plant growers in Vernon, CT. Approximately 35 growers were present.

April 12: Wade Elmer organized the Lockwood Lecture presented by Dr. Kerry O'Donnell from Peoria, Illinois, in Jones Auditorium. Twenty-five people were present.

Wade Elmer organized and hosted 12 Lunch Club seminars by Station staff in Jones Auditorium. Participation ranged from 10-30 people.

Citizen inquiries: Dr. Douglas, assisted by Ms. Inman, answered 6,939 inquiries about plant health from Connecticut citizens: 14% dealt with food crops, 69% with ornamentals and trees, 3% with turf grasses, and 14% were miscellaneous questions. Twenty-five percent of the inquiries were from commercial growers and plant care professionals, 70% were from homeowners, and 5% were from cooperative extension, health, news, and agricultural personnel. A further breakdown of responses showed that 52% of the inquiries came in by phone, 10% came in by mail, 3% came as email, and 35% were brought in person. Dr. Douglas and Ms. Inman also sent over 925 letters and sent numerous email messages with attached files of fact sheets. Many citizens opted to download fact sheets posted on the CAES website in lieu of letters since this gave them instant access to the information of concern. Most of the miscellaneous questions were concerned with identification, human toxicity, and control of poison ivy and other poisonous plants, identification of various plants and weeds, mushroom identification for health officials, and information about pesticides and their relationships to health and environmental concerns.



Mary Inman examines a hosta

Dr. Anagnostakis responded to over 780 inquiries about chestnut blight, chestnut trees, and other nut trees.

Dr. Elmer answered 20 inquiries dealing with plant problems on asparagus, basil, cyclamen, and pumpkins, and made 13 site visits to growers in Branford, Cheshire, North Grosvenordale, Shelton, Southbury, and Storrs. He also processed and autoclaved over 100 soil samples from cemeteries around the world for eventual use in the West Hartford Veterans Memorial Ceremony in fall 2005.

In the past year, Dr. Marra processed 185 nursery samples for the 2004 National Survey and 56 nursery samples for the Trace Forward survey.

DEPARTMENT OF SOIL AND WATER

Mosquito Trapping and Testing Program. Mosquito surveillance for West Nile virus (WNV) 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) baseline data that are used to assess the threat of WNV and EEE to the public and guide the implementation of mosquito control measures. The CAES is responsible for conducting all mosquito trapping and testing activities. The program is conducted by Drs. Theodore Andreadis and Philip Armstrong (assisted by John Shepard, Michael Thomas, and Shannon Finan). In 2004, the CAES reestablished the network of 91 permanent mosquito-trapping stations in 72 municipalities throughout the state. Mosquito trapping was conducted daily from June 1 to October 27. Traps were set and attended by CAES staff every 10 days at each site on a regular rotation. Mosquitoes were grouped (pooled) according to species, trapping site, and date of collection. 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 viruses. Virus isolates from mosquito pools were tested for EEE and WNV by Real Time (TaqMan) PCR using virus-specific primers and/or plaque reduction neutralization (PRNT). All of the virus isolation work was conducted in a certified Bio-Safety Level 3 laboratory.

A total of 156,409 mosquitoes (12,521 pools) representing 35 species were trapped and tested in 2004. A total of 43 isolations of WNV were made from 4 mosquito species: *Culex pipiens* (31), *Culex restuans* (6), *Culex salinarius* (5) and *Anopheles quadrimaculatus* (1) collected from 8 locations in 6 towns: Bridgeport, Fairfield, New Haven, Stratford, and West Haven. A major decline in WNV activity was seen throughout the state. No locally acquired human or horse cases were reported for the first time since 2000.

A total of 37 isolations of EEE virus were obtained from 10 mosquito species: *Culiseta melanura* (15), *Ochlerotatus canadensis* (7), *Aedes cinereus* (4), *Uranotaenia sapphirina* (3), *Aedes vexans* (2), *Anopheles punctipennis* (2), *Coquilletidia perturbans* (1), *Culex pipiens* (1), *Culex restuans* (1), and *Ochlerotatus trivittatus* (1). The infected mosquitoes were trapped in 6 locations in 5 towns including: Chester, Ledyard, North Stonington, Stonington, and Voluntown. No human or horse cases were reported.

Mosquito Investigations. Enzootic transmission of WNV requires sufficient contact between vector mosquitoes and avian amplification hosts, whereas epidemic transmission represents a diversion from the natural transmission cycle to humans. To evaluate the role of *Culex* mosquitoes as enzootic and epidemic vectors for WNV in northeastern United States, Drs. Goudarz Molaei, Theodore Andreadis, Philip Armstrong, John Anderson and Charles Vossbrinck collected blood-fed mosquitoes throughout Connecticut and identified the source of vertebrate blood by PCR amplification and sequencing portions of the cytochrome b gene of mitochondrial DNA. By implementing this method, they were able to unambiguously identify the blood meal source to the species level, therein improving the sensitivity and specificity of previous techniques for

blood meal analysis. An analysis of PCR products from a total of 213 *Culex pipiens*, 106 *Culex salinarius* and 33 *Culex restuans* revealed that all *Cx. restuans* and 93% of *Cx. pipiens* acquired blood from avian hosts; whereas, *Cx. salinarius* fed frequently on both mammals (53%) and birds (36%). Individual mosquitoes containing mixed-blood meals from both avian and mammalian hosts were detected in 11% and 4% of *Cx. salinarius* and *Cx. pipiens* respectively. American Robin was the most common source of avian blood for *Cx. pipiens* (40%) and *Cx. restuans* (37%), followed by Gray Catbird, House Sparrow, European Starling, and Mourning Dove. American Crow represented <1% of the blood meals identified in *Cx. pipiens* and none in *Cx. restuans*, despite historically high rates of WNV-mortality in the wild crow population. *Culex salinarius* obtained mammalian blood meals most frequently from the white-tailed deer (67%) and contained more crow-derived blood meals (9%) than *Cx. pipiens* or *Cx. restuans*. Human-derived blood meals were identified from two *Cx. salinarius* and one *Cx. pipiens*. These findings in conjunction with other lines of evidence, suggest that *Cx. salinarius* is an important bridge vector of WNV to humans, while *Cx. pipiens* and *Cx. restuans* serve as efficient enzootic vectors in this region of the northeastern United States.

The infectivity and pathogenicity of a baculovirus, called OscoNPV that was originally isolated from the salt marsh mosquito, *Ochlerotatus sollicitans* in FL, were evaluated in laboratory bioassays by Dr. Theodore Andreadis (assisted by John Shepard and Michael Thomas) against 10 species of mosquitoes native to the northeastern US. Five larval equivalents with 5 mM Mg²⁺ added were used as a dosage rate in exposures with second and third instar mosquito larvae at 20-24 °C. Development of the virus was observed in the nuclei of the midgut epithelial cells in the gastric caeca and posterior region of the stomach. One hundred percent mortality was observed in all larvae that exhibited gross symptoms of infection. Infection rates were as follows: *Oc. triseriatus* (35.4%), *Oc. canadensis* (13.0%), *Oc. cantator* (12.0%), *Oc. excrucians* (12.0%), *Oc. stimulans* (10.8%), *Oc. cinereus* (7.7%), *Ae. vexans* (7.0%) and *Oc. communis* (2.7%). No infections were obtained in *Cx. restuans* or *Cx. territans* nor were infections found in any species in the absence of Mg²⁺. This virus has potential for development as a biological control agent for *Aedes* and *Ochlerotatus* mosquitoes.

Arbovirus studies. Drs. Armstrong, Andreadis, Anderson, and Main documented the first isolation of Potosi virus (POTV) from the northeastern United States. In 2001, a bunyavirus was isolated from *Aedes vexans* that was different from other arboviruses known to occur in Connecticut by cross-neutralization and RT-PCR assays. Nucleotide and encoded amino acid sequences of a portion of the G2 envelope gene were 99% and 100% similar to POTV respectively, yet distinct from indigenous strains of Jamestown Canyon (JCV), Cache Valley (CVV), and Trivittatus viruses (TVTV). Viral isolates obtained from the state-wide surveillance program were re-tested by RT-PCR coupled with restriction enzyme analysis to distinguish POTV from other bunyaviruses. POTV isolates, previously typed by neutralization, were correctly identified by RT-PCR; however, many isolates classified as JCV or CVV by ELISA proved to be POTV by molecular assays. A total of 92 strains of POTV were isolated from 12 different mosquito species in 2000, 2001, and 2003, whereas POTV was not detected in mosquitoes sampled during 1998, 1999, 2002, and 2004. Viral isolation rates were highest for *Anopheles punctipennis* (3.2-11.3 infection rate per 1,000 mosquitoes) while

the greatest number of isolates came from *Ochlerotatus trivittatus* (Coquillett) (8-16 isolates). Repeated isolations of POTV over multiple years indicate that this virus is enzootic in Connecticut.

The phylogenetic relationships of eastern equine encephalomyelitis virus (EEEV) strains are currently being evaluated by Drs. Armstrong, Andreadis, Anderson, and Vossbrinck. Virus isolates obtained from the statewide mosquito trapping program during 1998-2004 were sequenced and analyzed to discern patterns of evolutionary change and lineage turnover from year-to-year. Preliminary results indicate the following: 1) Diverse EEEV lineages may co-circulate in a given transmission season. For example, in 2003, 6 well-supported clades were detected representing 11 distinct sequence variants. Two distinct lineages co-circulated in 2000 and 2001 versus one identical strain in 1998; 2) There appears to be limited viral traffic between foci in the western and eastern parts of the state. Using the CT River Valley as a dividing line, different strains tend to circulate along an east-west axis; and 3) The same strains do not reappear in successive years except for one from 2000-2001 and another from 2003-2004. This suggests that local over-wintering occurs in CT but on a limited basis. Most EEEV strains are unique and probably arose from importation events. Long term persistence of the same viral strain for more than two transmission seasons was not supported by the data.

Dr. Armstrong is currently developing rapid diagnostic tools for the identification of arboviruses circulating in Connecticut. A PCR-based assay was devised to detect and distinguish bunyaviruses endemic to Connecticut, including Jamestown Canyon, Cache Valley, Trivittatus, and Potosi viruses. The assay uses primers targeting highly conserved regions of the S-segment of the genus *Orthobunyavirus* and species-specific restriction enzyme sites to identify amplification products. Viral isolates previously typed by the cross-neutralization test were evaluated against the PCR-based assay. Preliminary results indicate that RT-PCR coupled with restriction enzyme analysis readily distinguishes bunyaviruses found in CT.

Drs. Vossbrinck, Andreadis, Armstrong and Anderson (assisted by John Shepard) have completed sequencing of more than 300 WNV isolates from Connecticut. Results show a correlation between location and evolutionary relatedness. Isolates obtained from mosquitoes are being recaptured in following years. Some are identical with isolates obtained in previous years while others show nucleotide mutations and changes to their protein structure. The recapture of isolates from previous years provides good evidence that the virus is over wintering in Connecticut. Analysis in the current year will look for convergent changes in the viral protein that is the same mutation in an unrelated isolate, to see if the virus is possibly adapting to the new bird hosts or mosquito vectors found in North America.

Molecular Biology Research on Microsporidian Parasites: The Microsporidia are a group of obligate intracellular parasites, now thought to be derived fungi. Dr. Vossbrinck conducted a comparative analysis of the small subunit rDNA (ssrDNA) of 125 species (sequences obtained from GenBank). This analysis showed that groups or clades are formed based largely on habitat and host. This result is supported by comparative molecular analyses of the past decade, and indicates that structural and ultrastructural characters are unreliable for distinguishing among higher-level

microsporidian taxa. His findings indicate the presence of five major clades of Microsporidia which group according to habitat. He proposed three new classes of Microsporidia based on natural phylogenetic groupings as illustrated by the ssrDNA analysis: Aquasporidia, Marinosporidia and Terresporidia. The names of the proposed classes reflect the habitat of each group. The class Aquasporidia, found primarily in freshwater habitats, is a paraphyletic group consisting of three clades. The Marinosporidia are found in hosts of marine origin and the Terresporidia are primarily from terrestrial environments.

Control of Variable Water Milfoil in Bashan Lake. Water milfoil is an invasive aquatic plant that can restrict the recreational use of lakes and eliminate desirable native aquatic plants. Since 1994, the Station has been monitoring the milfoil problem in Bashan Lake, East Haddam. The Connecticut Department of Environmental Protection (CTDEP), the town of East Haddam and the Bashan Lake Association have supplied the Station grants to study the use of the herbicide 2,4-D for controlling the milfoil. Greg Bugbee and Jason White have met with lake association, CTDEP and town officials to educate the public on the project and obtain the necessary permits. In 2000 - 2004 areas of Bashan Lake were treated with 2,4-D (2,4-D ester). Although control was generally very good regrowth occurred in some areas and new areas of milfoil were found particularly in water from 10 – 20 feet deep. Tests in 2001- 2004 have discovered that a late summer application of 2,4-D is likely more effective than the traditional spring treatments and the rate can be reduced from 200 lbs/acre to 75 – 100 lbs/acre with equally good control. Areas treated with 2,4-D usually stay nearly milfoil free for two years. Reinfestation is thought to occur by either uncontrolled remnants of previous plants or rooting of plant fragments from untreated portions of the lake. New underwater video equipment allowed accurate assessment of where the milfoil is occurring. Large areas not known to contain milfoil were discovered with new underwater video equipment in deep water. This milfoil could be the source of plant fragments. In September 2004 2,4-D was applied to a large deep-water area of milfoil between the island off the boat launch and the Sunset Acres dock. Other areas including the boat launch cove, Brooks Cove, and Laurel Cove were also treated. Late fall and spring surveys indicated excellent control. In September 2005, all remaining areas of milfoil will be treated with 2,4-D. Nearby groundwater wells are tested each year and no 2,4-D has been found.

Control of cabomba and Eurasian water milfoil in Lake Quonnipaug. Lake Quonnipaug, Guilford CT, has become infested with the the non-native aquatic weeds cabomba and Eurasian water milfoil. In 2001 the herbicide Sonar SRP (fluridone, slow release pellets) was applied to two acres of cabomba in the cove near the boat launch with excellent control. This was the first known successful control cabomba with a granular herbicide applied as a spot treatment. In 2002 this area was monitored for regrowth and a total of 122 plants were found and removed by hand pulling. Many of these plants had likely come from fragments floating in from other parts of the lake and taking root. Regrowth of cabomba in the north cove continued through 2004 and cabomba has become a problem again. Retreatment scheduled for 2005 was delayed by CTDEP until the proximity of an endangered plant called water marigold could be detailed. Eurasian milfoil is also present in the lake with dense patches in near a shoal in the lakes center.

Because the milfoil patches were close to water marigold, no applications were made in spring 2005. Discussions with the CTDEP on how to treat milfoil under these conditions are in progress. Aquatic vegetation was mapped. In the southern cove, a 2000 X 50 ft. area of lily pads and other nuisance vegetation was treated with glyphosate in September 2002. Three weeks later the area was then hydorraked and the collected vegetation was removed. In April 2004 the hydorraking was performed again to remove floating islands of muck and dead aquatic vegetation. A spring survey found large areas of cabomba in the treated area. Two treatments of fluridone Q (quick release) were applied in June 2004. Rapid decline of cabomba ensued but regrowth occurred late in the season. Surprisingly little of the cabomba that regrew survived the winter and few plants were evident in 2005. To monitor the results before and after treatment, aquatic plant surveys were performed along GPS referenced transects, in 2004 and 2005. Water samples were routinely tested for temperature, dissolved oxygen, pH, alkalinity, conductivity, phosphorus, and fluridone.

Control of Eurasian milfoil, sago pondweed, curly leaf pondweed and coontail with liquid fluridone in Grannis Lake, East Haven CT. Tests on the effectiveness of the aquatic herbicides fluridone and Diquat are underway in Grannis Lake. Plants in need of control are Eurasian milfoil, sago pondweed, curly leaf pondweed and coontail. Grannis Lake was surveyed for aquatic vegetation prior to the initial treatment and again each spring thereafter. North/South transects were made at 100 feet intervals using GPS. Vegetation samples were obtained at 50 ft. intervals, identified, judged for abundance and then brought back to the lab to obtain their dry weight. Fluridone was applied in Spring 2003 to obtain concentrations of 10 –20 ppb. Water was tested each week to determine fluridone concentrations. By late summer, control of Eurasian milfoil and coontail was excellent. Sago pondweed control was moderate, while curly leaf pondweed could not be assessed because this plant dies back naturally during the summer. The spring 2004 transects found a few milfoil plants, large areas of Sago pondweed and dense curly leaf pondweed. The fluridone treatment was, therefore, judged ineffective for sago and curly leaf pondweed. In 2005, a spring application of Diquat followed by several low rate applications of fluridone was tested. The hypothesis is that better control will occur with an initial quick acting herbicide (Diquat) followed by a full season dose of fluridone to prevent late season regrowth. Water samples are periodically tested for temperature, dissolved oxygen, pH, alkalinity, conductivity, phosphorus and fluridone. These studies continue to show the efficacy of highly localized spot treatments of herbicides as part of a management plan to control aquatic invasive weeds.



CAES Invasive Plant Program Staff Participating in Project CLEAR (Candlewood Lake Environmental Awareness and Research)

Statewide surveillance and mapping of Connecticut lakes for aquatic vegetation. Non-native aquatic plants such as Eurasian milfoil, variable milfoil and cabomba have become problems in many Connecticut lakes. Information is needed on the distribution of these plants and the conditions that encourage their growth. Beginning in spring 2004, a lake surveillance team including Gregory Bugbee, Dr. Jason White, and Dr. Robert Capers (assisted by Roslyn Selsky) was formed to visit state lakes, map the aquatic vegetation and compare the results with water chemistry and watershed land use information. Protocols were established using GPS and underwater video technology. An on-line database of the aquatic vegetation maps will be constructed and continually updated as the data from additional lakes are processed. The information will be made available to the scientific community and general public in via a newly designed web page (www.caes.state.ct.us/AquaticPlants/index.htm). Thirty-two lakes and ponds were surveyed in 2004, 61 plant species were observed. Twenty-four lakes contained invasive plants with the following being most prevalent; *Potamogeton crispus* (13), *Myriophyllum spicatum* (11), *M. heterophyllum* (10), *Najas minor* (8), *Cabomba caroliniana* (6), and *Marsilea quadrifolia* (1). Six new populations of state listed species found; *P. vaseyi* (2), *P. pusillus ssp. gemmiparus* (3), *M. sibiricum* (1). Over 60 lakes and ponds projected to be surveyed in 2005 with many being requests from town and local officials. To help citizens identify plants and supply CAES with information on potential sites, CAES sponsored three invasive aquatic plant workshops.

In conjunction with the Invasive Aquatic Plant Protection Program, Dr. Vossbrinck (assisted by Kirsten Deeds) has initiated studies to develop new molecular-based techniques to identify these non-native aquatic plants via DNA sequences from. This database make it possible to rapidly and accurately identify any new invasive plant species infesting Connecticut lakes. To date 12 plant species have been sequenced.

Soil Testing: Testing soil samples for fertility and suggesting methods for growing better plants is a continuing service for citizens of Connecticut. At the laboratory in New Haven, Mr. Bugbee tested 5002 samples and answered 1921 inquiries.

Phytoremediation of persistent organic pollutants: Studies were conducted by Dr. Jason White in an ongoing investigation of the potential of certain vegetation to remove moderately low levels of persistent organic pollutants from soil. Previous data

had indicated that *Cucurbita pepo* cultivars seemed to have remarkable abilities to phytoextract the weathered residues but that significant crop variability may exist down to the species level. Several studies were conducted with different lines of investigation in the past year: 1.) In a field study, the effects of two soil amendments, mycorrhizae or a biosurfactant, and on *p,p'*-DDE accumulation were determined. *Cucurbita pepo* ssp *pepo* accumulated large amounts of the contaminant from soil, having stem bioconcentration factors (BCFs, dry weight ratio of contaminant concentration in the stems to soil), translocation factors (TF, ratio of stem *p,p'*-DDE concentration to that in the root), and overall percent contaminant phytoextracted that were 14, 9.9, and 5.0 times greater than *C. pepo* ssp *ovifera*, respectively. Mycorrhizal inoculation at planting increased the accumulation of weathered *p,p'*-DDE in the tissues of both subspecies by an average 4.4 times. For ssp *pepo*, mycorrhizae increased the percent of contaminant extracted from 0.72 to 2.1%, including a value of 6.0% removal by one cultivar. Similar enhanced contaminant accumulation was observed with both subspecies after biosurfactant amendment, although treatment reduced the biomass of ssp *ovifera* by 60%. The biosurfactant had no effect on the biomass of ssp *pepo*, increased the average tissue concentration of the contaminant by 3.6-fold, and doubled the overall amount of *p,p'*-DDE removed from soil. These results demonstrate that soil amendments that enhance the mobility of weathered POPs will significantly increase the amount of contaminant phytoextracted by *Cucurbita pepo* and can be used to maximize remedial potential. 2.) In hydroponic studies, the mechanism by which shoots of zucchini (*Cucurbita pepo* L.) accumulate various hydrophobic contaminants from soil while cucumber (*Cucumis sativus* L.) does not was investigated. A mixture of DDE bound to Tenax™ beads stirred with a solution of water passing through an air-tight polyethylene mobile-phase reservoir provided a flowing solution with DDE at about 2 ug/L for many weeks duration. The DDE supplied in solution was bound tightly to the roots of both cucumber and zucchini. Less than 10% of the DDE was released when clean solution flowed past these contaminated roots. Some DDE moved from the roots to the shoot of both species, but the fraction translocated in zucchini, ranging from 6 to 27% in various trials, was 10 fold greater than that translocated in cucumber, 0.7 to 2%. There was a gradient of DDE concentration in zucchini, root >> stem > petiole > leaf blade, indicating the movement was in the transpiration stream. DDE in leaf blades varied less with time, position in trough, or species, than did DDE in stems and petioles, suggesting that DDE in leaves may have been absorbed from the air. These studies demonstrate the ability of zucchini to translocate DDE from roots to shoots is independent of its ability to extract weathered DDE from soil. 3.) In ongoing collaborative investigations with Dr. Jason Kelsey of Muhlenburg College, small pot studies were designed to assess the influence of nutrient amendments, cultivation conditions, and consecutive growing cycles on DDE accumulation by zucchini. This shows the bioavailability of weathered DDE to zucchini is impacted by nutrient status and cultivation conditions, and the amount of contaminant removed from soil increases during consecutive growing cycles. 4.) In greenhouse studies, the effect of different fungal inoculants on the uptake of weathered PCBs by zucchini and clover was investigated. Unlike DDE, fungal inoculation did not increase PCB uptake by either plant species, although in both cases the plants were successfully colonized by the fungal inocula.

Bioavailability of persistent organic pollutants to earthworms: In a study with earthworms and plants, experiments were conducted by Dr. White to study the influence of multispecies interactions in soil on the bioaccumulation factor (BAF; dry-weight ratio of contaminant concentration in the tissue to that in the soil) of DDE. Although some combinations of earthworm and plant species caused significant changes in the *p,p'*-DDE burden in both organisms, the effects were species specific. Contaminant bioconcentration in *C. pepo* was increased slightly by *E. foetida* and by 3 fold when the plant was grown with *L. terrestris*. *Eisenia foetida* had no effect on the contaminant BCF by *C. maxima*, but *L. terrestris* caused a 2-fold reduction in *p,p'*-DDE uptake by the plant. Contaminant levels in *E. foetida* and *L. terrestris* were unaffected by *C. pepo*. When grown with *C. maxima*, the concentration of *p,p'*-DDE decreased by approximately 4 fold and 7 fold in *E. foetida* and *L. terrestris*, respectively. The data indicate that contaminant bioavailability in soil may be significantly impacted by multi-species interactions and that exposure/risk estimation should account for these effects.

Quantification of True Sorption Hysteresis. (Mr. Michael Sander and Drs. Yuefeng Lu, and Joseph Pignatello). Sorption of organic chemicals to soils and sediments often shows true hysteresis. True hysteresis is the non-singularity of the sorption-desorption isotherm not attributable to known experimental artifacts and is usually manifested by less desorption than predicted by the sorption branch of the isotherm. Since true sorption hysteresis is fundamentally important to describing and predicting the behavior of chemicals in soil, a way to quantify it is desirable. Previously suggested indices of hysteresis are empirical and usually require a specific isotherm model. True sorption hysteresis to synthetic and natural organic solids has been attributed to irreversible structural changes of the solid during the sorption-desorption cycle. Therefore, we propose the Thermodynamic Index of Irreversibility (*TII*) for quantifying hysteresis in a sorption-desorption cycle in soils where natural organic matter is the predominant sorbing material. The *TII* is based on the difference in free energy between the observed desorption state and the hypothetical fully-reversible state. The index is 0 for completely reversible systems and approaches 1 as the process tends toward complete irreversibility (i.e., no desorption at all). It does not require any assumptions about the physical properties or molecular composition of the solid, and it does not depend on a specific equilibrium sorption model. A sensitivity analysis of measurement errors provides general recommendations for the setup of sorption/desorption experiments. The *TII* was applied to sorption of 1,4-dichlorobenzene to two high-organic matter soils, Pahokee Peat and Amherst Soil, and a low-rank coal reference material, Beulah-Zap Lignite. Common artificial causes of hysteresis were eliminated. Hysteresis was significant in the peat and the coal. The *TII* was clearly concentration dependent for both solids; it decreased with concentration for the peat, but increased with concentration for the coal. The *TII* allows quantification of hysteresis as a function of sorbate/sorbent combination, concentration, time, and other variables.

Mechanism of Sorption Hysteresis (Drs. Yuefeng Lu and Joseph Pignatello). The sorption of two nonpolar organic solutes in three samples of macromolecular natural organic matter (NOM) was examined in order to test whether history-dependent (“irreversible”) behaviors, including sorption hysteresis and the conditioning effect, agree

with a pore deformation/creation hypothesis for irreversibility applicable to glassy organic polymers. The solutes are 1,2,4-trichlorobenzene (TCB) and naphthalene (Naph). The NOM samples are a soil humic acid (H-HA), an Al³⁺-exchanged form of the same humic acid (Al-HA), and a low-rank coal (Beulah-Zap lignite, BZL). The humic acids are believed to be free of environmental black carbon. The degree of nonlinearity in the sorption isotherm and the ratio of hole-filling to solid phase dissolution obtained from the dual-mode model increased with hardness (stiffness) of the solid in the order: H-HA < Al-HA < BZL. Independently of solid, the solutes show a 15-20 kJ/mole preference for hole “sites” compared to dissolution “sites”, which we attribute to the free energy needed in the dissolution domain to create a cavity to accommodate the solute. All solids exhibited hysteresis and the conditioning effect, which refers to enhanced re-sorption after pretreatment with a conditioning agent (in this case, chlorobenzene). Conditioning the sample results in increased sorption and increased contribution of hole-filling relative to dissolution. The effects of original hole population, matrix stiffness, and solute concentration on the hysteresis index and on the magnitude of the conditioning effect are consistent with a pore-deformation mechanism as the underlying cause of sorption irreversibility. This mechanism involves concurrent processes of irreversible hole expansion and the creation of new holes by the incoming solute (or conditioning agent). The results show that nonlinear and irreversible behavior may be expected for macromolecular forms of NOM that are in a glassy state, and emphasize the case that NOM is not a passive sorbent, but may be physically altered by the sorbing molecules to affect sorption in a second experiment, whether that be desorption or re-sorption. The results of this study enhance our understanding of the molecular forces that govern the adsorption of pollutants by soil components.

Mechanism of Adsorption of Chemicals to Black Carbon (char) Particles. (Drs. Dongqiang Zhu and Joseph Pignatello and Mr. Michael Sander). Molecular interactions controlling the sorption of pollutants to environmental black carbon (i.e., soot and charcoal particles) that are commonly found in soils are not well resolved. The adsorption of a series of aromatic compounds to wood charcoal and nonporous graphite powder as a model adsorbent was studied. The charcoal (420 m²g⁻¹) was produced from maple-wood shavings by oxygen-limited pyrolysis at 673 K. Issues of concern were the possible involvement of π - π electron donor-acceptor (EDA) interactions of electron-poor and electron-rich compounds with the graphene (i.e., polycyclic aromatic) surface of the BC and molecular sieving effects (i.e., exclusion based on molecular size). Sorption of π -acceptor compounds, benzonitrile (BNTL), 4-nitrotoluene (MNT), 2,4-dinitrotoluene (DNT), and 2,4,6-trinitrotoluene (TNT), and to a lesser extent π -donor compounds, naphthalene (NAPH) and phenanthrene (PHEN) was greater than predicted by hydrophobic driving forces in accord with their acceptor or donor strength. Hydrophobic effects were estimated using a concentration-dependent free energy relationship between adsorption and partitioning into an inert solvent (*n*-hexadecane or benzene) for a non-donor/non-acceptor calibration set of compounds (benzene, chlorinated benzenes and methylated benzenes). Molecular complexation between acceptors and model graphene donors, NAPH, PHEN, and pyrene (PYR), in chloroform and benzene was tracked by ring-current induced upfield shifts in the ¹H NMR spectrum and by charge-transfer bands in the UV/visible spectrum. The EDA component of graphite-water adsorption for the

acceptors correlated with the NMR-determined complexation constant with the model donors in chloroform, which, in turn, correlated with π -acceptor strength (TNT > DNT > MNT > BNTL) and π -donor strength (PYR > PHEN > NAPH) of the adsorbing compound. Charcoal-graphite isotherms calculated from charcoal-water and graphite-water adsorption isotherms indicated molecular sieving effects on charcoal for tetrasubstituted benzenes (tetramethylbenzenes and TNT) and some trisubstituted benzenes (1,3,5-trichlorobenzene, possibly DNT). When steric effects are taken into account, the order in adsorption among acceptors was qualitatively similar for graphite and charcoal. The results suggest π -EDA interactions of the acceptors and possibly the donors with both graphite and charcoal surfaces. For graphite it is postulated that π -acceptors interact with electron-rich regions of the basal plane near edges and defects, and π -donors with electron-depleted regions further away. A similar mechanism may operate on the charcoal, but would be modified by the electron-withdrawing effects of oxygen functional groups on the edges of graphene sheets. The results of this study enhance our understanding of the molecular forces that govern the adsorption of pollutants by soil components.

In a companion study, we investigated the sorption on charcoal of three weakly soluble aromatic solutes, benzene (BEN), toluene (TOL), and nitrobenzene (NBZ), by conducting both single-solute and bi-solute experiments. The charcoal ($420 \text{ m}^2\text{g}^{-1}$) was produced from maple-wood shavings by oxygen-limited pyrolysis at 673 K. Solute affinity for charcoal followed the order NBZ > TOL > BEN. Commonly employed adsorption models did not adequately describe the single solute isotherms. Competition in both TOL-BEN and the TOL-NBZ bi-solute systems was strong. Normalization of the isotherms for the hydrophobic driving force by using an existing free energy correlation between sorption and partitioning to an inert solvent (benzene or *n*-hexadecane) with a nonpolar aromatic compound calibration set, resulted in enhanced sorption of NBZ relative to the coalesced BEN and TOL isotherms, indicating some specificity in the interaction of NBZ. The competitive data indicated 1:1 molar competition between BEN and TOL and between NBZ and TOL, showing conclusively that this specificity was not due to a sub-population of sorption sites unique to NBZ. Hydrogen bonding of H-donor surface groups with the H-acceptor nitro group was ruled out, as the relative affinity for the sorbent among the solutes did not change at all when increasing the solution pH from 6.5 to 11. $^1\text{H-NMR}$ experiments showed molecular complexation in chloroform between NBZ and small molecules (naphthalene, phenanthrene, and pyrene) selected to model the graphene polycyclic aromatic surface. Such complexation was absent for BEN and TOL. This result, in combination with the results of the companion study by Zhu and Pignatello (*Environ. Sci. Technol.*, 39: 2033-2041, 2005), is used to support the existence of π -electron donor-acceptor (EDA) interactions between NBZ (electron acceptor) and the polycyclic aromatic charcoal surface (electron donor) as the cause of enhanced NBZ sorption. The results of this study enhance our understanding of the molecular forces that govern the adsorption of pollutants by soil components.

Surface Properties Controlling Adsorption of Chemicals to Black Carbon. (Drs. Dongqiang Zhu, Seokjoon Kwon, and Joseph Pignatello). Environmental black carbon (BC) is believed to be an important adsorbent of organic pollutants. In this study, we examined the effects of changes in surface properties and adsorbate molecular structure.

A series of nonpolar or weakly-polar compounds (cyclohexane, 1,2-dichlorobenzene, 1,4-xylene, 1,2,3,5-tetramethylbenzene, 1,3,5-triethylbenzene) and a series of polar compounds (*o*-cresol, 4-nitrotoluene, 2,4-dinitrotoluene, and 2,4,6-trinitrotoluene) were adsorbed from aqueous solution to maple wood char prepared under five thermochemical conditions as follows. Two chars were prepared in air at 340 °C (C340) and 400°C (C400). A sub-sample of C400 was treated with H₂ in the presence of a supported Pt catalyst at 500°C (C400-H) to remove surface oxygen atoms. Another was treated under N₂ at 500°C (C400-N) to serve as a control for C400-H. The reduced C400-H char was further oxidized in air at 340 °C to reintroduce oxygen atoms (C400-H-A). The five chars vary in oxygen atom content (26.1%, 22.3%, 4.2%, 20.8% and 18.6% by weight, respectively) but show only minor differences in surface area and pore-size distribution based on N₂ and CO₂ gas adsorption analysis. These chars provide a basis for rationalizing sorption intensity as a function of adsorbate molecular structure and char surface chemistry. The following conclusions were drawn. (1) Polar interactions of the adsorbate with surface oxygen functional groups are not a significant driving force for adsorption. (2) When isotherms are adjusted for adsorbate “hydrophobicity” (calculated from the *n*-hexdecane-water partition coefficient), sorption intensity of the polar compounds is greater than sorption intensity of the nonpolar/weakly-polar compounds, possibly due to π - π EDA interactions of the polar compounds with the basal plane of the graphene sheets. (3) The largest molecules show steric exclusion from a portion of the adsorption space available to the others. (4) Removal of oxygen functional groups by hydrogenation enhances sorption intensity by reducing competitive adsorption by water molecules. The results contribute to our understanding of how pollutants adsorb to this important component of soils.

Bench Studies of the Feasibility of Bioremediation of Coal Tar Contaminated Soil. (Drs. Jun Li, Joseph Pignatello, Barth Smets, Domenico Grasso, and Esteban Monserrate). In this study, the rates of biodegradation and desorption of a set of 15 polycyclic aromatic hydrocarbon (PAH) compounds in a coal-tar contaminated soil collected from a former manufactured gas plant site in Connecticut were measured to evaluate the feasibility of in situ bioremediation of the soil. Experiments were conducted in well-mixed, aerobic soil suspensions containing various additives over a 93-106 day period. In general, both biotransformation and desorption decreased with PAH ring size, becoming negligible for the six-ring PAH compounds. Biodegradation by native microorganisms was strongly accelerated by the addition of inorganic nutrients (N, P, K, and trace metals). The rates of biotransformation of PAH compounds by native microorganisms in these nutrient-amended flasks outpaced their maximum rates of desorption (i.e., chelate-enhanced and carried out in the presence of an infinite sink of Tenax polymer beads) in sterilized systems run in parallel, suggesting that native microorganisms somehow facilitated desorption of the PAHs. Biodegradation by native microorganisms in nutrient-amended flasks appeared unaffected by the addition of a site-derived bacterial enrichment culture, even though this culture resulting in ~100-fold higher aromatic dioxygenase levels, and furthermore by the addition of 0.01 M chelating agent (citrate or pyrophosphate), even though such chelating agents greatly enhanced desorption in microbially-inactivated flasks. The strong ability of nutrients to enhance degradation of the bioavailable PAHs indicates that their persistence for many decades at

this site is probably due to nutrient-limited natural biodegradation. It also suggests that an effective strategy for their bioremediation could consist simply of adding inorganic nutrients.

VALLEY LABORATORY

RESEARCH ACTIVITIES

Activities on the farm: There were a total of 43 experimental plots during the past year at the Windsor farm. Five Windsor-based scientists had 30 of these plots; five New Haven-based scientists were using the remaining 13 plots. Valley Laboratory scientists also conducted experiments in many plots off site, such as in growers' fields and State forests. Richard Horvath kept the farm and his equipment ready and in excellent shape. With the help of Michael McHill and Matthew Deltendre, Richard expertly maintained the many field plots and addressed the specific needs of each scientist. He and his summer assistants did an outstanding job maintaining the extensive ornamental garden in cooperation with Rose Hiskes and the Connecticut Nursery and Landscape Association. Mr. Horvath 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.

Exotic insect pests of hemlock

Dr. Carole Cheah is currently dividing her time between research projects on various aspects of biological control of hemlock woolly adelgid, spending 50% of her time at the Valley Laboratory in Windsor, cooperating with Dr. Richard Cowles, and 50% at the Northeastern Research Station, USDA Forest Service in Hamden, CT. Hemlock woolly adelgid (HWA), *Adelges tsugae*, an introduced invasive insect pest from Asia, continues to be a very serious pest of national importance, threatening native eastern hemlock, *Tsuga canadensis* and Carolina hemlock, *Tsuga caroliniana* on state and private lands, national forests and parks, and nursery production of hemlocks for landscape use in 16 eastern states. Current range expansion for HWA is at its most rapid rate southwards through the Carolinas, Georgia and Tennessee where extensive hemlock mortality is occurring, while a series of colder than normal winters have temporarily retarded its northward and westward expansion. Biological control remains the major priority of the HWA Initiative for management, developed by the USDA Forest Service with national and state partners. Dr. Cheah continues to direct a 3 part project to enhance biological control of HWA using imported coccinellid predators, in collaboration with the USDA Forest Service.

1.) Dr. Cheah participated in a year long Supervised Agricultural Experience (SAE) at the Valley Laboratory with two seniors, Richard Chandler III and Eddie Thornton, Jr. from Weaver High School, Hartford through the Harris AgriScience Center in Bloomfield, a vocational agricultural school. They volunteered as interns 2 to 3 afternoons a week throughout the school year and assisted in experiments, colony maintenance and rearing of the introduced Japanese predatory coccinellid, *Sasajiscymnus* (= *Pseudoscymnus*) *tsugae*. Dr. Cheah, in collaboration with Dr. Allen Cohen, Insect

Diet and Rearing Institute, Tucson, Arizona, continued with artificial diet investigations for maintaining and/or mass rearing *Sasajiscymnus* (formerly *Pseudoscymnus*) *tsugae*, an introduced predator for biological control of hemlock woolly adelgid. Another 20 diets were tested for palatability and feeding preferences. Preferred concentrations of sugars, antifungal components, additional vitamins and feeding stimulants were established. Diets containing casein and wheatgerm were the least palatable, while diets with egg yolk were preferred. However, adult *S. tsugae* did not readily accept diet formulations containing commercial egg extracts and/or entomophage diets. It was determined from behavioral bioassays that adults highly preferred fresh egg preparations. A novel new diet delivery system was developed using the host plant, non-infested eastern hemlock, which greatly increased predator feeding response. Diet applied to hemlock tips were readily fed on and initial trials showed high survival (74%) after 6 weeks on artificial diet and water alone. This has been significant progress toward the development of a diet for maintaining survival of predators reared for biological control implementation in the management of hemlock woolly adelgid. Larvae of *S. tsugae* also responded and fed for the first time on the same diet. Current studies are directed toward the development of suitable textures for larval feeding and the potential for rearing through to the adult stage.

The national biological control program administered and supported by the USDA Forest Service provides several introduced predator species for deployment in the HWA-infested states. Currently, five state-run, private or commercial insectaries in New Jersey, Pennsylvania, North and South Carolina and Tennessee are mass rearing *S. tsugae* and other imported predators using a procedure completely dependent on extensive collections of healthy, heavily infested hemlock foliage. The availability of such foliage, optimal for mass production of high vigor predators, is unpredictable due to recent extreme winter mortality of adelgids, and/or declining hemlock conditions affecting adelgid quality. The dependence on natural prey collections has placed production limitations on the efficacy of the biological control management strategy. Currently, the annual rate of mass production of predators for release in multiple states is subject to the bottleneck caused by adelgid availability and the high costs of the labor-intensive process. Current funding for mass rearing at federally supported insectaries in the south and mid-Atlantic runs at > \$500,000 annually. While annual production has numbered in the several hundred thousands for *S. tsugae* and to a much lesser extent for other species, the demand for more predators greatly exceeds the supply. Development of an artificial diet for mass rearing and/or a supplement for enhancing *S. tsugae* survival during storage when adelgid is scarce until implementation would have significant economic impact and savings for the multiple states (16 eastern states to date) benefiting from the national biological control strategy for hemlock woolly adelgid management. Findings would also have significant implications and applicability for other predator species mass-produced for biological control.

2). Hemlock health assessments in *S. tsugae* release sites in 2004 were completed by Dr. Cheah with the assistance of Jason Parent, and assessments in 2005 are continuing with the assistance of James Preste, Richard Chandler and Eddie Thornton. In Connecticut, the majorities of *S. tsugae* release sites were implemented in the mid-late 1990s and at 4-10 years since release represent some of the oldest *S. tsugae* sites in the U.S. In 2004, *S. tsugae* release sites continued to show recovery across all types of woodland suitability sites with high levels of new shoot production and much reduced

HWA crown levels. Hemlock recovery was evident even in the poorest of hemlock habitats composed of rocky outcrops with very thin droughty soils. The recovery of hemlocks occurred statewide in both release and non-release stands and was correlated with optimal cool moist growing seasons and concurrent heavy winter mortality of adelgids in 2003 and 2004. Cumulative hemlock mortality in release sites was minimal and was largely due to recent drought events in 1999 and 2002. The major portion of mortality was attributed to hemlock borer attacks. The 2005 winter was less severe with much more variable and patchy HWA survival (mean 71%) and some resurgence of HWA has occurred in some eastern sites. Foliar transparency, a standard Forest Inventory Analysis procedure used by the USDA Forest Service in forest health monitoring, is a visual index, which measures the amount of sunlight penetrating the canopy. Foliar transparency in combined Connecticut and New Jersey hemlock assessments emerged as a useful tool for tracking hemlock health in release and non-release sites from year to year in a joint assessment performed by the two states. A low transparency rating indicates a more dense, healthy and foliated crown. Comparisons of Connecticut foliar transparency ratings in 2003 were analyzed in 2005 and mean ratings in *S. tsugae* release sites were significantly lower than in non-release infested hemlock stands surveyed in Litchfield and northern Hartford counties. Mean foliar transparencies in release sites were statistically comparable to those in pristine northwestern high elevation stands which had negligible adelgid or scale infestations or impact, indicating the overall restoration of previously adelgid-damaged hemlock stands. In 2004 and 2005, two *S. tsugae*, a larva and an adult, were recovered during summer sampling. The recovery of previously declining hemlock stands in Connecticut is one of the first to be reported in eastern states that have been under HWA siege since the early 1990s. This recovery has significant economic and ecological implications on managed forests, obligate species, recreational areas, wildlife winter cover, and watershed ecosystems. The majority of the premium fishing and recreational streams and rivers are hemlock-lined. Hemlock-dominated streams harbor considerably higher aquatic species diversity than comparable mixed hardwood streams. Streams running through hemlock stands have significantly cooler temperatures and oxygenated waters which are essential for the survival of native brook trout and other stocked trout species, which are the preferred species for stream recreational fishing. The loss of hemlock stands along important trout streams would impact the part of the revenue generated by the sale of fishing licenses for the state which support the state's fisheries programs. Hemlocks are also important for maintaining and holding soil moisture and nutrients and provide an important function in the purification of ground and stream waters around reservoirs. Several warbler and vireo species are obligate to hemlock stands and preservation of natural hemlock stands enhances the survival of these avian species. In aesthetic and functional terms, hemlocks also provide dense cool shade for popular picnic and other public recreational areas and the recovery of damaged hemlock stands is important to the public's enjoyment of the outdoors. Winter cover in hemlock stands is very important to the survival of many wildlife species with important implications for recreational hunting revenues for the state. The documented recovery of damaged hemlock stands is concurrent with *S. tsugae* releases in Connecticut and New Jersey and this finding, in addition to recent recoveries of *S. tsugae*, has provided the first documentation for continued predator establishment and encouraging support for the national biological control program of the USDA Forest

Service, whose annual budget for HWA research and suppression support exceeds 3-5 million annually.

3) Dr. Cheah, with the assistance of USDA Forest Service technicians Paul Moore, Gregg Bradford and Cuyler Remick, has re-established the original stressed US laboratory colonies and improved mass rearing techniques for two other introduced coccinellid species from southwestern China, *Scymnus sinuanodulus* and *Scymnus ningshanensis*. These species were discovered in the mid-1990s by Dr. Michael Montgomery and his colleagues from China. Successful small-scale mass-rearing in 2004-2005 at the Insect Rearing Facility of the Northeastern Research Station in Hamden, CT, has produced healthy ladybeetles for the first release of *S. sinuanodulus* in the Northeast at the Centennial Memorial State Forest in Weston, Fairfield County, CT and has also provided beetles for a 2004 fall release in the southern Appalachian mountains of northern Georgia. A comparative sleeve assessment also provided the first documentation in Connecticut and Georgia in spring 2005 of the reproductive ability of mature *S. sinuanodulus* (> 1 year) and capability of development from egg to adult under caged field conditions at both the northern and southern part of the HWA range. Studies in 2004 and 2005 have also shown that *S. ningshanensis* does not exhibit peak reproductive ability until the second year after emergence, in spite of the provision of optimal densities of healthy adelgids, photoperiod and temperature. Over 5,000 *S. sinuanodulus* and > 1,300 *S. ningshanensis* were successfully reared in Hamden in 2005 and this will facilitate additional free release trials of both species next spring in Connecticut, Pennsylvania and perhaps other states. Optimal temperatures and photoperiod for inducing oviposition and maintenance of *Scymnus* adults until implementation and release have also been established through studies in Hamden.

In addition, Dr. Cheah is also directing the quarantine investigations and evaluations of new species of coccinellids collected from expanded foreign exploration in China that were initiated in April 2005 under the biological control initiative. These studies are being conducted in the USDA Forest Service Quarantine Laboratory in Ansonia, CT.

The revival of imported *Scymnus* predator colonies has been an important step forward toward the implementation of free release trials. This has been long been an important objective of the national biological control strategy by the USDA Forest Service. The evaluations of new species of coccinellids for potential biological control of HWA under quarantine laboratory conditions are also an important component of the national strategy for establishing a complex of introduced predators in the US to combat HWA. USDA Forest service support for expanded explorations and quarantine support was \$378,000 in 2005.

Nursery Integrated Pest Management

Tim Abbey continues to work with commercial nursery growers, and other ornamental plant industries, to promote the adoption of integrated pest management (IPM) practices. During the 2004 field season, three nurseries received intensive on-site assistance with establishment of IPM programs. Detailed pesticide records from one nursery were used to calculate changes in pesticide use attributed to increased adoption of IPM strategies. Pesticide usage records from the cooperative year, in this case 2004, are compared to the year designated as pre-IPM adoption (2002). Overall,

insecticide/miticide usage increased by 16.3 pounds of product. Total active ingredient applied decreased by 4.7 pounds. This translated into a decrease of \$234 for pesticide products. Along with the detailed analysis of the pesticide spray records, participants were asked to complete a post-season questionnaire that allows them to review their collaboration with Mr. Abbey. The three participants of record rated the overall Nursery IPM program as “good.” All of the participants stated that they would recommend the program to other Connecticut nurseries.

The first year of a life history study of the rhododendron leafminer (*Lyonetia latistrigella*) was completed in 2004 at a model container nursery. Forty-one hoop houses were selected in the nursery. Areas (approximately 250 sq.ft.) were marked with flagging tape at both ends and the middle of each house. The *Rhododendron* spp. in these areas were monitored on a weekly basis from late April through September. Infested leaves were counted and removed each week. The routine monitoring documented the date and location that this pest first appeared in the nursery, along with the corresponding growing degree days. Insecticide applications were applied to target specific insect life stages and areas of rhododendrons rather than cover sprays to entire blocks of plants. The hypothesis that early detection and targeted insecticide treatments will stop a major rhododendron leafminer infestation, and thus, decrease overall insecticide applications, appears to be accurate. There was minimal (non-detectable) damage at the end of the 2004 growing season. The monitoring will continue in 2005 to confirm the observations made in 2004. At this time in 2005, no damaging leafminer population has been detected.

A native plant survey was sent to Connecticut Nursery and Landscape Association members who are retail businesses, or have retail as part of their business. The intent of the survey was to determine if the publication *Alternatives for Invasive Ornamental Plant Species* (originally printed in November 2002 and revised September 2004) is being used by the general public to influence their selection of plants (i.e., has there been an increased awareness and sales of native plant species in garden centers). Ninety-two surveys were mailed in late 2004. Forty-four (48%) were returned. The results showed that most respondents had not seen a consumer using the publication, and that the sale of native ornamentals has not increased for most businesses.

Black vine weevil: Commercially acceptable strawberry cultivars grown in the Northeast vary in their susceptibility to black vine weevil (mediated by adult feeding preference for the foliage) and black root rot. Four varieties with superior tolerance for either or both of these characteristics produced about 2,000 seedlings in 2003. During the first year of growth, no obvious differences with respect to black root rot or black vine weevil were obvious. Selections have been made to eliminate plants with photosynthetic defects (variegation), excessive crown division, susceptibility to leaf diseases, and poor fruit flavor. Some plants have collapsed due to poor root function and have been eliminated, and screening continues to determine palatability of foliage to black vine weevil adults. Sixty plants with exceptional flavor and fruit size were allowed to set runners, and these daughter plants were tested in the greenhouse (in collaboration with Dr. James LaMondia) to determine their tolerance to black root rot. Considerable variation was present, with two modes of tolerance to black root rot being apparent.

Some plants had a very low incidence of infection of their roots, while other plants simply grew so many roots that the loss of some of the root biomass from root rot did not affect overall root function. Many more strawberry hybrids have been found through laboratory bioassays to be unpalatable to black vine weevil adults. These additional plants will be screened during the winter for black root rot susceptibility, and the best plants (based on flavor, fruit size, black vine weevil tolerance, and black root rot tolerance) will be propagated further to field test in cooperating grower's fields to determine commercial acceptability.

Christmas tree insect pest management: A special problem for Christmas tree growers is the loss of green color in foliage late in the growing season. Color defects can be caused by the loss of root function, for example, by white grub injury to roots. A dose-response experiment determined whether application to the soil of imidacloprid (Admire) would manage white grubs, conifer root aphids, and balsam twig aphids. In this trial, imidacloprid significantly reduced the populations of conifer root aphid, whereas the white grub population was too low to determine treatment effects. Although the populations of balsam twig aphids were not reduced quickly enough to prevent injury during the year of application, the population of stem mother aphids was significantly reduced during the next spring. Therefore, a new strategy for using soil-applied systemic insecticides may provide an alternative to the current practice of foliar sprays to control balsam twig aphid. A follow-up study is currently evaluating the impact of imidacloprid on various pests and the growth rate of Christmas trees. Along with the previously mentioned insect pests, this study will determine whether populations of the yellow ant are disrupted. The yellow ant is found in mutualistic association with conifer root aphids, and is implicated in the dispersal of root aphids between trees. Pales weevils seriously damage Christmas trees when the adults feed on and girdle side branches and leaders. The larvae develop in fresh stumps of spruce and pines; so the focus for control of this pest has been to kill adults at the stumps before they have a chance to lay eggs. In 2003, stump sprays of bifenthrin were as effective as the labeled high rate of chlorpyrifos for preventing larval development on spruce stumps at a cooperating Christmas tree farm. The concentration of chlorpyrifos commonly sprayed by growers was found to be completely ineffective. In 2004, a higher rate of bifenthrin was tested, and found to not improve control. Improvement in control is being tested in 2005 by treating a larger area around the stump, and by spraying at an earlier timing. An organically acceptable cultural control method (a 1-inch layer of soil burying the stump) and a potential deterrent to oviposition (a spray of diesel fuel on the stump) were found in 2004 to be ineffective. Growers in the past have used diesel fuel in combination with insecticides; these results should discourage this ineffective and potentially polluting practice. Growers have now adopted the use of bifenthrin for management of pales weevils, thereby reducing the spraying of the much more toxic organophosphate insecticide chlorpyrifos. The cost of control has been decreased from about \$73 to \$20 per acre, and control has improved. White pine weevil is a similarly troublesome pest, which in spite of its name, attacks nearly all species of trees grown as Christmas trees. A trial conducted in 2005 at a cooperating grower's field has determined that an application rate of 3.4 grams per acre of bifenthrin applied to the leaders in early April provided complete control of this pest, while a 1.7 gram rate gave 80% suppression. This treatment will cost

\$1.75 per acre, and save approximately a value of \$20 - \$1,000 per acre in damage to trees.

Hemlock woolly adelgid: Imidacloprid application techniques for control of hemlock woolly adelgid include a drench around the base of the tree, injection into the soil close to the trunk or under the dripline, or trunk injection with various types of equipment. All of these methods were compared in fall (2002) versus spring (2003) application timing in five sites within Connecticut to determine the most effective techniques. All soil-based applications provided statistically significant and excellent levels (48 – 100%) of population reduction over one year, with the soil injection near the trunk at the fall timing giving complete control. Trunk injection methods were ineffective, with populations of adelgids ranging from 52 – 144% of those found in the untreated checks. The average population reduction for the soil-based applications was found to be 78% in 2003, and 98.2% in 2004 repeated evaluations of these treated trees. Improved control of adelgid populations over time suggests that annual treatment of valuable forest or landscape hemlock trees is unnecessary, and that an appropriate treatment interval is greater than 2 years. A follow-up experiment in Pennsylvania state forests will determine whether a lower dosage of imidacloprid will provide adequate control of hemlock woolly adelgid. The longer treatment interval and lower dosages of imidacloprid implies that the environmental loading of imidacloprid could be reduced, thereby reducing treatment costs and the risks to non-target organisms. These results have influenced decision-making in hemlock forests throughout the range of hemlock woolly adelgid infestations, both at the level of individual arborists treating landscape trees, in state forest treatment plans (Pennsylvania) and in federal forests (Smoky Mountains National Forest). Most importantly, ineffective treatment measures have been abandoned (use of the Wedgle trunk injection system), and soil application has become the treatment method of choice where practicable.

Indoor Fungi Studies:

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

Airborne fungi: Dr. Li is collecting both indoor and outdoor air samples from New Haven, Windsor, and Avon on a monthly basis. This is a long-term study started last fall to measure the airborne fungal concentration and compositions (types of fungi) in Connecticut, to establish the baseline of exposure of residents/occupants to airborne fungi in CT, and to determine seasonal and diurnal patterns of airborne fungi, and at the same time determine the relationship of airborne indoor fungi with outdoor ones. The samples are under analysis. Thresholds for fungal exposure levels are not available in Connecticut and in the United States at present due to a lack of long term research and the presence of huge variations in airborne fungi related to geographic areas, season, and time. This study is important to determine the exposure level of airborne fungi in Connecticut in different seasons and the predominant airborne fungi in the area. These data will provide professionals who conduct field investigation of indoor fungal infestation with baseline data for comparison. The outcome of the study will help Indoor

Air Quality (IAQ) professionals to come up a better sampling strategy for investigation and remediation of indoor fungi.

Fungal succession on building materials: A fungal succession on drywall experiment is being conducted on interior wall units (2 × 4 ft), which were specially built for the project. The wall units are subject to water damage at low (2L), medium (4L), high (8L) levels by adding water to the wall units at monthly intervals. Three batches of fungal samples are taken from the wall units every four months. The early predominant fungi that appeared on wall units with low water damage are *Cladosporium sphaerospermum*, *Alternaria tenuissima*, *Epicoccum nigrum*, *Ulocladium botrytis*. More fungi appeared on wall units with medium water damage and the predominant fungi are *Cladosporium cladosporioides*, *Cladosporium sphaerospermum*, *Alternaria alternata*, *Alternaria tenuissima*, *Epicoccum nigrum*, *Ulocladium botrytis*, *Chaetomium globosum*, *Curvularia clavatus*. The predominant fungi found on wall units with high water damage are *Cladosporium cladosporioides*, *Cladosporium sphaerospermum*, *Alternaria alternata*, *Alternaria tenuissima*, *Epicoccum nigrum*, *Ulocladium botrytis*, *Curvularia clavatus* and *Penicillium* spp. The fungal composition is positively related with the level of water damage.

Moisture distribution following water damage was also studied. After the drywalls were wetted at the bottom, water movement in the drywalls was determined by wooden stubs behind the drywalls. Moisture levels at the spots on the drywall with stubs behind them are much higher than the ones at locations without stubs behind. Moisture in the wall units is unevenly distributed and it appears that wooden stubs absorbed and move water more efficiently than the drywall panels.

Preliminary data showed that the severity of water damage affects the type of fungi that developed on the wall units. More diversified fungi developed on the wall units with higher levels of water damage. At early stages of water damage species of *Penicillium* and *Aspergillus* are not the predominant species. These results are not in agreement with what indoor air quality professionals currently believe. These data are crucial to the IAQ industry and public health professionals. Dating the time frame of water damage according to what kinds of fungi are present will require additional research.

Infiltration of spores of mushrooms outdoors into residences: Most indoor airborne fungi originate from outdoor sources. A study was conducted to determine the ability of mushroom spores produced near residences to infiltrate into residences, to determine release and short distant dispersal of several mushrooms, and to define their concentration fluctuation with time. Samples of airborne spores of *Amanita muscaria* var. *alba* and two boletes were collected from three locations: the back yard, deck, and living room in September and October of 2004 in Avon CT. It was found that the fruiting bodies of *Amanita muscaria* var. *alba* released a large amount of spores into the air. In the first day of expansion of the fruiting body, the concentration of airborne spores near the fruiting bodies ranged from 21,992 to 151,270 spores/m³. The highest concentration was 281,738 spores/m³. *Amanita muscaria* var. *alba* spore release mainly occurred in the first three days following the expansion of the caps. The concentrations of released spores near fruiting bodies were 77,137; 75,062, and 41,738 spores/m³ in the first three days, respectively. After three days, the concentration dropped by 95%. On the deck,

airborne spore concentrations dropped 96 to 99% after 3 days with the concentrations of 940, 575, and 1,359 spores/m³ in the first three days, respectively. Spore concentration showed a diurnal pattern with a relatively extended night peak. Relative humidity and dew were positively correlated with spore release and short distance dispersal. Rain and rain rate were positively correlated with spore release, but not correlated with short distance dispersal. The spore release period of *Amanita muscaria* var. *alba* was short, but within such a period it released a large amount of spores. However, less than 5% of spores released were dispersed to the deck 5.2 m away and 2.7 m above the fruiting bodies. Less than 0.1% of spores dispersed from the fruiting bodies were found inside a nearby residence.

Airborne boletes spores at all locations showed diurnal patterns with night peaks. Bolete spores in the living rooms showed strong correlations with the ones on the deck. Dew and wind speed correlated with both large and small spores at all locations positively and negatively, respectively. Relative humidity was correlated with the spores outdoors, except the small spores on the deck. Rain was not correlated with the number of bolete spores. Diurnal patterns and daily variations of small spores near the ground were correlated with the ones on the deck, but not so for large spores. Human activity had a significant effect on large bolete spores in the living room, but not on the small ones. With an open window/door, a significant number of bolete spores entered the residence and the concentration of small bolete spores indoors reached 33,301 spores/m³. However, overall <5 % of the spores infiltrated the residence.

The occurrence of high populations of airborne spores of mushrooms may have significant effects on allergic individuals. Such data and information are helpful for medical practitioners to better understand mushroom related allergy for proper diagnosis and treatment. *Amanita muscaria* var. *alba* is a toxic mushroom. The effect of breathing in such spores on public health is not clear. Individuals near fruiting bodies of *Amanita muscaria* var. *alba* will be exposed to a large amount of airborne spores. To very sensitive individuals, such an exposure could be a very significant health risk. This area needs more research on the health effects of these mushroom spores in the air. Spatial distribution of the mushrooms was different within a 5-m range. Less than 5 % of the mushroom spores infiltrated the residence. Diurnal and daily variations of mushroom spores indoors and outdoors were very high and reached > 10 folds for the comparisons of maximal and minimal spore populations. Understanding spatial, daily, and seasonal variations of mushroom spores will be crucial for using a proper strategy to take air samples to avoid non-representative results.

Tobacco pathology: The breeding program conducted by Dr. Jim LaMondia to develop resistance to tobacco pathogens in Connecticut, including *Fusarium oxysporum* (the fungal pathogen causing Fusarium wilt of broadleaf tobacco); *Globodera tabacum tabacum* (the tobacco cyst nematode); tobacco mosaic virus, and the blue mold pathogen (*Peronospora tabacina*) is continuing for both shade and broadleaf tobacco types. The development and deployment of resistant plants is the most effective, economical and environmentally safe means of managing disease. Approximately 25 lines each of shade and broadleaf tobacco were grown and evaluated under field conditions in 2004. After a tobacco free period to eliminate blue mold, an additional generation of 20 shade and 20

broadleaf lines was grown in the greenhouse during the winter of 2004-2005 to reduce the number of years required to release resistant lines to growers.

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

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

Single dominant gene resistance to tobacco mosaic virus is present in many of these lines. Evaluation and selection for TMV resistance is conducted on all field-grown progeny. In 2002, 2003 and 2004, TMV infection resulted in significant commercial losses (\$3 million to \$5 million) due to green spot symptom development on susceptible shade tobacco leaves. Our research demonstrated the associated of green spot with TMV infection, and determined that plant resistance was the single most important factor for reducing green spot disease. Grower lines were evaluated for resistance to TMV and large amounts of seed of homozygous TMV-resistant 8212 produced at the Valley Lab was distributed to growers to reduce losses from virus infection.

Blue mold, caused by *Peronospora tabacina*, has been a recurring problem on tobacco in the Connecticut River Valley from 1997 through 2004, causing losses in the tens of millions of dollars annually. The development and use of better spray technology, timing of applications, and grower education have greatly reduced blue mold severity in recent years. Tobacco lines with resistance to blue mold were collected from different sources and evaluated for blue mold resistance under field conditions in Windsor. Shade and broadleaf tobacco lines last grown in the 1960's and held in long-term storage in North Carolina ranged from almost complete immunity to mildly infected. Two shade

tobacco lines developed by the USDA in the 1960's, line numbers 509 and 292-393, were promising sources of adapted resistance and have been used as parents in crosses to Connecticut shade tobacco types. A Cuban dark tobacco accession, H2000, was found to be virtually immune to blue mold infection and will be used as a resistant parent in crosses to Connecticut broadleaf tobacco. Blue mold resistance breeding in shade and broadleaf is being attempted through the selection of resistant inbred lines and the development of male-sterile Connecticut types to allow the production of F1 hybrids between resistant 509 or 292-393 and susceptible shade tobacco and H2000 and susceptible broadleaf tobacco. Early hybrids were intermediate in resistance and commercial quality. Pathogen response to tobacco resistance genes differed in the years prior to 2001 and in 2001 to 2002. Greater numbers of lesions of larger size have been observed on F1 lines in 2001, 2002 and 2003, indicating that a more aggressive isolate may have been present. Resistance levels generally decreased with inbreeding beyond the F1 selection, however, certain F2 selections with significant resistance have been identified and selfed to the F3. Male sterile lines are also currently being developed to allow production of F1 hybrid blue mold resistant seed. Blue mold incidence was compared between susceptible commercial varieties and resistant lines. Over 5 pickings in 2004, susceptible 8212 tobacco had a total of 360 blue mold lesions per plant while several promising advanced breeding lines had 0 to 11 lesions per plant. The development and deployment of blue mold-resistant cultivars will greatly reduce disease losses with reduced pesticide application.

Fungicide applications were evaluated for efficacy of blue mold control in shade and broadleaf tobacco in Windsor, CT. Acrobat MZ, Actigard, and Quadris fungicides were applied at 14-day intervals to shade and broadleaf tobacco plants in small plots. Actigard resulted in fewer blue mold lesions per leaf than Acrobat MZ (1.0 to 2.5 lb./acre) or Quadris (0.24 or 0.48 pt/acre) and was active at rates as low as 0.03 oz/acre Actigard when applied in combination with Acrobat MZ or Quadris. All fungicide applications resulted in significantly less disease than untreated controls. Actigard, a systemic acquired resistance elicitor, may act synergistically with fungicides to increase fungicide efficacy at very low rates.

Perennial flowers and Ornamentals: Plant parasitic foliar nematodes can cause severe damage to a large number of flowering ornamentals in nurseries and landscape plantings. The range of symptoms observed on flowering ornamentals can vary considerably with plant and nematode species, but leaves, stems, flowers, or buds are commonly distorted, dwarfed and killed. There are two different plant parasitic nematodes which can attack above-ground ornamental plants, the most common foliar nematode, *Aphelenchoides fragariae*, and *Ditylenchus dipsaci*, the stem and bulb nematode. Both of these nematodes are widely distributed and can quickly ruin foliage and flowers. Dr. LaMondia evaluated the insecticides Avid (avermectin) and Pylon (chlorfenapyr) in combination with shoot pruning, for efficacy against both nematodes on Anemone, Salvia and Phlox. Both insecticides reduced nematode numbers in Anemone and Phlox, but not in Salvia. The combination of scouting, sanitation and insecticide use is currently the only effective management approach for foliar nematodes.

Root-knot nematodes, *Meloidogyne* spp., are one of the most widespread pests limiting agricultural productivity around the world, infect all major crop plants, and are

difficult to control in the soil environment. The northern root-knot nematode *M. hapla* is a common and serious problem in many minor-use food and ornamental crops such as herbaceous perennial ornamentals, vegetables and small fruit in the Northeastern U.S. The effects of a TerraClean (active ingredient 27.18% hydrogen dioxide; EPA Registration No: 70299-5) drench of pasteurized field soil inoculated with *M. hapla* juveniles and eggs in suspension or with nematode-infested roots containing females, juveniles, and egg masses were evaluated in the greenhouse and in field microplots, then planted with one Rutgers tomato transplant 24 hours after treatment. TerraClean (active ingredient 27.18% hydrogen dioxide; EPA Registration No: 70299-5) is registered as a broad-spectrum bactericide/fungicide. In preliminary greenhouse experiments, pre-plant drenches of 1 to 500 and 1 to 250 dilutions of TerraClean to root-knot nematode-infested soil reduced tomato root galls per plant by 43 to 59 percent after four weeks growth (P=0.006). In the field, preplant drench treatments reduced initial root infection, but populations were not different at the end of the season. Research is continuing in 2005.

Weed research:

Dr. Todd Mervosh conducts research on weed management in a variety of crop systems and in non-crop areas. In the past year, his projects included weed control experiments in ornamental plants grown in containers, Christmas tree plantings, and pumpkins. These experiments were conducted at the CAES Valley Laboratory in Windsor and/or in growers' fields or nurseries. Dr. John Ahrens is a research partner in some experiments involving ornamentals and Christmas trees. In addition, Dr. Mervosh is conducting experiments to find effective and environmentally sound methods to control the following non-native invasive plants: Asiatic (Oriental) bittersweet (*Celastrus orbiculatus*) vines in a woodland at Bluff Point State Park in Groton, pale swallowwort (*Cynanchum rossicum*) in a coastal ecosystem at Bluff Point, Japanese knotweed (*Fallopia japonica*) on town-owned land in Ledyard, and common reed (phragmites) (*Phragmites australis*) in marshes in Manchester and in Old Saybrook. Jeremy Leifert assisted with projects in the summer of 2004, and Krystle Olszewski and Dorothy Reiss assisted with projects in the summer of 2005.

Nursery ornamental weed control: The efficacy of six granular herbicides for residual weed control in nursery containers and their safety to the ornamental shrub spirea (*Spiraea x bumalda*) was determined in two-gallon containers. Plugs of spirea were planted in half the containers on June 4, while the other half remained plantless. The experiment was arranged in a randomized complete block design with four plots per treatment. Each plot contained three containers of spirea and three plantless containers. In addition to an untreated check, the following herbicide treatments were applied on June 10: Snapshot 2.5TG at 150 lb/A (isoxaben + trifluralin), Ornamental Herbicide 2 (OH-2) at 100 lb/A (oxyfluorfen + pendimethalin), Rout at 100 lb/A (oxyfluorfen + oryzalin), Regal O-O at 100 lb/A (oxyfluorfen + oxadiazon), Ronstar 2G at 200 lb/A (oxadiazon), and BroadStar 0.25G at 150 lb/A (flumioxazin). Once the spirea foliage was completely dry, treatments were applied over the containers. Thirty minutes after applications had been completed; all containers were watered. On June 11, seeds of the following weeds were spread in separate plantless pots in each plot: large crabgrass (*Digitaria sanguinalis*), Virginia pepperweed (*Lepidium virginicum*) and birdseye

pearlwort (*Sagina procumbens*). Relatively minor stunting of growth (1.5 on a scale of 0 to 10) was observed on spirea treated with flumioxazin at 4 WAT, but the plants recovered. No other treatment injured spirea. Weed control data (visual ratings based on weed numbers and size) and weed counts were collected at 6, 12 and 16 WAT. At 6 WAT, all treatments provided 95% or better control of crabgrass and at least 92% control of pepperweed. Nearly complete prevention of pearlwort was provided by treatments other than oxadiazon alone and oxyfluorfen + oxadiazon, both of which provided no control of pearlwort. Weeds were counted and removed, and the same weed seeds as before were sown in the plantless pots. At 16 WAT, containers treated with flumioxazin had the fewest weeds overall, with the following control ratings: crabgrass, 70%; pepperweed, 86%; and pearlwort, 100%. Weed control ratings for the other herbicides ranged from 15% (oxyfluorfen + pendimethalin) to 54% (oxadiazon) for crabgrass, 33% (isoxaben + trifluralin) to 65% (oxadiazon; oxyfluorfen + oxadiazon) for pepperweed, and 20% (oxadiazon; oxyfluorfen + oxadiazon) to 100% (oxyfluorfen + pendimethalin) for pearlwort. Overall, flumioxazin provided better residual control of the weeds present than did the other herbicides tested.

At the IR-4 Ornamental Horticulture Workshop in 2003, high priority was placed on obtaining data needed to expand labels for preemergence herbicides to include additional tolerant perennials. Drs. Mervosh and Ahrens conducted an experiment to evaluate four widely grown herbaceous perennials for their tolerances to herbicides not currently registered for use on these plants. The following herbicides were included: *s*-metolachlor (Pennant Magnum 7.62L), pendimethalin (Pendulum 2G), and isoxaben plus trifluralin (Snapshot 2.5TG). The plants evaluated were catmint (*Nepeta faassenii* 'Walker's Low'), lavender (*Lavandula angustifolia* 'Munstead'), green & gold (*Chrysogonum virginianum* 'Springbrook'), and lady's mantle (*Alchemilla mollis*).



Perennial container experiment at Valley Laboratory

All plants were potted in 1-gallon containers on June 11, 2004. Each plot contained three plants of each perennial and treatments were replicated four times in a randomized complete block design. Applied on June 17, treatments consisted of *s*-metolachlor sprays at 1, 2 and 4 lb ai/A, pendimethalin granules at 3, 6 and 12 lb ai/A, and isoxaben plus trifluralin granules at 2.5, 5 and 10 lb ai/A (0.5, 1 and 2 lb ai/A of isoxaben plus 2, 4 and 8 lb ai/A of trifluralin, respectively), and an untreated check. Visual evaluations of plant injury (0 = no injury; 10 = dead) were recorded on June 24, July 2 and July 30 [1, 2 and 6 weeks after treatment (WAT)]. Plant vigor (0 = dead; 10 = most vigorous) was evaluated on August 26 and October 18 (10 and 18 WAT). The only significant injury was observed on *Chrysogonum* treated with isoxaben plus trifluralin at dosages of 5 and 10 lb

ai/A. Injury was first observed at 2 WAT, when average injury ratings of 1.5 and 1.75, respectively, were assigned. Injury consisted of stunting and purple leaf coloration. Slight reductions in vigor (9.0 and 8.5, respectively) of these *Chrysogonum* plants were observed later in the growing season. The only other treatment effect was a slight reduction in flowering of *Lavandula* at 10 WAT with isoxaben plus trifluralin at the 10 lb ai/A rate. Otherwise, the perennials demonstrated excellent tolerance to the herbicides tested.

Weed Management in Pumpkins: Herbicide options for pumpkins (*Cucurbita pepo* L.) were evaluated in 2004 in experiments conducted at the CAES Valley Laboratory in Windsor. Treatments were replicated four times in plots arranged in randomized complete blocks. Pumpkin seeds of two varieties ('Howden' and 'Oz') were planted in alternating plots. Plants were thinned to two per hill after 2 weeks. Treatments included an untreated check and a hand-weeded check. Preemergence (PRE) herbicides applied on June 18 were: ethalfluralin (Curbit 3EC), clomazone (Command 3ME), Strategy (ethalfluralin + clomazone), and Sandea 75DF (ethalfluralin + halosulfuron). Halosulfuron was applied as postemergence (POST) treatments. In these plots, ethalfluralin had been applied preemergence to prevent annual grasses. Postemergence halosulfuron treatments were applied at "early POST" (July 7) or "late POST" (July 16) timings. Also applied on July 16 was a treatment containing the herbicide Poast (halosulfuron + sethoxydim) to control emerged weeds in plots that did not receive any preemergence treatment.

Weed control was evaluated on July 26. All treatments containing ethalfluralin prevented more than 90% of large crabgrass (*Digitaria sanguinalis*). Ethalfluralin alone provided 80 to 90% control of redroot pigweed (*Amaranthus retroflexus*), purslane (*Portulaca oleracea*), common lambsquarters (*Chenopodium album*) and carpetweed (*Mollugo verticillata*). Clomazone did not work as well in 2004 as in previous experiments. Clomazone prevented only about 70% of crabgrass, a weed that usually is more susceptible to this herbicide. Control of other weeds by clomazone was more typical, with control ratings of 95% for purslane, 85% for lambsquarters, 42% for pigweed, and 0% for carpetweed. Halosulfuron PRE provided better control of purslane and lambsquarters than did halosulfuron POST, which was very weak on these weeds, especially at the late POST timing. All halosulfuron treatments (PRE & POST) were excellent in terms of pigweed, carpetweed and yellow nutsedge (*Cyperus esculentus*) control. Only treatments containing halosulfuron provided adequate control of yellow nutsedge. The late POST treatment containing sethoxydim controlled over 90% of emerged crabgrass. The best overall weed control was provided by ethalfluralin + clomazone combinations (except for Strategy at the lowest rate) and the ethalfluralin + halosulfuron PRE combinations.

Halosulfuron was the only herbicide to injure pumpkins. Slight stunting and chlorosis occurred when halosulfuron was applied PRE, more injury resulted from early POST treatments, and the most severe injury occurred on pumpkins sprayed with late POST halosulfuron treatments. Injury was directly related to halosulfuron application rate, but was most dependent on application timing. Most injured plants recovered well, except for the pumpkins receiving the late POST halosulfuron treatments.

As expected, the lowest pumpkin yield was harvested from the untreated (weedy) check plots. Total weight of pumpkins from the check plots was 189 lb. Low yields also resulted from poor weed control [clomazone alone: 346 lb; lowest rate of Strategy: 373 lb] or excessive plant injury [all late POST treatments containing halosulfuron: 232 to 338 lb]. The highest pumpkin yields were harvested from plots with excellent weed control and little to no plant injury. The following PRE treatments produced the highest pumpkin yields: ethalfluralin + clomazone [Strategy] at the highest application rate (549 lb), and ethalfluralin + halosulfuron (547 lb).



Dorothy Reiss and Todd Mervosh after pumpkin harvest

Invasive Plant Management at Bluff Point State Park: Oriental Bittersweet and Pale Swallowwort: Dr. Mervosh has been working in cooperation with David Gumbart of The Nature Conservancy on a project partially funded by the Long Island Sound License Plate Program, administered by the Connecticut Department of Environmental Protection, Office of Long Island Sound Programs since 2003. The primary focus is to conduct research on control of the invasive plants Oriental bittersweet (*Celastrus orbiculatus*) and pale swallowwort (*Cynanchum rossicum*) at Bluff Point State Park and Coastal Reserve in Groton, CT, and to remediate specific areas impacted by these invasives. These plants threaten the health of ecosystems at this coastal location and in many other areas throughout North America. Data on the efficacy of various treatments should improve conditions for native vegetation at Bluff Point and provide information for other projects intended to manage these invasive plants.

Research on control of Oriental bittersweet is being conducted in wooded areas at Bluff Point, where vines are adversely affecting tree growth. Vines were selected in two size classes: small vines with diameters of 15 to 25 mm (< 1 inch) and large vines with diameters of 25-40 mm (> 1 inch). Each treatment was applied to 10 vines (five small, five large) at each of three timings (April, August, November) in 2003, and similarly to a different set of vines at three timings in 2004. Treatments were applied to vines 6 to 12 inches above the ground, either to the bark of uncut vines (basal-bark treatments) or to the cut surface immediately after lopping vines off (cut-stump treatments). Each herbicide treatment was applied undiluted directly to vines with a paint brush. Basal-bark treatments (1.5 ml per vine) consisted of no herbicide (uncut check), Garlon 4 (triclopyr ester, 61.6% active ingredient), and Vine-X (triclopyr ester, 13.6% a.i.). Cut-stump treatments (0.75 ml per vine) consisted of no herbicide (cut check), Garlon 3A (triclopyr amine, 44.4% a.i.), Ortho Brush-B-Gon (triclopyr amine, 8% a.i.), Roundup Pro (glyphosate, 41% a.i.), and Roundup Homeowner Concentrate (glyphosate, 25% a.i.). Vines treated in 2003 were evaluated in the summer of 2004. A section of bark was

scraped off each vine just above ground level to determine if the vascular cambium tissues were dead or alive. Also, the number and length of any new sprouts from above or below ground were noted. Treatment efficacy in 2003 was not affected significantly by application timing. Combined over all timings in 2003, the following number of Asiatic bittersweet vines (of 30 treated) were still alive in 2004: uncut check (28), Garlon 4 basal-bark (6), Vine-X basal-bark (11), cut check (25), Garlon 3A cut-stump (3), Brush-B-Gon cut-stump (8), Roundup Pro cut-stump (1), Roundup Homeowner Concentrate cut-stump (2). Vines cut without herbicide produced an average of 2.4 new sprouts per vine. All herbicide treatments either eliminated or greatly reduced sprout formation. Bittersweet vines treated in 2004 are being evaluated in 2005.

An area of the cobble beach infested with pale swallowwort is being used as an experimental site. This coastal habitat is home to some rare or threatened native plant species. Treatments were applied to dense stands of pale swallowwort on July 15, 2003. Treatments consisted of: untreated check, swallowwort pulled by hand, plants cut off just above ground, application of glyphosate (Roundup Pro, 50% solution) to cut stems, application of triclopyr amine (Garlon 3A, 50% solution) to cut stems, foliar spray of Roundup Pro (2% solution), and foliar spray of Garlon 3A (2% solution). Spray volume was equivalent to 25 gallons of spray solution per acre. One year after treatment, plots in which plants were pulled or cut had slight reductions in swallowwort density. Although the triclopyr spray treatment reduced pod formation both years, swallowwort vigor was not affected in 2004. The largest reductions in swallowwort density and vigor occurred in plots sprayed with glyphosate and those in which glyphosate or triclopyr were applied directly to cut stems. Treatments were applied again to the same plots in August 2004, and are being evaluated in 2005.

Christmas Trees. On Fraser firs planted in a commercial plantation in 1998, Mr. Rathier is evaluating the effect of applications of luxurious amounts of phosphorus fertilizer on bud formation, growth and tree quality. Additional phosphorus is a practice used on Fraser firs growing in North Carolina and other southern states to improve bud count thus speeding growth and improving quality. Connecticut soils may already contain sufficient phosphorus for excellent trees but if additional amounts can improve tree quality or shorten field growth time, it would be a benefit. After five annual applications of 100, 200 or 400 lbs P₂O₅ per acre, the third annual evaluation was made in fall, 2002. As yet, no evidence of improved bud formation, tree growth or quality has been observed, suggesting that many soils in the Northeast already have sufficient phosphorus levels. Many trees in the experiment have reached harvest size. Final quality evaluations revealed no differences between any treatments.

In 2000, Mr. Rathier began a long-term experiment to determine how much nutrition Christmas trees get from the soil they are planted in compared to how much they get from applied fertilizers. Several plantations in Connecticut successfully grow trees with no annual applications of fertilizer though it may take them longer to grow. Forestry research suggests that uptake of fertilizer applied nutrients is slight compared to what trees get from native soil. But the slight extra nutrition that trees obtain from fertilizer nutrients may be enough to maintain quality color and reach salable size a year or more sooner. Therefore, plots have been established at the Valley Laboratory for a ten-year experiment. Uniformly high quality, 4-year-old Fraser fir transplants were

planted at ten foot spacing, which will allow for annual root pruning between plots to limit root growth into adjacent plots. One treatment will receive no fertilizer for ten years. Others will receive the following annual treatments that began in 2002: phosphorus and potassium only; nitrogen, phosphorus and potassium (NPK) applied in the spring; NPK applied in the fall; and NPK applied in the spring along with a second application of N only in the fall. Every 2 years, 4 trees from each treatment will be cut, chopped and analyzed for nutrients. During the summer of 2003, visual color differences were observed between trees receiving N (darker green) and those that have not received N (lighter green). The first set of trees to be harvested for analyses was cut in December 2003. Fresh and dry weight data did not differ between treatments. Additional harvests are planned every 2 years until the trees reach maturity. Results of this experiment could impact the industry by helping growers realize the fertility values of their soils, possible avoiding over fertilization.

In 2000, Mr. Rathier established a Christmas tree transplant survival experiment at the Valley Laboratory. With droughty springs and/or summers occurring in three out of the last five years, many Christmas tree growers have experienced substantial transplant losses that may be reflected in a shortage of mature trees in seven or eight years. Since most tree plantations cannot be easily irrigated, bare root transplants are greatly susceptible to drought problems, and growers are looking for strategies or products that may assist in survival. Products such as biostimulants, mycorrhizal fungi and planting gels are currently being used to improve transplant survival in the landscape and arborist industries. The volume of roots may also play a role in survival, so the Fraser fir transplants in this experiment were graded into 2 categories – good and poor. Each root grade group was planted with one of the following transplant survival products: biostimulant; mycorrhizal fungi; planting gel; a combination of all three products; and no treatment. In July 2002, one tree was removed from each plot and evaluated for root quantity and quality. The only effect noticed was that the trees with greater root volumes at planting were the most vigorous and continued to have the greatest root volumes. No effects were observed due to any of the supplemental treatments. Similar results were observed with the second harvest in 2003. The 2004 harvest revealed similar results. Two trees will remain in each plot to grow to salable size. Enough room was left in this experiment to make a second planting in spring, 2002 in cooperation with Dr. Cowles. Instead of grading by root volumes, however, the trees were graded based on whether or not they had their root systems injured by white grub feeding. The same evaluation criteria will apply to these trees. The impact of transplant survival experiments should be to help growers optimize survival and avoid costly replanting and losing time in production areas.

Tobacco. One shade tobacco grower in the valley is growing the crop under plasticulture (e.g. plastic film mulch for weed control and leaching management and drip irrigation for water and nutrient management). This method is appropriate for Connecticut tobacco but is complicated by the fact that the quality of our crops is linked to the traditional use of natural sources of nitrogen such as cottonseed meal or castor pomace. Conventional culture allows for the application of these meal types of fertilizers prior to planting and in side-dressings throughout the first 30 days after transplant in the field. Formation of raised beds and installation of the drip irrigation and plastic mulch

limit the use of meals to the preplant period only. Determining how much meal to add in advance and its rate of mineralization under the plastic is a significant challenge. Additionally, amounts and timing of supplemental nitrogen applied through the drip irrigation needs to be determined.

Since 1997, Mr. Rathier has been conducting studies at shade tobacco farms in Suffield and West Suffield, CT. The findings thus far are 1) The plastic mulch speeds up the N mineralization rate by 2-3 weeks, depending on the weather. In years with unusually high rainfall amounts and cool soil conditions, the plastic mulch actually slows down N mineralization. 2) The timing of supplement N applications should mirror the N needs of the plants but be advanced by about 2 weeks; 3) Applying twice as much meal fertilizer than normal does not improve N availability or yield or leaf quality. 4) Applying no meal fertilizer in advance reduces N availability, yield and leaf quality; 5) Eliminating supplement soluble N addition reduces yield and leaf quality but not N availability. 6) No difference was observed among different N treatments when soil texture was variable. 7) The actual amounts of supplement soluble N needed at any one time are far less under plastic. This study will continue for a few more years to work out all the possible variations of preplant and supplemental nitrogen and their affects on yield and quality. The major impact of this experiment will be to help growers reduce losses of nitrate nitrogen and other solutes to ground water, reduce fertilizer costs and improve the ability to grow a uniform crop.

SERVICE ACTIVITIES

Requests for information: A total of 8,229 inquiries were answered at the Valley Laboratory during the past year. The majority of these queries (77%) were answered by Mr. Thomas Rathier (5,132), assisted by Mr. John Winiarski (827) and Ms. Rose Hiskes (341) in the inquiry office, and by Drs. LaMondia (12%), Cowles (4%), and Mervosh (5%). About 60% of the requests for information were from the public sector; the remainder was from commercial growers and pest control operators. Inquiries by subject category were as follows: arthropod pests (19%); plant diseases (10%); general horticultural information (29%); soil fertility and water issues (25%); pesticide use (10%); weed control (4%); mammals, birds and reptiles (2%); and others (1%).

Continuing concern among tobacco growers over the blue mold epidemic in the Connecticut River Valley spawned a large number of inquiries to Dr. James LaMondia and Thomas Rathier. Dr. LaMondia answered 1003 inquiries, made 14 presentations to grower and citizen groups, and was interviewed on 9 occasions about his research. He also initiated and maintained the Connecticut River Valley Blue Mold Web Site to keep tobacco growers current with the progress of the disease in North America, and the potential exposure and management options in the Valley. He also obtained a Section 18 registration for Quadris fungicide for control of blue mold in shade tobacco

Inquiry office perspective: Commercial agriculture:

Mr. Rathier made 52 field visits to commercial and municipal fields, nurseries, greenhouses, Christmas tree farms, forests and private landscapes to diagnose complex problems firsthand. Some problems were solved during the visits but many required

taking plant and soil samples for laboratory analyses and subsequent reports to the growers. Most of the inquiries from commercial agriculture came during grower visits to the diagnostic lab or during phone calls.

Many diagnoses were centered on plant responses to weather conditions. The 2004 growing season was moderate throughout most of the summer and remained so during the fall and early winter. Sunlight was somewhat limited during the summer which kept yields down and promoted diseases due to unmarketable products among annual crops and woody plants. Many large trees in parks, golf courses and commercial landscapes required substantial pruning or even removal as the drought related losses from previous seasons continued. Many weakened trees succumbed to vascular wilts such as *Verticillium* and Dutch elm disease and various borers.

Christmas trees performed well with newly planted and mature trees growing well in 2004. The 2005 spring planting season had many difficulties to, at first to cooler weather followed by 2 damaging, warm, dry spells in June. Drought related injuries are expected as the 2005 season continues. White pine weevil, Pales weevil, spruce spider mites and elongate hemlock scale were the insect pests most often reported. Needle diseases (*Rhabdocline* and *Rhizosphaera* needlecasts and spruce needle rust) were the most reported problems.

Comparatively little winter injury was observed on over-wintering woody plants in production settings although some desiccation injuries occurred on broadleaf evergreens and conifers. Growers of woody and herbaceous plants in containers outdoors experienced good results during the growing season. Most plants over wintering in white plastic covered hoopouses or other structures made it through the winter with very few injuries. Freeze and frost injuries and subsequent bacterial or fungal blights and leaf spots resulted in significant losses, especially in lilacs and rhododendrons.

Greenhouse growers experienced a bright though difficult to heat late winter season but cool, dark conditions during the spring resulted in root diseases such as *Pythium* and foliar diseases, especially *Botrytis* blight. The marketing season for bedding plants was marred by several rainy, cold weekends which limited sales.

Golf courses and turf farms saw more foliar and root diseases throughout the cool, moist summer and fall. Forage crops grew well but most growers were unable to harvest hay on time in June 2005. Silage crop harvests were moderate in 2004 although some wet conditions made storage of harvests difficult.

Small fruit harvests were below average during the 2004 season, with cool, wet conditions causing significant disease and harvest problems. Spring 2005 saw very little frost damage to strawberries but difficult conditions for harvesting and yields were average.

Vegetable growers required very little irrigation but had only modest harvests in 2004 due to disease loss and poor ripening. Bacterial spot and wilt diseases continued to plague peppers and tomatoes. Growers using plasticulture or row covers saw fewer problems despite a colder than normal start. The planting season in 2005 was plagued by alternating cold and very warm and dry conditions. Many growers had to replant fields.

Tobacco acreages did well in 2004 although cool conditions probably limited yields somewhat. Blue mold appeared later in the season and had a comparatively minimal effect thanks to greater attention to fungicide spray coverage and the widespread use of the fungicides Acrobat and Quadris. Most broadleaf tobacco growers experienced

significant curing losses as wet conditions in late summer kept harvested tobacco from drying properly in sheds. Ordinary insect problems, such as budworms and aphids were present in many fields. The transplant production season in spring 2005, as was the case in both 2003 and 2004, was hampered by significant periods of cool, dark conditions, which limited rapid growth in the greenhouse. Also present in spring 2005 was black root rot (*Thielaviopsis basicola*), which resulted in substantial losses of transplants. Presently, no fungicide is registered for management of this disease but growers can successfully use cultural methods to manage the disease.

Commercial and Home Landscapes

As for commercial agriculture, weather conditions throughout the bulk of 2004 were moist and moderate with nearly all landscape plants growing vigorously and making it into Spring 2005 with some winter injuries and other desiccation problems, especially to conifers like arborvitae. Most other plants survived the winter in good shape. Spring 2005 brought many problems as April and May were dryer and much colder than ordinary followed by nearly the warmest, driest June in history.

Vascular wilts, most commonly caused by *Verticillium* were diagnosed in many different woody plants but most commonly in maples. More than likely the infections were made worse by the droughty conditions of previous seasons. Despite the moist conditions, many trees will continue to fail well into 2005.

Home landscapers reported more success with transplanted trees and shrubs, due mostly to more consistent moisture supplies. Transplant shock or failure remains the single most important cause of losses in landscapes. In some cases, field dug shrubs and trees did not have enough roots to support the transplant and soil conditions did not allow timely growth of new roots. Container grown plants may have had too many roots that didn't allow the plant to grow new roots until too late. The highly porous conditions of container growing media create conditions where root growth dominates the space within the container and the plants do well while under daily irrigation. But once that root ball is placed in a typical landscape soil, its needs are no longer met. The plant lives on the carbohydrate reserves in the roots and stems and often do not grow new roots. Landscapers and homeowners need to take better care to prevent or limit this condition.

Home landscapers with frequent irrigation habits reported many cases of slime molds growing on mulches, especially wood chips or locally produced bark mulch that contained large amounts of wood. The presence of wood in the mulch allows the mold fungi to grow more rapidly, and the moist conditions of regular irrigation created the ideal environment for growth. Artillery fungus that "shoots" spore cases towards light colors such as structures and vehicles, also grow well in these conditions and was widely reported. Many cases of sour mulch were reported in 2003. This is caused by poorly piled mulch becoming anaerobic, producing alcohols and acids that can injure many plants.

Also a result of two darker, moister growing seasons, algae and lichens were reported on a variety of surfaces including trees, paved areas, bare soil, roofs and siding. Frost and freeze related problems were observed on an assortment of plants in June 2005.

Hemlock woolly adelgid has begun to rebound after two difficult winters in a row (2002-2003 and 2003-2004). Cool moist conditions in the 2004 growing season and a moderate winter of 2004-2005 allowed many hemlocks to recover and grow more

vigorously. The same conditions also favored adelgid populations and, for the first time in a few years, sprays were necessary. Also plaguing hemlocks and other conifers were elongate hemlock scale and spruce spider mites.

Gypsy moths were quite prevalent in several areas around the state, perhaps the result of dry conditions in June 2005. Sprays were typically not needed but homeowners and landscapers are being cautioned to scout for egg masses in the coming winter and to be prepared to spray next year.

Other arthropods of note during 2003 were white pine weevil and Pales weevil. Hard pines were once again infested with European sawflies, tip moths and pine shoot moths. Pear leaf blister mites were widespread in early spring, 2004. Leafhoppers, lace bugs, arborvitae leaf miners were more plentiful and significant defoliation by assorted caterpillars and sawflies was observed on deciduous and evergreen plants.

Also noticed were azalea bark scale, cottony camellia scale, assorted lecanium scales and white prunicola scale. Hibiscus sawfly and lily leaf beetle, both newcomers to Connecticut continued to establish populations in Connecticut. Viburnum aphids and assorted eriophyid mites were more numerous in Spring 2005.

Diseases were more plentiful in 2004-2005, especially foliar disorders such as leaf spots, blights and anthracnose. Anthracnoses have been widespread and especially problematic to sycamores, oaks, maples and birches. Cedar apple rust and other gymnosporangium rusts were quite common on many crabapples, hawthorn and shadbush. Stressed related cankers were reported on many trees, especially ornamental cherries, maples and beeches.

Powdery mildew was a problem on many different broadleaf trees and shrubs as well as herbaceous plants. Conifers were plagued by needlecasts, needle rusts, and tip blights.

Home lawns experienced cool moist conditions throughout all of 2004 and right up through May, 2005. But drought conditions resulted in some losses in June, 2005. Disease pressure was much higher on high maintenance lawns, especially summer patch, Pythium and red thread. Large numbers of scarab beetles adults were reported in spring 2005, so caution may be appropriate for the coming season. White grub injury was less obvious because conditions were less stressful. Bluegrass billbug outbreaks have been observed on a few occasions and only on sodded areas.

Ground ivy, violets, corn speedwell and yellow nutsedge were the most important weeds in lawns. Poor crabgrass management was a common observation in 2004 due mostly to home landscapers applying pre-emergent controls too early in the season followed by heavy rains and cool conditions. Crabgrass germinated late in most lawns and management compounds were below the seed by then. Moss colonization of poor turf areas received plenty of attention from homeowners, as well.

Management strategies offered for all pests include cultural and sanitary approaches as the primary effort with low impact pesticides as a second effort, and lastly, stronger pesticides when other approaches do not succeed.

Wildlife and Structural Pests

Animal problems were numerous throughout the year with most inquiries concerning squirrels, chipmunks, moles, voles, rabbits, woodchucks, skunks and snakes.

Insects that bother humans were of concern to many homeowners during the wet conditions of 2004, especially mosquitoes. Many inquirers expressed interest in larvicidal, sanitary and predatory (bats) management strategies rather than sprays. Mosquito problems were less intense in spring 2005. Many ticks were submitted for identification. All blacklegged ticks were forwarded to the lab in New Haven for spirochete analysis. Wasps, especially German yellow jackets and solitary ground bees were bothersome to many. Numerous populations of ground bees were reported in Spring 2005.

Among arthropods found inside structures, carpenter ants, termites, black and varied carpet beetles, ground beetles, grass carrier wasps, cigarette beetles, larder beetles, acorn weevils and spiders received the most attention. Also noted were multicolored Asian lady beetles, squash bugs, western conifer seed bugs, boxelder bugs, clover mites, assorted food infesting beetles, Indian meal moths and centipedes and millipedes. On a somewhat disturbing note, bed bugs were submitted in greater numbers in the past year.

Where management strategies for indoor and other structural pests were necessary, most homeowners chose baiting and/or sanitation rather than pesticide use.

Field visits by scientific staff: Valley Laboratory scientists visited 309 commercial fields, greenhouses, golf courses, Christmas tree farms, residential properties, parks and forests during the past year to diagnose the more complex problems firsthand. The majority of these visits were made by Timothy Abbey (137) who visited production nurseries, Christmas tree growers, and golf courses. Thomas Rathier made 52 visits to commercial and municipal fields, nurseries, greenhouses, Christmas tree farms, forests and private landscapes, Dr. Richard Cowles made 22 field visits to evaluate soil-inhabiting insect pests and mites in nurseries and strawberry fields, Dr. James LaMondia visited 19 farms, and Drs. Todd Mervosh and John Ahrens made 31 and 11 visits, respectively, to investigate weed control problems. Most problems were solved during these visits, but many required taking plant and soil samples for laboratory analysis with subsequent reports to growers by letter or phone call.

Special diagnostic tests: Valley Laboratory scientists conducted 1043 special diagnostic tests at the request of citizens during the past year. Of these, 500 were in-depth investigations of unusual pest problems by Thomas Rathier and Rose Hiskes, 233 involved identification and enumeration of plant parasitic nematodes in soil samples by Dr. James LaMondia, 40 were evaluations of mites and soil-inhabiting insects by Dr. Richard Cowles, 79 were tobacco seed germination trials and 99 were soil texture or organic matter determinations conducted by Mr. John Winiarski, 50 were made by Tim Abbey from nursery visits, and 8 were identifications and control evaluations of weeds by Drs. Todd Mervosh and John Ahrens.

Soil testing: A total of 4,042 soil tests were expertly performed by Mr. John Winiarski during the past year. About 63% were performed for commercial growers, 30% for homeowners, 1.5% for municipalities, and the remainder for Station research. Of the 2,573 commercial samples submitted, 49% were for landscapers; 22% for tobacco growers; 23% for nursery growers; 5.5% for vegetable growers; 2% for Christmas tree

growers; 1.5% for golf course superintendents; 2% for fruit growers; 1% for greenhouse growers, and the remainder for others.

Gordon S. Taylor Conference Room: Many agricultural organizations used the conference room at the Valley Laboratory regularly for their meetings. During the past year, 40 different groups used the room on 131 occasions. Our most frequent users were the Farm Wine Council, the CT Wine Association, Connecticut Chapter of the National Association of Organic Farmers, Connecticut Department of Environmental Protection, Connecticut Farmland Trust, Connecticut Farm Fresh, Connecticut Greenhouse Grower's Association, Connecticut Nursery and Landscape Association, Connecticut Rhododendron Society, and Connecticut Invasive Plants Workgroup. Jane Morrison, Thomas Rathier and John Winiarski scheduled the appointments and Richard Horvath arranged the furniture for scheduled meetings and ensured that the room was available after hours.

*BULLETINS OF THE CONNECTICUT AGRICULTURAL EXPERIMENT
STATION PUBLISHED DURING 2004-2005*

- 996 (966) Identification Guide to the Mosquitoes of Connecticut. 178 pages.
Theodore G. Andreadis, Michael C. Thomas, and John J. Shepard.
Illustrated by Gale Ridge. (2005)

*SCIENTIFIC JOURNAL ARTICLES PUBLISHED
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