

The Connecticut Agricultural Experiment Station



At a Glance

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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 – 91

Recurring operating expenses:

General Fund – \$ 7,099,882

Federal Funds – \$ 3,439,197

Other – \$ 484,138

Total – \$ 11,023,217

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, Protecting Agriculture, Public Health and the Environment” 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). Within available resources, field and laboratory studies are conducted, as determined by the agency's Board of Control, state residents (e.g., growers), or as requested by the General Assembly, pursuant to Connecticut General Statute (CGS Section 22-81). 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 public health threat from encephalitis viruses (CGS Sec 22-81a); 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 moth, Asian longhorned beetle, Emerald ash borer, and other insect pests of economic or public health importance. In many instances, there are interactions with scientists or other officials in federal agencies. 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 or regulations. 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 research findings and reducing operating costs. There were 237,074 sessions, 510,467 page views and 146,983 users during this reporting period. The average session duration was 2 minutes. Social media is also being used to reach out to our constituents via Facebook www.facebook.com/CT.CAES, Twitter www.twitter.com/CT_CAES, and YouTube Channel www.youtube.com/user/CTAGEXPSTATION. CAES also maintains a Wikipedia page http://en.wikipedia.org/wiki/Connecticut_Agricultural_Experiment_Station. Staff members gave more than 569 talks and interviews to civic groups and the media. One open house event was held at our Lockwood Farm facility during the summer; more than 925 state residents had an opportunity to meet scientists, hear presentations on scientific progress, see experimental plots and laboratories, and to make comment on research and outreach programs. Tapings of the event at are available on the CTN, Connecticut Network, <http://www.ctn.state.ct.us/>

Public Service

Public service remains 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 invasive pests, such as the Asian longhorned beetle and Emerald ash borer. Boxwood blight, a fungal disease new to North America first described in Connecticut in October 2011, continues to threaten landscapes, production nurseries, and garden centers in the state. The emerald ash borer was first detected in Connecticut on July 16, 2012 in the town of Prospect. Subsequently in 2013 and 2014, this destructive tree pest was found in additional towns in New Haven County and adjacent towns in Fairfield, Litchfield, and Hartford Counties. The state quarantine was expanded from New Haven County to include all four counties. State regulations control the movement of wood and other regulated articles. More than 24,800 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, Public Health 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' inquiries, 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 5-year strategic plan are being achieved. This strategic plan and accomplishment reports are requirements for USDA funds. Both documents are reviewed annually by federal officials.

New testing procedures are developed as needed to improve analyses, particularly when samples require more sensitive and specific methods. Scientific research at the CAES involves identifying a problem, investigating existing published knowledge, and designing experiments which will provide new information to help solve the 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 Food and Drug Administration (FDA) in the Food Emergency Response Network (FERN). The CAES has a 5-year, \$2 million grant from the FDA for the FERN, as well as an additional 5-year \$1.5 million FDA grant to achieve ISO Accreditation as described in the Food Safety Modernization Act. Recent work with the FDA has centered on CAES staff validating new methods and instrument platforms for the detection of contaminants in food; chemists at CAES are not only applying these methods and analytical platforms to federal samples but also to our state programs. In a targeted study focusing on teas, samples of tea bags were collected by CT Department of Consumer Protection (CT DCP) Inspectors, including green and black teas, oolong tea, and organic products. All non-organic teas contained violative pesticide residues, with an average of 5 violations per sample; two tea samples contained 10 violative pesticide residues. Two of the organic teas contained no

pesticide residues but the remaining three have 6 violative residues each. In nearly all cases, these were “zero tolerance” violations and residues were present at part per billion levels. The data was reported to the FDA, CT DCP, and the US Department of Agriculture; a regulatory response is anticipated shortly. With increased commerce from foreign countries and more emphasis on large-scale food processing domestically, there is increasing potential for foods and beverages to be contaminated with toxic chemicals, such as pesticide residues, melamine, pharmaceuticals and heavy metals. The CAES “Market-basket” program serves as the sole chemical surveillance and monitoring effort in the state, assuring that the food supply within CT is free from adulteration and contamination. Chemists at the CAES continue to assist the Federal Bureau of Investigation (FBI) Weapons of Mass Destruction Directorate (WMDD), 14th Connecticut National Guard Civil Support Team, and CT Department of Public Health Bioterrorism Coordinator as a part of the counter-terrorism programs within the state.

- **Mosquito-Borne Disease Surveillance:** Mosquito surveillance for eastern equine encephalitis (EEE) and West Nile virus (WNV) is integral to the public health response to these mosquito-transmitted diseases in Connecticut and provide an effective early warning system for citizens of the State (CGS Section 22-81a). CAES scientists and technicians monitor mosquito and encephalitis virus activity at 91 trapping sites from June through October. In 2013, WNV was detected in 90 mosquito pools collected from 22 towns representing over 192,000 mosquitoes. Four human cases were reported in Fairfield County. High levels of EEE activity were found in New London County. A total of 58 isolations of EEE virus were made from mosquitoes collected in five towns. Camp grounds in the Pachaug State Forest in Voluntown were closed due to high EEE activity in mosquitoes. A horse stabled in Griswold and hundreds of pheasants from commercial flocks in Killingly, Putnam and Sprague died from EEE infections this past summer. An adult resident of eastern Connecticut died of EEE virus associated illness, the first confirmed human case in the State. CAES continues to closely monitor the expansion in Connecticut and vector potential of two exotic mosquito species from Asia, *Aedes albopictus* (Asian tiger mosquito) and *Aedes japonicus* that are aggressive human biters and have been implicated in transmission of several human pathogens, including Chikungunya virus, EEE and WNV.
- **Invasive Aquatic Plants:** CGS Section 22-81(c) directs the CAES to perform experiments on plants. Invasive aquatic plants have been introduced in Connecticut from other parts of the world. With no natural enemies, they spread rapidly and threaten the ecological and recreational value of Connecticut’s lakes. Since 2004, the CAES Invasive Aquatic Plant Program (IAPP) has completed aquatic vegetation surveys of 206 Connecticut lakes and found 60% contain invasive plants. Government and local officials request CAES assistance in finding methods to protect their bodies of fresh water. In fiscal year 2013-14, CAES IAPP surveyed 23 lakes and performed multifaceted research including; the effects of winter drawdown on Eurasian watermilfoil in Candlewood Lake (Danbury), the use of grass carp to control curly leaf pondweed in Grannis Lake (East Haven), and the efficacy of herbicide treatments of variable water milfoil in Bashan Lake (East Haddam) and Brazilian waterweed in Fence Rock Lake (Guilford). The CAES IAPP has extensive public outreach via workshops, speaking engagements and a comprehensive web site available at www.ct.gov/caes/iapp. Results are published the scientific journals, technical reports and in CAES bulletins.

- **Tick-Borne Disease Research:** Human cases of Lyme disease and other tick-borne diseases are prevalent in Connecticut. CAES has found that human babesiosis is expanding in the state and a relatively rare virus called Powassan that causes serious disease has now been found in ticks collected in Bridgeport and North Branford. An integrated tick management project supported by the Centers for Disease Control and Prevention is being conducted in four neighborhoods in the town of Redding to reduce the abundance of the blacklegged tick, *Ixodes scapularis*, and the risk of disease. A combination of interventions that include a natural entomopathogenic fungus product (*Metarhizium anisopliae*), mouse bait boxes, and deer management are being evaluated over a three year period. The application of the fungus reduced nymphal blacklegged tick populations on residential properties by an average of 75% the first year of the study. Deer populations decreased by 28% in areas between 2013 and 2014 where population management was undertaken, while increasing by 21% in the unmanaged areas.

Improvements/Achievements 2013-2014

New statutory authority (CGS 22-82a) permits the CAES to seek patents, trademarks, and licensing agreements. License agreements have been established for a new cultivar of strawberry and a disease-resistant tobacco cultivar. Portions of the royalties are being used for operating costs and reinvesting into the crop research programs.

Efforts continue to reduce energy and other operating expenses of the agency. The agency has converted to natural gas to heat our buildings on the New Haven Campus. The agency has actively participated in the Governor's Lead by Example energy efficiency program and replaced the exterior lighting on the New Haven Campus to LED technology. In the coming year we will be replacing the windows in three of our older laboratory buildings which will provide significant savings on energy and maintenance costs. The Griswold Research Center is fully operational with the addition of a 27 x 48 greenhouse to propagate experimental plants and trees.

Plant pathologists at the CAES continued their research on boxwood blight, a fungal disease caused by *Calonectria pseudonaviculata* new to North America detected on boxwood and pachysandra in landscapes and nurseries in Connecticut. This disease is continuing to spread and is now found in 15 other states and three provinces in Canada. Boxwood is an economically important crop for the Connecticut nursery industry and is a popular ornamental plant in landscapes. With input from the nursery industry, personnel at the CAES responded to these problems by developing guidelines for best management practices (BMPs) for mitigating boxwood blight for use by landscapers, commercial plant producers, and homeowners. Research programs at CAES have made advances in developing molecular tools for early detection in plants, soil, and water, understanding survival and longevity of the fungus on hard surfaces in nursery production, identifying effective sanitizers for disinfecting tools and equipment, and identifying effective fungicides to prevent new infections. BMPs are updated when new, science-based information from our ongoing research programs becomes available. BMPs and basic information on the fungus (including pictures of infected plants) are posted on the CAES website (www.ct.gov/caes).

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. The CAES

employed 15 white male, 23 white female, and five minority seasonal research assistants during the summer as a part of a mentoring program. The student intern program, designed to teach scientific methods in brief periods, was continued to include 6 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 Hamden. Through these and other direct interactions, staff 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.

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	2013-2014
Inquiries answered (all departments)	19,370
Field visits and diagnostic tests	741
Nematode diagnostics	162
Soil Tests completed	
New Haven and Windsor	11,200
Samples Tested	
Department of Agriculture	455
Department of Consumer Protection (DCP)	248
Department of Energy & Environmental Protection	247
CAES Departments	626
FDA, Municipal Health Departments, Cities/Towns, Misc. Foundations	153
UConn Cooperative Extension	21
University Research Collaborations	1,698
Seed Samples Tested (vegetable, lawn, field crop)	329
Plant Samples Tested (incl. more tests for DCP)	7
Food Samples Tested	260
Nursery and Seed Inspections	
Greenhouse plants	329
Nursery stock containers and bare root	45,730
Perennial plants	4,173
Nurseries inspected	671
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Tobacco (bales, boxes, bundles, and cartons)	113,658
Permits to move homeowner plants out of state	11
Seed (cartons and bags)	597
Acres of nursery stock inspected	3,134
Gypsy Moth Survey	
Forest acres surveyed for gypsy moth by air	1.8 million

Bee Inspection

Beekeepers registered	737
Beehives examined for mites and foulbrood	951

Tick Identification and Testing

Ticks identified	2,956
Ticks tested for Lyme disease spirochetes	1,587
Ticks infected with spirochetes	499 (31.4%)

Mosquito Testing

Mosquitoes trapped, identified, and tested for EEE, West Nile, and other encephalitis viruses	192,172
Number of trapping sites	91