

Connecticut Agricultural Experiment Station



At a Glance

LOUIS A. MAGNARELLI, Director

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Established – 1875

Statutory authority – CGS 22-79 – 22-118

**Central office – 123 Huntington Street,
New Haven, CT 06511**

Number of employees – 93

Recurring operating expenses -

General Fund - \$6,673,111

Federal Funds - \$3,418,677

Other - \$539,532

Total - \$10,631,320

Organizational structure – Administration, Analytical Chemistry, Biochemistry & Genetics, Entomology, Environmental Sciences, Forestry & Horticulture, Plant Pathology & Ecology, Valley Laboratory (Windsor, CT), Griswold Research Center (Griswold, CT).

Mission

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

Statutory Responsibility

Statutory responsibilities for The Connecticut Agricultural Experiment Station (CAES) focus on insects, ticks, plants and related diseases, and the development of methods to reduce pesticide use (i.e., integrated pest management). Field and laboratory studies are conducted, as determined by the agency's Board of Control or as requested by the General Assembly, pursuant to Connecticut General Statute (CGS Section 22-81). On occasion, state residents identify new, specific problems that need investigation. Scientists and technicians analyze food and other items at the request of any state agency; test ticks for the Lyme disease agent upon request of a state or municipal health officer or for scientific research purposes; test mosquitoes for encephalitis viruses; oversee official control, suppression or extermination of insects or diseases, which are or threaten to become serious pests of plants; conduct research on integrated pest management (CGS Section 22-84a); inspect for diseases of honey bees and register beekeepers (CGS Sections 22-89, 22-90); and survey towns for gypsy moths, Asian longhorned beetles, Emerald ash borers, and other insect pests of economic or public health importance. The Director is in charge of all matters pertaining to serious pests of plants and has regulatory authority (CGS Sections 22-84); responsibilities include the inspection and certification of nurseries, the registration of dealers of nursery stock, and enforcement of federal and state quarantines. Findings are reported to the public and scientific community by correspondence, lectures, media interviews, the agency's website, or published works. Emphasis is placed on submitting scientific manuscripts to peer-reviewed journals.

Station staff members provide prompt answers to routine and difficult but important agricultural, food safety, forestry, environmental, consumer protection, or public health questions by performing analyses; providing services to state residents; assisting small and large businesses, municipalities, state agencies and the scientific community; and by giving oral and written reports of research findings. Transferring new scientific information to the public and businesses is a high priority. The enhanced agency website (WWW.CT.GOV/CAES) continues to be an efficient means of communicating results and reducing operating costs. There were about 1,113,099 page views during this reporting period. Of these, 7,830 page views were recorded for CAES publications. The average visit duration was about 14 minutes. Staff members gave more than 800 talks and interviews to civic groups and the media. Two open house events were held during the spring and summer to give state residents an opportunity to meet scientists, hear presentations on scientific progress, see experimental plots and laboratories, and to make comment on research and outreach programs.

Public Service

Public service is a high priority. The CAES serves a diverse group of state residents, large and small businesses, municipalities, and the scientific community within its areas of expertise. More than 48,000 jobs in agriculture, wood products industry, and other business sectors are supported by the services provided by CAES staff members. People bring or mail samples or call with questions to the New Haven or Windsor facilities. Extensive contacts with state residents are particularly important for the early detection of emerging insect or plant disease problems. Global marketing of plants and plant products increase the chances for the introduction of exotic pests, such as the Asian longhorned beetle and Emerald ash borer. Nearly 19,000 state residents received direct assistance from staff members at the CAES during the past year. Station scientists also visit farms when difficult or unique problems arise and provide information to

growers and the media when asked. In addition, scientists served on advisory boards and provided information to about 110 stakeholder organizations. Employees of other state agencies, such as the Departments of Agriculture, Consumer Protection, and Energy and Environmental Protection, also requested help from Station staff members when they sent specific samples for chemical, biological or microscopic analyses. All of these activities helped identify emerging problems, facilitated prompt and accurate responses to state residents, and ensured safe foods and other products. Receiving comments from citizens on evaluation or survey forms at public workshops, open house events, and other agency functions helps administrators gauge the effectiveness of research programs and services and provides opportunities to realign program goals. In addition, there is an annual assessment of whether or not objectives listed in the agency's five-year strategic plan are being achieved. This strategic plan, a requirement for USDA funds, is reviewed annually by federal officials.

New testing procedures are developed as needed to improve analyses, particularly when samples require more sensitive and specific methods. For example, CAES scientists developed new analytical methods to detect oil-related chemicals in seafood. These methods greatly assisted the US Food and Drug Administration (FDA) in determining the safety of seafood caught in the Gulf of Mexico following the Deep Horizon oil spill. Scientific research at the CAES involves identifying a problem, investigating existing published knowledge, and designing experiments which will provide new information to help solve a problem, enhance Connecticut's economy, or improve the well-being of state residents. In many instances, scientific results have impacts nationally.

Specific examples include the following:

- **Food Safety:** Connecticut General Statute [Sec. 22-81(c)] directs the CAES to conduct analyses as required by any state agency. In addition, CAES chemists work closely with the US FDA in the Food Emergency Response Network and the US Environmental Protection Agency (EPA). The CAES has a five-year, \$2 million grant from the FDA. Seafood samples, collected by the FDA near the oil-spill area of the Gulf of Mexico, were tested for polycyclic aromatic hydrocarbons by new methods developed by CAES chemists in collaboration with scientists at the FDA Forensic Chemistry Center in Cincinnati and the Minnesota Department of Agriculture. These new methods have been published in a peer-reviewed journal. In collaboration with the FDA, some of the seafood tested in the national program was done by CAES scientists using these new methods. No violations were reported concerning contaminated seafood. With increased commerce from foreign countries and more emphasis on large-scale food processing domestically, there have been instances when foods, beverages, and other consumer products have contained toxic chemicals, such as pesticide residues, melamine, cadmium, or lead. In cooperation with the Department of Consumer Protection, chemists at the CAES have recently analyzed imported herbs and detected pesticide residues that exceeded EPA tolerance levels. Results were reported to the CT Department of Consumer Protection and the FDA for regulatory action. In addition, chemists at the CAES are prepared to assist the 14th Connecticut National Guard Civil Support Team and the Federal Bureau of Investigation as a part of the counter-terrorism program on toxic chemicals.
- **Mosquito/Encephalitis viruses:** Pursuant to CGS Section 22-81a, scientists and other staff members at the CAES collect mosquitoes at 91 trap sites in the state, identify the insects to species, and process pools of specimens for cell cultures to determine if the mosquitoes were carrying encephalitis viruses. During the period of early June through July 25, 2011, about

190,000 mosquitoes were tested in the statewide surveillance program. This total exceeds the 113,354 mosquitoes caught during the entire 2010 season. West Nile virus was most prevalent in New Haven and Fairfield Counties. Specific results are posted on the CAES website. The West Nile virus, historically most active in southern and southwestern Connecticut, has been detected in more inland areas of the state. Frequent press releases on the presence of West Nile virus-infected mosquitoes, issued by the Connecticut Department of Health, helped warn state residents and provided information on how to reduce risks of mosquito bites.

- **Control of Invasive Aquatic Plants:** CGS Section 22-81(c) directs the CAES to perform experiments on plants. Members of lake associations have reported extensive growths of aquatic weeds and have asked for CAES assistance in improving water quality. Explosive growth of aquatic weeds can reduce public access to water, restrict boat navigation, increase harmful sedimentation and eutrofication processes, and negatively alter wildlife habitats. The herbicide diquat has been effective in reducing weed infestations in localized areas. However, municipal officials and property owners, living adjacent to treated areas, were concerned about possible long-term herbicide contamination of the water. Per aqueous liquid chromatography methods were used to analyze water samples collected one day after dilute concentrations of diquat were applied to a portion of a lake. Tests revealed that the amount of herbicide present in the treated lake water was extremely low (about 309 parts per billion). This concentration is not considered a human health concern. The herbicides controlled the weed problem.
- **Japanese Barberry/Ticks:** Blacklegged ticks transmit disease organisms that cause Lyme disease, human granulocytic anaplasmosis, and human babesiosis. Relatively high concentrations of infected ticks have been associated with extensive growths of Japanese barberry in woodlands. The white-footed mouse and other small rodents are hosts for immature ticks and serve as reservoirs of the aforementioned human pathogens. The mice live in the barberry thickets and are protected from avian and mammalian predators. Field experiments have revealed that removal of Japanese barberry reduces the numbers of infected ticks by lowering the rodent population and humidity. Ticks need high humidity for optimal survival. In cooperation with land trusts, municipalities, conservation groups, and the CT Department of Energy and Environmental Protection, more than 450 acres of land have been treated for barberry control.

Improvements/Achievements 2010-11

A new cultivar of strawberry (called Rubicon) was produced. This plant is resistant to the black vine weevil, a destructive insect pest, and root rot (caused by a fungus infection). The new cultivar should require less pesticide usage. New statutory authority (CGS 22-82a) permits the CAES to seek patents, trademarks, and licensing agreements. Papers have been filed to patent the strawberry plant discovery and to use portions of the royalties for operating costs and reinvesting into the crop research programs.

A collaborative two-year study, conducted by the CT Department of Energy and Environmental Protection (DEEP), The CT Department of Public Health, University of Connecticut (Farmington), and the CAES, was completed. The purpose of the study was to assess the health and environmental impact of artificial turf fields that contain crumb rubber infill derived from recycled tires. The Department of Analytical Chemistry at the CAES investigated the release of chemical compounds from the crumb rubber materials in the laboratory. The

DEEP coordinated field tests of chemicals leaching from the athletic fields, and UConn conducted analyses of air above one indoor and four outdoor artificial turf fields. Although several chemicals were detected volatilizing and leaching from crumb rubber materials in the laboratory, the use of outdoor and indoor artificial turf fields was not associated with elevated health risks. The study report (available at the DEEP) also noted that it would be prudent for building operators to provide adequate ventilation for indoor fields. However, higher amounts of zinc, detected in storm water samples from the fields, exceeded aquatic toxicity criteria. The scientific work was reviewed by a panel of expert scientists chosen by the CT Academy of Science and Engineering. The CAES research findings were published in *Chemosphere*, a peer-reviewed, scientific journal.

Lyme disease and other tick-associated diseases are prevalent in northeastern United States. Incidence of Lyme disease in Connecticut is among the highest in the country. The application of pesticides remains a primary method of tick control in the residential landscape. However, there is growing interest in developing biological, natural, and cultural methods to reduce the risk of tick bite and disease. Scientists at the CAES conducted the first field trials in the United States with a pathogenic fungus that kills the tick that transmits the Lyme disease agent and other human pathogens. Field trials resulted in 56% and 85% control of ticks in lawn and woodland plots, respectively, at treated home sites. A provisional registration for the fungus was obtained by the manufacturer from the EPA. Subsequent field trials conducted by CAES scientists resulted in full EPA and individual state registrations.

The CAES reaffirms its continuing policy of commitment to affirmative action and equal opportunity employment as immediate and necessary objectives and relies solely on merit and accomplishment in all aspects of the employment process and research programs. One Other female, one White female, and one White male were hired as Postdoctoral Research Scientists. Nine minority seasonal research assistants (college students) were also employed along with 22 white males and 20 white females during the summer as a part of a mentoring program. The student volunteer program was expanded to include 15 persons. The goals of mentoring programs are to promote interest in science and provide specialized training. Station scientists also participated as judges in science fairs in New Haven and encouraged high school students to further their science education. The CAES continues to comply with diversity training requirements and is also participating in the University of Connecticut's Employee Assistance Program. The agency's goals in awarding contracts to small businesses and minority business enterprises were exceeded. The agency's Affirmative Action Plan was filed on schedule and conditionally approved by the Commission on Human Rights and Opportunities.

Information Reported as Required by State Statute

Scientists and technicians performed chemical, seed, soil, fertilizer, pesticide, animal feed, mosquito, and tick tests; answered inquiries; conducted plant, nursery, and bee inspections; and surveyed for the gypsy moth and other insect pests as listed below.

Service or Test Number	2010-2011
Inquiries answered (all departments)	18,609
Field visits and diagnostic tests	767
Soil Tests completed	
New Haven and Windsor	10,957

Samples Tested

Department of Agriculture	392
Department of Consumer Protection (DCP)	933
Department of Energy & Environmental Protection	172
CAES Departments	171
Municipal Health Departments, Police, Nonprofits	52
UConn Cooperative Extension	14
Seed Samples Tested (vegetable, lawn, field crop)	339
Plant Samples Tested (incl. more tests for DCP)	2,329

Nursery and Seed Inspections

Greenhouse plants	7,182
Nursery stock containers and bare root	101,685
Perennial plants	4,129
Nurseries inspected	311
Nursery inspections	719
Tobacco (bales, boxes, bundles, and cartons)	121,121
Permits to move homeowner plants out of state	6
Seed (cartons and bags)	506
Acres of nursery stock inspected	7,925

Gypsy Moth Survey

Forest acres surveyed for gypsy moth by air	1.8 million
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Bee Inspection

Beekeepers registered	861
Beehives examined for mites and foulbrood	773

Tick Identification and Testing

Ticks identified	3,128
Ticks tested for Lyme disease spirochetes	1,476
Ticks infected with spirochetes	391 (26.5%)

Mosquito Testing

Mosquitoes trapped, identified, and tested for EEE, West Nile, and other encephalitis viruses	113,354
Number of trapping sites	91