The Connecticut Agricultural Experiment Station

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Putting Science to Work for Society since 1875

At a Glance

THEODORE G. ANDREADIS, Ph.D., ***Director***
Jason C. White, Ph.D., ***Vice Director***
***Established* – 1875**
***Statutory authority* – CGS 22-79 – 22-118**
***Central office* – 123 Huntington Street, New Haven, CT 06511**
***Number of employees* – 89**
***Recurring operating expenses*:**

General Fund –	**$ 6,669,043**
Federal Funds –	**$ 3,079,735**
Other/Pass Thru –	**$ 1,001,688**
Total –	**$ 10,750,466**

***Organizational structure* – Administration, Analytical Chemistry, 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 infectious agents that cause Lyme disease, Babesiosis and Anaplasmosis 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 60,372 page views during this reporting period. The average session duration was 3:39 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, YouTube www.youtube.com/user/CTAGEXPSTATION, Instagram www.instagram.com/ct.caes/, and Pinterest www.pinterest.com/caes123. CAES also maintains a Wikipedia page http://en.wikipedia.org/wiki/Connectcut_Agricultural_Experiment_Station. Staff members gave 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 1,157 state residents had an opportunity to meet scientists, hear presentations on scientific progress, see experimental plots and laboratories, and to make comments on research and outreach programs. Tapings of the event 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 increases the chances for the introduction of invasive pests, such as the Asian longhorned beetle, Emerald ash borer, Southern pine beetle, and boxwood blight. The Emerald ash borer (EAB) was first detected in Connecticut on July 16, 2012 and has subsequently spread through a large portion of the state. The internal state quarantine for EAB was dropped in 2014 and all of Connecticut became part of the larger federal EAB regulated area. State regulations control the movement of wood and other regulated articles into Connecticut. Expanding its range, the Southern pine beetle was detected

in Connecticut on March 17, 2015 and attacks 'hard' pines such as red pine, Scotch pine, Austrian pine, and our native pitch pine. More than 40,000 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 more than 150 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 requested by other state agencies. In addition, CAES chemists work closely with the US Food and Drug Administration (FDA) in the Food Emergency Response Network (FERN). CAES is now in its 13th year of funding ($3.89 million through 2020) under this program, with the current funding cycle running for two more years. Separately, CAES is completing its first year a 2-year FDA grant that is enabling the Department of Analytical Chemistry to expand ISO 17025 Accreditation as described in the Food Safety Modernization Act (FSMA). This two-year award is a continuation of a previous 5-year $1.5 million FDA grant that enabled acquisition of accreditation in December 2016. The accredited program involves a surveillance of fresh and manufactured foods for pesticides and arsenic; results are published in Bulletins that are freely available to the public. Separately and in conjunction with the CT Department of Agriculture, CAES is completing a third year of a 5-year FDA grant ($750,000) to bring animal feed chemical analysis under accreditation as described in FSMA. This project, which is measuring mycotoxin contamination in feeds, was brought under accreditation in February 2018. Recent work with the FDA included a surveillance assignment testing imported spices, herbs, and flour (100 samples) for heavy metals, pesticides, poisons and toxins; results were submitted to FDA in December 2017. CAES staff have continued work with the FDA to develop the use of liquid chromatography with high resolution mass spectrometry for the detection of contaminants in food. CAES chemists are also actively using this new platform in many of our state programs, including the analysis of foods and environmental samples for organic contaminants. In addition, CAES is currently conducting an FDA surveillance assignment of

rice-based baby foods and juices (100 samples) for poisons, toxins, pesticides and heavy metals, including inorganic arsenic. Two CAES staff chemists have continued to serve as primary instructors for FDA training courses that deploy FERN food safety methods to both federal and state laboratories across the country. The Analytical Chemistry Department Head served on the FDA Method Coordination Committee, which reviews and approves FDA chemical, microbiological and radiological methods, and he is also serving on the FDA Flexible Funding Model Workgroup, which is investigating new strategies for supplying federal funds to the states in support of food safety work. The Manufactured Food Regulatory Program Standards or MFRPS, which CAES conducts with the CT Department of Consumer Protection and the FDA, 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. Similarly, the AFRPS or Animal Feed Regulatory Program Standard, conducted with the CT Department of Agriculture and the FDA, serves as the sole surveillance and monitoring effort in the state for pet and livestock feed. Last, staff continue to work with FBI Weapons of Mass Destruction Directorate (FBI WMDD), 14th Connecticut National Guard Civil Support Team (CST), CT State Police Emergency Services Unit, and CT Department of Public Health Bioterrorism Coordinator as a part of state-wide counter-terrorism programs. For example, in April 2018 staff participated in a First Responder Training Exercise run by the 14th CST and the FBI WMDD. The field training event involved an aircraft at a local airport with a chemical weapon; liquid samples with suspected sodium azide were submitted to our laboratory. We used FDA methods to quantify azide in the samples; accurate results were reported 6 hours after sample receipt.

- **Childhood Lead Poisoning:** The Department of Analytical Chemistry provides assistance by request to municipal health departments for investigations of high blood lead levels in children. As part of a lead poisoning investigation in Stamford CT in October 2017, the CT Department of Consumer Protection (DCP), on behalf of the Stamford Health Department, submitted samples of the spice turmeric from the child's house, along with comparison samples from a local retailer. Scientists in the Department utilized FDA methods and detected 0.5% lead and 0.1% chromium in the spice. These levels are more than 100,000 times that of the background samples. Our results identified the source of contamination and enabled elimination of the child's exposure.
- **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 provides 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 2017, a total of 194,934 (14,185 pools), represented by 42 species, were trapped and tested for arboviruses. A total of 125 isolations of West Nile virus (WNV) were made from 10 species: *Culex pipiens* = 75, *Cx. restuans* = 22, *Cx. salinarius* = 17, *Culiseta melanura* = 5, *Anopheles crucians* = 1, *An. punctipennis* = 1, *Cx. territans* = 1, *Ochlerotatus canadensis* = 1, *Oc. taeniorhynchus* = 1, and *Psorophora ferox* = 1, collected from 30 locations in 26 towns in six counties (Fairfield, Hartford, Middlesex, New Haven, New London, Windham). The first WNV positive mosquitoes were collected on June 29 and the last on October 25. The majority of WNV virus activity was detected in densely populated urban and suburban regions in Fairfield, Hartford and New Haven counties. Three human cases of WN virus-associated illness (encephalitis/meningitis n=2, WN fever = 1) were

reported, all locally acquired. Dates of onset of symptoms were from August 22 to August 28. Human cases were temporally and spatially consistent with WN virus isolations from mosquito pools. One horse case of WNV infection was reported, with a date of onset of October 23. There were six isolates of Eastern Equine Encephalitis (EEE) reported, all obtained from *Cs. melanura* pools between October 5 and October 25. Four of the isolates were obtained in the town of Hampton (Windham county) and one isolate each in the towns of North Stonington and Voluntown (New London county). In response to finding EEE-positve mosquitoes, supplemental mosquito trapping was conducted at these locations from October 17 to November 7. There was no EEE activity reported from humans, horses, or exotic birds. Other mosquito-borne viruses isolated included: Jamestown Canyon virus = 25 isolates from 10 species (June 7 – August 31), Cache Valley virus = 12 isolates from 3 species (July 19 – October 5), Potosi virus = 128 isolates from 19 species (June 27 – September 28), Highlands J = 9 isolates from 1 species (September 20 – October 11), and Flanders virus = 1 isolate from 1 species (June 22). CAES continues to closely monitor the expansion in Connecticut of two exotic mosquito species from Asia, *Aedes albopictus* (Asian tiger mosquito) and *Aedes japonicus,* which are aggressive human biters and have been implicated in the transmission of several human pathogens, including dengue, chikungunya, 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 339 aquatic vegetation surveys of 240 Connecticut lakes and has found that 59% contain invasive plants. A total of 101 water bodies have been resurveyed to determine how invasive plants are changing the quality of lakes over time. In fiscal year 2017-18, CAES IAPP surveyed 14 lakes and performed multifaceted research. Lake Candlewood, Connecticut's largest lake, was surveyed for the 11th consecutive year to determine the effects of winter drawdowns and grass carp *(Ctenopharyngodon idella)* the area and abundance of Eurasian watermilfoil (*Myriophyllum spicatum*), minor naiad (*Najas minor*) and curlyleaf pondweed (*Potamogeton crispus*). Lakes Lillinonah, Zoar and Squantz Pond were also surveyed to track changes in the population of invasive species. Taunton Lake in Newtown was surveyed for the third time and the positive effects of recent plant eating sterile grass carp introductions on reducing Eurasian watermilfoil (*Myriophyllum spicatum*) No effects were found as more time is needed for the carp to attain sufficient size to consume the large biomass of vegetation. .Government and local officials request CAES assistance in finding methods to protect their bodies of fresh water. In response to requests from the town of East Haddam, CAES IAPP surveyed Bashan Lake and herbicide treatments were performed to eliminate phragmites *(Phragmites australius)* that invaded after a state mandate drawdown for dam repairs. CAES IAPP tested bottom herbicide placement and eliminated Brazilian waterweed (*Egeria densa*) from Fence Rock Lake. 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 in scientific journals, technical reports and in CAES bulletins.
- **Gypsy Moth and Emerald Ash Borer:** Due to drought conditions in spring and early summer of 2017, we observed defoliation due to gypsy moth on 1,175,004 acres, mostly in the eastern half of the state, which includes Middlesex, New London, Tolland, and Windham

counties. The *Entomophaga maimaiga* fungus that usually keeps gypsy moth larvae (caterpillars) in check did not "kick in" until late in the season, resulting in high larval mortality in many localities. In December 2017 through March 2018, a gypsy moth egg mass survey was conducted on a grid (102 sites) throughout Connecticut. Egg mass counts were very high in many locations, indicating a high potential for another smaller outbreak in 2018. Caterpillar activity was heavy in some locations in June 2018. Detections and monitoring for the Emerald ash borer through *Cerceris* wasp colonies continued. EAB has been detected in all eight counties and a total of 112 towns. During aerial survey, we mapped 10,318 acres defoliated by EAB, and expect acreage and mortality to increase in the coming years. Our biocontrol releases for EAB have been successful and may eventually lead to long term control.

- **Honey Bee Health and Pollination:** Colony inspections continue to find *Varroa* mite infestation and the virus complex associated with *Varroa* infestation as the primary reason for colony mortality. Beekeepers continue to lose colonies overwinter in high numbers; the Bee Informed Annual Loss report for CT in 2017 was 53.89 %; the winter loss was 49.83%. Due to high winter losses in 2017, local beekeepers continued to replace losses with package bees from southern states. Our unofficial estimates indicate that over 5000 packages of honey bees were imported into Connecticut for sales to new beekeepers and to replace losses. Despite these challenges, beekeeping interest is still strong with over 400 new beekeepers being trained this winter. CAES reported new Connecticut state records for 14 species of wild bees, bringing the total number of species recorded in the state to 349. Active collection of bees around the state will lead to a comprehensive bee checklist and document bee diversity in natural areas and man-made pollinator habitats.
- **Tick-Borne Disease Research:** Human cases of Lyme disease are prevalent, other tick-borne diseases are increasing, and new tick species are becoming more common. A joint integrated tick management project in Guilford, CT supported by and in cooperation with the USDA Agricultural Research Service is evaluating combinations of deer-targeted 4-poster treatment stations, rodent-targeted bait boxes, and acaricide applications to reduce tick abundance and the risk of Lyme disease. A spray trial comparing large volume hydraulic spraying vs. low volume backpack mist blower applications for tick control was conducted in 2017 and 2018. Evaluation of a new delivery device for the distribution of rodent targeted Lyme disease vaccine bait was initiated. An established population of lone star ticks, *Amblyomma americanum*, was discovered on Manresa Island in Norwalk, CT in 2017. A control program was initiated in 2018 using the deer-targeted 4-poster. In the second year of a survival study, 60% of lone star tick adults successfully overwintered on mainland Connecticut.
- **Tick Testing Program:** Tick testing for infectious agents that cause human disease is freely available to State residents. The objectives are to: 1) examine ticks for evidence of infection in order to better understand the epidemiology of tick-associated diseases in Connecticut, 2) inform residents of any potential health risk, and 3) assist physicians and residents concerning treatment. In 2015 the Tick Testing Laboratory was expanded to test blacklegged ticks, *Ixodes scapularis*, for two additional pathogens. In the past, testing was limited to *Borrelia burgdorferi*, the Lyme disease agent, but in view of increasing human cases of tick-related illnesses in the state, testing has been expanded to include *Anaplasma phagocytophilum*, the causative agent of Human Granulocytic Anaplasmosis, and *Babesia microti*, the causative agent of Babesiosis. Of the 4,824 ticks submitted by Connecticut

residents, health departments and/or physicians' offices during fiscal year 2017-2018, 3,563 were examined, of which 1,347 (37.8%) tested positive for Lyme disease, 187 (5.3%) for babesiosis, and 278 (7.8%) for anaplasmosis. The number of lone star tick encounters by residents has been steadily increasing in Connecticut in recent years; indigenous lone star ticks submitted by the residents and health departments to the CAES Tick Testing Laboratory have increased significantly by 58% from the period of 1996-2006 to 2007-2017. New molecular-based testing methods have additionally been implemented to reduce the average turnaround time to three days or less representing a significant enhancement of the tick testing services.

Improvements/Achievements 2017-2018

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 costs to become more efficient in performing research and delivering services to our residents. The agency has actively participated in the Governor's Lead by Example Energy Efficiency Program over the years. The agency has converted all interior and exterior lighting to LED technology, changed over from heating oil to natural gas to heat out buildings and is in the process of replacing old drafty windows with energy efficient windows to lower heating and other operating costs. Our Jenkins-Waggoner Laboratory building which opened in January, 2015 received a federal LEAD gold energy efficiency certification. Plans to renovate outdated CAES greenhouses with state of the art technology have been initiated.

The Experiment Station is utilizing the state's e-licensing software program for the online registration of nursery growers, nursery dealers and beekeepers. The program also allows inspectors to enter and store regulatory inspection data in the online program. The statutorily required registration and inspection process is much more efficient for both the agency and registrant and provides the agency and state with significant cost savings.

Plant pathologists at the CAES continued to monitor and research boxwood blight, a disease caused by the fungus *Calonectria pseudonaviculata*. New to North America, the disease was first detected on boxwoods in nurseries in Connecticut in 2011 and on pachysandra in landscapes in 2012 This disease has continued to spread and is now found in 23 other states in addition to 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 industry concerns by researching and developing best management practices (BMPs) in the mitigation of boxwood blight; these BMPs are suitable for use by landscapers, commercial plant producers, as well as 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, identifying effective fungicides and spray programs to prevent new infections, fungicides capable of curative activity for up to 48 hours after infection, boxwood accessions with resistance to infection, susceptibility of pachysandra varieties, and understanding the

genetic mechanisms underlying the potential for fungicide resistance. BMPs have been updated whenever new, science-based information from our ongoing research programs becomes available. BMPs and basic information on the fungus (including an identification guide with pictures of infected plants) are posted on the CAES website (www.ct.gov/caes).

Several new programs in Plant Pathology have been initiated and a new Fruit Virologist who plans to work closely with the wine industry in the State has been hired. Efforts are underway to advance our understanding of the molecular genetics of plant pathogenic bacteria. By deciphering the pathogen distribution and evolution of virulence factors in plant pathogenic bacteria, CAES scientists are identifying possible areas for disease management. Our forest pathologists are developing new areas of study that employ electrical-resistance tomography to nondestructively detect internal decay and cavities in trees. This technology determines if there is a higher frequency of internal decay in American elms that receive trunk injections for the treatment of Dutch Elm Disease. It is also measures the amount of C in forest trees, thus refining current models of the role that forests play in sequestration of atmospheric carbon. CAES plant pathologists have made significant inroads into demonstrating a role for nanoparticles of metalloid and metallic oxides in suppression of plant diseases of asparagus, chrysanthemums, eggplants, pumpkins, soybeans, strawberries, watermelon, and wine-grapes along with urban tree species. This novel strategy utilizes host nutrition of young plants and results in minimal amount of nano-products being applied, which in turn, may increase yields for a negligible costs. Our disease modeling and forecasting efforts continue to advise wine grape growers about disease outbreaks throughout the state. These CAES-web based postings are saving growers unnecessary fungicide applications, thus reducing costs and chemical inputs into our environment

CAES scientists are increasing our knowledge and understanding of the appropriate selection, location, and maintenance of trees in urban and suburban spaces to increase utility reliability, public safety, public health, environmental benefits, and reduce costs and risks for municipalities. Roadside trees and branches that fall during severe weather often cause extended power outages and extensive road blockages. CAES foresters are collaborating with utilities, environmental groups, land owners, and other state agencies to develop practical, cost-effective protocols to proactively foster healthy, storm resistant roadside forests by integrating silvicultural and arboricultural practices. Ten demonstration areas including over 4,300 trees have been established throughout Connecticut. Lessons learned on tree selection and coordination from implementation at nine areas are being incorporated into treatments scheduled at the remaining sites.

Scientists in the Department of Environmental Sciences have made progress in a number of areas in FY18. In one study funded by the U.S. Department of Agriculture, they have discovered novel methods for modifying activated carbons to catalytically assist in chemical breakdown of air and water pollutants. This technology has so far been applied to the treatment of simulated gaseous vent streams containing the ozone-depleting chemical, methyl bromide, a fumigant used internationally in the quarantine and pre-shipment sterilization of produce and lumber. In a study also funded by USDA they created a modified charcoal-like material from woody wastes (modified biochar) that strongly binds certain nutrients when added to composted manures, inhibiting their movement to water bodies where they can cause eutrophication and groundwater contamination. They also found that biochar mixed in soil strongly binds nitrous oxide, an important greenhouse and ozone depleting gas emitted naturally and from nitrogen fertilizer by soil bacteria. In another study funded by the Centers for Disease Control and

Prevention, CAES scientists discovered that mosquitoes infected with the Zika virus more readily transmit the virus to humans when provided with additional non-infectious bloodmeals. Multiple feeding by mosquitoes is commonplace in nature. This discovery may explain why Zika virus epidemics can be maintained with relatively few infected mosquitoes. Scientists in the department have also developed an axenic (bacterial-free) mosquito model, which is a new advance for studying the interaction between mosquitoes, their microbiome, and disease transmission. A study using genomic analysis and computational biochemistry is elucidating the structure of the ribosome of microsporidia, a group of unicellular parasitic fungi that infect all major groups of animals. Future work aims at finding methods to control microsporidial diseases in honeybees and silkmoths.

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. CAES scientists were granted funds from a USDA proposal that funded the CAES/SCSU Summer Undergraduate Fellows in Plant Health and Protection program where undergraduate from Connecticut and elsewhere gain valuable experience work in CAES laboratories. The interns included 2 white males, 2 minority males, 5 white females, and 2 minority females. 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	**2017-2018**
Inquiries answered (all departments)	22,926
Field visits and diagnostic tests	280
Nematode diagnostics	125
Soil Tests Completed	
New Haven and Windsor	12,157
Samples Tested	
Department of Agriculture	119
Department of Consumer Protection (DCP)	293
Department of Energy & Environmental Protection	71
CAES Departments	2,163
FDA, Municipal Health Departments, Cities/Towns, and Misc. Foundations	171
UConn Cooperative Extension	35
University Research Collaborations	856
Seed Samples Tested (vegetable, lawn, field crop)	231
Consumer Plant Samples Tested	1,845

Wine Grapes Tested	27
Nursery and Seed Inspections	
Greenhouse plants	1,522
Nursery stock containers and bare root	62,973
Perennial plants	2,388
Nursery inspections	178
Tobacco (bales, boxes, bundles, and cartons)	135,334
Permits to move homeowner plants out of state	70
Seed (cartons and bags)	287
Acres of nursery stock inspected	5,000
Gypsy Moth Survey	
Forest acres surveyed for gypsy moth by air	1.8 million
Bee Inspection	
Beekeepers registered	642
Beehives examined for mites and foulbrood	1,400
Tick Identification and Testing	
Ticks identified	13,763
Ticks tested for human pathogens	3,563
Ticks infected with *Borrelia burgdorferi* (Lyme disease)	1,347 (37.8%)
Ticks infected with *Babesia microti*	187 (5.3%)
Ticks infected with *Anaplasma phagocytophilum*	278 (7.8%)
Mosquito Testing	
Mosquitoes trapped, identified, and tested for EEE, West Nile, and other encephalitis viruses	194,934
Number of trapping sites	91