The Connecticut Agricultural Experiment Station (CAES)

First in the Nation, Founded 1875

Putting Science to Work for Society

Main Laboratories

123 Huntington Street
New Haven, CT 06504-1106
(203) 974-8500

Lockwood Farm

890 Evergreen Avenue
Hamden, CT 06518-2361
(203) 974-8618

Valley Laboratory

153 Cook Hill Road
Windsor, CT 06095-0248
(860) 683-4977

Griswold Research Center

190 Sheldon Road
Griswold, CT 06351-3627
(860) 376-0365

www.ct.gov/caes

The Connecticut Agricultural Experiment Station (CAES), established in 1875, is the oldest agricultural experiment station in the United States. The institution is a separate but relatively small state agency. Historically, there has been a modest annual budget, but numerous scientific advances have been made to improve farming and the quality of life for state residents and the nation. There have been positive economic impacts linked to discoveries that show good returns on taxpayer's investments during the agency's 135-year history.

The main mission of the CAES is research. Effective programs also exist to educate the public and to transfer new findings to people trying to solve agricultural, forestry, environmental, and public health problems. In 1875, scientists in the Department of Analytical Chemistry, the first unit, tested fertilizer for label compliance. This activity marked the birth of consumer protection. Even today, analyses are performed on a wide range of foods, beverages, and other consumer products to detect unwanted chemicals and check for label compliance. Food safety is a very high priority for consumers.

Agriculture is the main core area of research. New fruit and vegetable crops are evaluated. Pest problems are promptly diagnosed and investigated for control. Integrated Pest Management programs are developed to reduce insect and plant disease infestations with minimal use of pesticides. Nursery plants are inspected before they are shipped to other states or countries. The works of the Experiment Station scientists and other staff members support at least 48,000 jobs and 2,159 businesses in the state.

Vast forestlands exist in Connecticut. Hardwood trees are important economically and ecologically. However, two destructive invasive insects, the Asian longhorned beetle and the Emerald ash borer, present in nearby Massachusetts and New York, threaten our valuable forest resources. Extensive surveillance programs are in place to detect these and other pests as well as emerging plant diseases. Research is conducted to improve forest management practices.

Ticks and mosquitoes transmit pathogenic organisms that can cause human illnesses or death. Lyme disease, granulocytic anaplasmosis, human babesiosis, and Rocky Mountain spotted fever are caused by infectious agents transmitted by ticks. West Nile and Eastern Equine Encephalitis are caused by viruses transmitted by mosquitoes. Although not known to transmit infectious agents, bed bugs are a major pest in human dwellings. Field and laboratory studies are conducted to determine how these arthropods live and what methods can be safely used for control.

Important environmental problems require continual research. There is a need to develop methods to remove pesticides from soil and groundwater. Numerous species of invasive plants grow in lakes and ponds, thereby reducing water quality. Field studies are being conducted to control these weeds. Mold growing in buildings is identified and controlled.

The information presented in this summary describes the many accomplishments of CAES scientists, the diversity of research programs, and how taxpayer investments have paid dividends. There are many examples of how CAES personnel put science to work for society (our motto) and how basic and applied research work together.

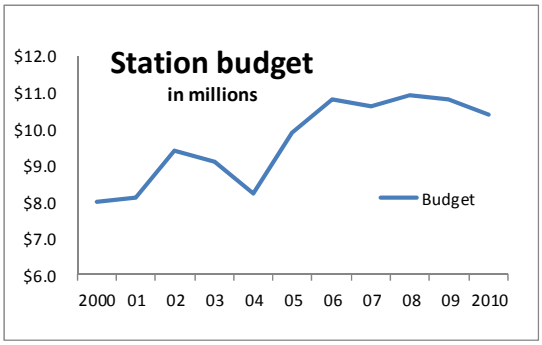
Basic Information

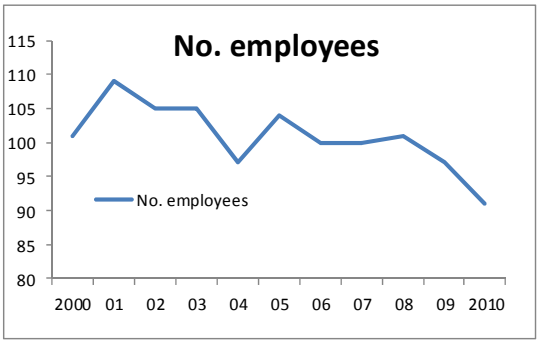
- Number of active permanent staff, June 30, 2010 = 91
- Number of active permanent staff, June 30, 2000 = 100
- Annual budget, June 30, 2010
  State $6,495, 014
  Federal $3,527,648
  Other $380,023
  Total $10,402,685
- Annual budget, June 30, 2000
  State $5,278, 132
  Federal $2,176,137
  Other $143,901
  Total $7,598,170
- Employees directly assist 2,159 businesses and more than 21,000 state residents annually on a variety of agricultural, forestry, public health, and environmental problems.

Experiment Station Properties and Assets

- Five buildings and 5 greenhouses on 6 acres in New Haven (main offices and laboratories)
- 75-acre research farm (Lockwood Farm) in Hamden, CT (Pictured)
- One state building and a greenhouse on 50 acres in Windsor, CT (Valley Laboratory)
- Two buildings on 26 acres in Griswold and Voluntown, CT (Pictured)
- Several trust funds (endowments)

The CAES operates on a lean budget, where more than one-third comes from funding sources outside the state budget. Nearly 80% of the Experiment Station's land was purchased with donated/willed trust funds. Despite a project workload that has expanded by 50% over the past decade, the number of permanent staff positions has declined during the same period. Department Heads (Chief Scientists), the Director, and Vice Director conduct research in addition to administrative duties.

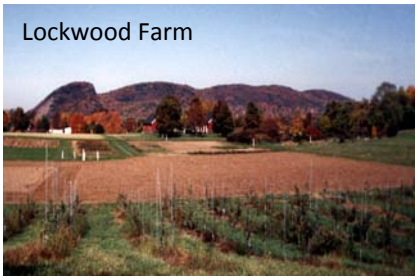




The CAES is governed by an 8-member Board of Control, which includes the Governor. Lockwood Farm and nearly all of the land at Windsor are owned by the Board, not the State of Connecticut. The value of these properties plus the trust funds, which are also under Board management, is at least $32 million. Based on the wills for these assets, if CAES were to be merged into another state agency or abolished and could not act as trustee, the land and trust funds would be directed to other non-state entities. The state would lose these precious resources.


Main Campus


Griswold Research Center


Lockwood Farm


Valley Laboratory

Key Accomplishments Timeline

1888 1st identification potato scab pathogen , a fungus that can cause significant crop losses

1901 Office State Entomologist established, which led to state regulation of plant pests and diseases

1919 Developed double-crossed hybrid corn that revolutionized global agriculture

1919 Developed the first Morgan test to analyze soil fertility

1875 CAES founded: First agricultural experiment station in the United States

1913 Pioneering work that led to the discovery of Vitamin A

1926 First introduced a genetically crossed sweet corn variety

Comment:

The CAES supports many small and mid-sized businesses, which are important for job growth. During the main shipping season for nursery plants and tobacco, any lengthy disruptions, due to layoffs or state government shut-downs, will stop shipments of export items and greatly harm these businesses.

Comment:

Scientists collaborate with researchers in at least 40 states and countries. There are extensive internal interactions among scientists in different departments within the agency. For example, chemists are assisting entomologists on tick control and pesticide analysis of honey bees.

Comment:

The Experiment Station Associates, a citizen support group, was founded in 1990. The CAES Research Foundation was established in 2007.

Regulatory Responsibilities

Pursuant to Connecticut General Statutes, the CAES is responsible for the registration of honey bees, nurseries, and dealers of nursery stock and for inspection of apiaries and nursery plants. Inspection of plants being exported from Connecticut is required. The CAES employees assist the nursery, bedding plant, landscape, and forest-products industries, valued at more than $1 billion annually and support at least 48,000 jobs in the state. Ensuring pollination of fruit trees and some vegetable plants is critical because one-third of our food supply depends on this process.

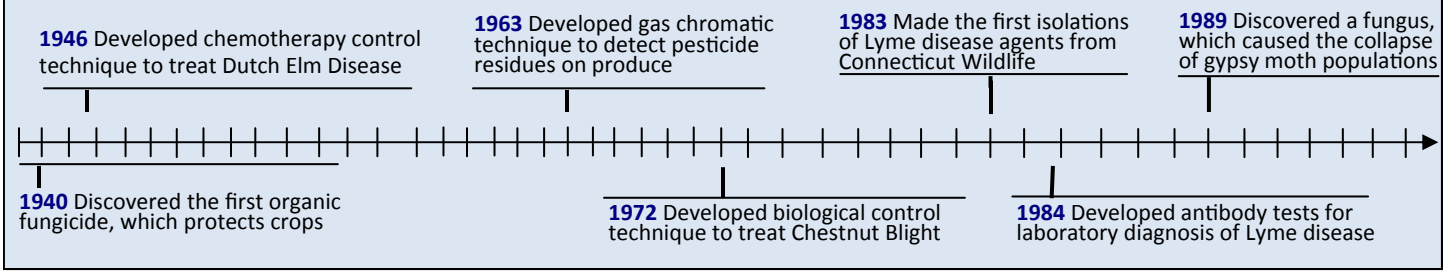
Future Potential for Earnings from Patents and Royalites

During 2010, the Governor signed a new law enabling Experiment Station scientists to pursue patents, licensing agreements, and trademarks on the new plant cultivars they develop or other discoveries, which have potential for generating royalty income to reinvest in research and other operating costs.

Key Research, Surveillance, and Service Programs

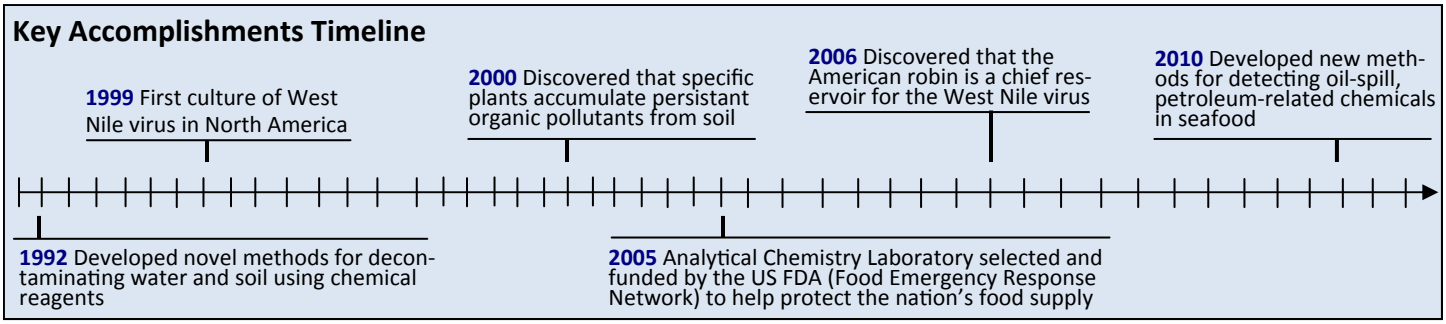
- Development of new fruit and vegetable cultivars that are resistant to pests and disease
- Producing quality farm products with healthy honey bees and less pesticides
- Managing tick populations and the pathogens that cause human diseases
- Testing ticks for the Lyme disease agent
- Mentoring high school and college students on scientific research
- Monitoring mosquitoes for West Nile and Eastern Equine encephalitis viruses and conducting research on the biology and blood-feeding habits of medically important mosquito species
- Providing diagnostic services for plant diseases and insect damage
- Conducting soil analyses to reduce fertilizer use and pollution of water resources
- Developing methods to remove chemical pollutants from soil and water
- Surveying lakes and ponds for invasive aquatic plants and developing methods of weed control
- Testing foods and other commercial products for unwanted chemicals
- Monitoring bed bug populations in buildings and developing methods of control
- Monitoring for Asian long-horned beetles, Emerald ash borers, and other destructive tree pests and developing control measures
- Developing methods for more efficient forest management
- Developing and evaluating new varieties of resistant chestnut trees
- Diagnosing and managing mold problems in buildings

Key Accomplishments Timeline



Examples of CAES Returns on Taxpayer's Investments

- The development of double-cross **hybrid corn** by Dr. Donald F. Jones at the CAES had immediate impacts by greatly increasing yield per acre and the total acreage dedicated to US corn production. Increased corn production provided food for hogs, cattle, and chickens at a time when the US population was growing rapidly. Milk production increased and improved human nutrition. In 1963, it was estimated that Jones' discoveries resulted in a net increase in national wealth of $904 million for that year, which was 10% of the national budget. In 2010, at least 95% of the US corn acreage is planted to hybrid corn with an estimated production of 12.8 billion bushels. At a market price of $3.00 per bushel, the value of the US crop is about $38.4 billion this year. Corn has multiple uses (e.g., ethanol, corn syrup, corn meal, cornstarch, etc.) and is an important US export item.
- The pioneering work on proteins, conducted by Dr. Thomas B. Osborne, led to the discovery of **Vitamin A**. This discovery had tremendous impacts on human nutrition and health. Subsequent studies performed elsewhere led to the discoveries of other vitamins and the development of nutritional programs designed to promote good health and prevent diseases. The economic and health benefits of this CAES discovery are immeasurable.
- New cultivars of **tobacco** and **strawberry** plants have been recently developed. The Connecticut tobacco crop, valued annually at about $57 million, is used to produce premium cigars. However, disease problems, caused by fungi, nematodes, and viruses, can destroy crops or lessen market value. The new cultivar is resistant to 4 different pathogens or pests. When this plant cultivar is introduced, there will be lower farm costs associated with reduced pesticide use, thereby lessening human and environmental exposure to these chemicals. Licensing of the cultivar will be sought. The state's strawberry crop is valued at about $2 million annually. "Pick-your-own" operations are very popular with the public. The plants are susceptible, however, to insect damage and fungus infections. A new cultivar has been developed to reduce these problems. Patent protection will be sought. There will be lower farm costs associated with less pesticide use, reduced human exposure to pesticides, and a cleaner environment. In both cases, income revenue from these plants will be re-invested into research and used to offset operating costs for the CAES.
- Connecticut's **vineyard industry** is thriving with about 40 farms on about 380 acres. These businesses have wine tastings, encourage tourism, and support local economies. Wine production for 27 businesses is expected to be at least 300,000 gallons in 2010 with a value of at least $10 million. Research results on cold-hardy rootstocks to prevent losses due to winter damage will save growers about $126,000 in replacement costs for 90 acres of production over a 3-year period. Other work on testing high-grafted chardonnay vines to prevent crown gall (bacterial) infestations will save growers about $2,070 plus labor per acre.
- **Diagnostic laboratories** are important in detecting emerging plant disease or insect infestations. During 2009, the cool, wet conditions favored a fungus that attacks tomatoes and potatoes. CAES plant pathologists promptly diagnosed infections and notified growers in Connecticut and Massachusetts. Although significant crop losses still occurred, some growers applied fungicides and saved their crops valued at about $4 million. Produce from Massachusetts enters Connecticut markets. The CAES plant pathology laboratory is one of 12 facilities nationally certified to test for the disease organism that causes Ramorum blight in oak trees and other plants.



- Integrated pest management (IPM) programs are designed to reduce pesticide use on farms. **Christmas trees** are grown on about 6,000 acres in the state. Annual gross revenue for 440,000 trees harvested yearly, representing 6% of the total 7.7 million trees available in Connecticut, is valued at about $4 million. Armored scale insects, however, can cause discoloration of needles, which decreases market value. Careful monitoring of the insect pest and timely application of an insecticide helped prevent losses of about $20,000 per acre. Six large nurseries, where other IPM programs are in effect, shipped 1,501,504 pest-free arborvitae and rhododendron plants (valued at $6.3 million) to other states and Canada in 2010.
- ***Invasive aquatic plants*** reduce water quality in lakes and ponds and can alter wildlife habitats. Research studies revealed that dilute concentrations of an herbicide can be applied to weed-infested bodies of water without contaminating wells. Studies indicated that a single fall treatment instead of spring and fall treatments was sufficient to control Variable water milfoil and restore water quality. This approach will save $4,000 in treatment costs for a 10-acre lake and lessen exposure to herbicides.
- Staff members in the **Department of Analytical Chemistry** test foods, beverages, and other commercial products for unwanted chemicals at the request of other state agencies or the US FDA. Analyses of seafood from the oil-spill area of the Gulf of Mexico resulted in the development of more efficient testing methods and gradual reopening of fishing waters off the coasts of Alabama, Florida, and Louisiana. Other tests resulted in the recalls of contaminated cereal, pomegranate juice, candies, cookies, toys, and toothpaste, many of which were imported into the US.
- Each year, physicians and other local health officials submit **ticks** to the CAES for DNA analyses to determine if the Lyme disease agent is present. To reduce costs, only blood-engorged ticks removed from people are analyzed. During 2009, 2,712 ticks were received and identified. Of these, 1,318 (49%) were tested; 430 (33%) of the blacklegged ticks analyzed were positive. Results were reported back to the health officials and decisions were made by physicians and their patients concerning antibiotic treatment.
- CAES staff members collect **mosquitoes** each year from 91 sampling sites throughout the state, identify these insects to species, and analyze pooled samples for different viruses, such as the West Nile virus and Eastern Equine Encephalitis virus. Results of positive cultures are reported to the State Department of Public Health. News releases inform state residents living in the areas where the infected mosquitoes were collected. This early warning system educates the public on this important health issue and acts to reduce human infections. Municipalities rely on test results when treating water in catch basins and other sources of mosquitoes. The CAES program is capable of detecting new, exotic viruses that may enter the state.
- **Mold** growing in buildings can cause allergic reactions and other health problems. A CAES scientist was asked to assist on identifying and solving mold infestations in four public buildings in Hartford, Middlebury, and Stratford. Diagnosis of mold species was made, and corrective actions were taken to remedy the problems.

Other Current Research and Service Programs in Progress

- Investigating the association of Japanese barberry, white-footed mice, and ticks infected with the Lyme disease organism and other human pathogens in forested areas
- Testing a fungus to control blacklegged ticks and bed bugs
- Studying photosynthesis and plant development to improve crop yields
- Evaluating new crops (eg., Chinese cabbage, leeks, heirloom tomatoes, calabaza (squash), plums, grape cultivars, and sweet potatoes) to enhance farm incomes and provide fresh produce for consumers. Evaluating rapeseed for biodiesel fuel production and nematode control
- Testing bark-applied insecticides to control forest pests
- Testing honey bees for pesticide exposure or other causes of mortality
- Investigating deer behavior to find ways of keeping these animals away from highways and to reduce damage to tree saplings, crops, and homeowner plantings
- Conducting studies on ebb and flow irrigation systems in greenhouses to efficiently apply fertilizers and to prevent surface and groundwater pollution