

# Connecticut (Connecticut Agricultural Experiment Station New Haven, University of Connecticut Combined) Annual Report - FY2021

**Report Status: Approved as of 07/08/2022**

## Contributing Organizations

---

Connecticut Agricultural Experiment Station New Haven  
University of Connecticut

## Executive Summary

---

### Overview

The Connecticut Agricultural Experiment Station (hereafter referred to as CAES) and the University of Connecticut Storrs Agricultural Experiment Station and Cooperative Extension System (hereafter referred to as UConn) continued partnering in efforts to address the challenges and opportunities we previously identified with Connecticut's residents.

This Report of Accomplishments describes four critical issues for Connecticut that CAES and UConn jointly address based on our stakeholder input. These include (1) sustainable agriculture and food supply; (2) enhancing health and well-being; (3) sustainable landscapes across urban-rural interfaces; and (4) adaptation and resilience to a changing climate. Research and public engagement initiatives conducted in Connecticut often overlap into one or more of these areas.

Our research and extension programs were highly successful despite the ongoing challenges from the COVID-19 pandemic.

Extension educators provided 8,859 hours (about 1 year) of instruction across all four of our critical issues through 462 statewide programs, 733 learning events, and 220 publications. We also had our 2,864 active volunteers contribute a total of 156,597 hours (about 18 years), that is valued at \$4.4 million according to the Independent Sector. The combined efforts of these efforts helped us engage 157,653 people. SAES and CAES have a combined total of 105 Hatch and Hatch Multistate Research Projects. Funds are allocated separately to the two institutions, and as such, the report of accomplishments will continue to detail the separate successes of CAES and UConn. Hatch funds are submitted for both institutions and detailed in the appendix documents. Extension transitioned to the new reporting system, but only entered one project initiation for this reporting period as the software continued deployment. Highlights of our Extension accomplishments are summarized in each critical issue below. Additional Extension program initiations and results will be reported in the NIFA Reporting System (NRS) next year.

### Critical Issue: Adaptation and resilience to a changing climate

Capacity funds supported 8 CAES and 4 UConn research projects related to this critical issue. Research highlights include:

- CAES Scientist Gregory Bugbee's Hatch project, accession number 1018780, supported aquatic invasive plant surveys in 15 lakes and ponds as well as the Connecticut River. Comparing invasive plant management techniques, he found that deep and long drawdowns of the water level during winter provide good short-term control of invasive plants. This finding will be used to inform management of invasive plants in CT waterways as climate change permits the introduction of new plants.
- Dr. Boris Bravo-Ureta's Hatch project, accession number 1016875, conducted an extensive meta-analysis to evaluate the connection between agricultural productivity and climatic effects. Key findings indicate that changing weather configurations are expected to have adverse effects on agricultural production in many regions across the globe, which will necessitate adaptation strategies including modifications in farming systems and resource use.

We have over 19 Extension programs providing climate resilience and adaptation service in the state. A few highlights of our climate work in the reporting period include:

- 8 independent study students in our Climate Corps undergraduate program completed 1,008 hours (about 1.5 months) on climate resilience and adaptation projects in four towns.
- Over 300 invasive plant activities occurred in over 50 Connecticut towns (N=169), reaching 9,153 Connecticut citizens, including agency and municipal staff. A minimum of 17,350 hours (about 2 years) of intensive invasive plant training sessions and management activities were provided by Extension educators and our partners, as well as technical educational outreach.

The following are two examples of Extension programs in this critical issue:

### **Living Shorelines Program**

Although we work statewide, this report highlights a few of our projects during the reporting period. The Hepburn Preserve is a four-acre beach, dune and brackish tidal wetland habitat owned by the Lynde Point Land Trust, located in the town of Old Saybrook. Storm events caused serious erosion of the area when high winds and waves hit the shoreline, compounded by shoreline changes due to nearby seawalls and groins. Several major coastal storms overtopped or breached the dunes including Tropical Storm Irene in 2011 and Superstorm Sandy in 2012. A permanent breach, compounded by sea level rise, would cause long term changes to this marsh system.

Our collaborative group proposed, designed, and implemented an innovative hybrid living shoreline as a solution at the site to decrease erosion of the beach/dune habitat, create marsh habitat along the shoreline, and aid in the protection of the dune system. Living shorelines are a green infrastructure technique to aid in shoreline stabilization using native marsh vegetation.

Sometimes, as in this case, low sills (such as rock or oyster reefs) are incorporated into living shoreline designs, hence the term, “hybrid” living shoreline. The purpose of a sill is to break and slow wave energy. Sills are placed parallel to the shoreline with the length and height dependent on site requirements. When multiple sills are used, large enough space between sills is required to allow for movement of marine organisms.

Collaborators on this group included the land trust, local officials, and residents. They had started meeting years before this living shoreline was implemented to educate each other and to research and discuss options. They spoke with many groups, including Connecticut Sea Grant/UConn Extension, on how they might best proceed and what their options for a living shoreline might be. Many partners were brought together with the Connecticut River Conservancy taking the lead on a Long Island Sound Study Futures Fund grant that funded part of the implementation.

GZA GeoEnvironmental, Inc designed the living shoreline with funding from the CT Institute for Resilience and Climate Adaptation, and the Borough of Fenwick in Old Saybrook, CT Dept of Energy and Environmental Protection, and others provided input throughout the process. CT Sea Grant/UConn Extension provided oversight of the living shoreline plantings.

Another example is our work with Sherwood Island State Park in Westport. This was Connecticut’s first state park, and it has 238-acres of beaches, wetlands, and forest that serves as a public recreation area.

### **Master Gardeners Program**

Improving Habitat for Wildlife Work & Learn is a year-round outreach project that teaches Master Gardeners, interns, and the public to create, improve and maintain a natural habitat for wildlife. It is an ongoing project that continued during our reporting year, with three volunteers working on the project. The three Master Gardener volunteers spent 20 hours teaching and facilitated work for 60 other volunteers. These volunteers donated a combined 768 hours (about 1 month) of work at Sherwood Island State Park. The three Master Gardeners donated 200 hours (about 1 week 1 and a half days) combined. They worked with 515 residents and visitors on the project.

The group met at Sherwood Island State Park three times per week in the growing season and once per week for the remainder of the year. In the winter, they focused on removing invasive plants. Areas at the park where they worked include the sand dunes, the pollinator garden, the three sister gardens and throughout park as needed. The Park Superintendent is fully supportive of wildlife habitat improvement using native plants.

We also have a small part of our dune restoration initiative - a 5-foot by 75-foot area that is an experimental patch. Our Master Gardeners found that by planting *Ammophilus brevigulata* in jute erosion cloth, the survivability of the stems was increased to 99% from a range of 60-85%. This information was shared with other shoreline Extension and Master Gardener projects to aid climate resilience and adaptation efforts.

## Critical Issue: Enhancing health and well-being

Capacity funds supported 4 CAES and 27 UConn research projects related to this critical issue. Research highlights include:

- Dr. Elaine Lee's Hatch project, accession number 1020910, successfully validated that Aronia fruit supplementation enhances resistance to toxic chemical stress, dehydration/osmotic stress, pathogenic infection and heat stress. This study will support targeted therapy development, dosing recommendation, and greater precision in recommendations regarding consumption of nutraceuticals for health benefit.
- A Hatch Multistate project led by Dr. Yangchao Luo, accession number 22, developed a new nanotechnology enabled solution to prepare hydrogel beads with in-situ immobilization of silver nanoparticles that are highly active to kill pathogenic bacteria in water-based medium, a great achievement towards future application of this system for treating contaminated recycled water. The nano silver-hydrogels also exhibited high efficacy to adsorb heavy metal ions from water medium. This development will improve health outcomes by through treatment of improperly treated wastewater containing high levels of foodborne pathogens which could contaminate crops and produce, especially the fruits and vegetables that are normally consumed raw.
- Dr. Phil Armstrong's Hatch project, accession number 1021837, found that treating mosquito habitats with larvicides effectively decreased the abundance of West Nile Virus vector larvae in two Connecticut towns. However, this did not affect the overall predicted risk level for West Nile Virus. This study will help state and local governments in their future decision making on mosquito control programs.
- Dr. Gale Ridge's Hatch project, accession 7000947, found that placement of deer insecticide self-treatment devices could reduce the population of Lone Star ticks in Connecticut by over 90%. This finding will be integrated into municipal public health strategies in the state.

We have 23 Extension programs with human, environmental, and animal health initiatives statewide.

- 26,875 low-income families were reached with community nutrition programs through multiple initiatives, including our Smith-Lever, EFNEP (Expanded Food and Nutrition Education Program), and SNAP-Ed funding sources. In one project, 80% of children who participated were willing to try and make the recommended healthy behavior change.
- 2,679 hours (about three and a half months) were contributed by 16 undergraduate summer interns across all our program areas, including in our One Health initiative.
- 2,279 clients were served in 138 Connecticut municipalities and 23 states and territories by the Connecticut Veterinary Medical Diagnostic Laboratory.
- 45 youth received individualized mentoring through one of our urban 4-H programs.

The following are three examples of Extension programs in this critical issue:

### One Health Initiative

The One Health approach emphasizes how human health is intimately connected to the health of the plants, animals, and environment. One Health has gained prominence, especially given its implications for how animals can serve as reservoirs for viruses such as the coronavirus that causes the COVID-19 pandemic.

We hired an undergraduate summer intern during the reporting year to work with Extension on the One Health initiative. The team she worked with includes an extension educator and associate professor of growth physiology from the Department of Animal Science.

The intern helped develop a website to disseminate One Health information to the community. This information includes guidance on interacting with animals and food safety. She said this internship helped her learn and practice how to make scientific information accessible to the public.

The One Health website (<https://onehealth.cahnr.uconn.edu/>) uses a multimedia approach to share information. Our team created and aggregated infographics, podcasts, and other kinds of media that appeal to different learning styles.

The integrated group working on this initiative is currently assessing what courses at UConn could be used to fulfill requirements for a major or minor in One Health and what courses could be added.

Our intern reflected on her experience, stating that it helped her develop her research and communication skills while learning about this critical emerging field in healthcare. "I would love to be able to make that positive impact, especially for a young kid in a scary situation," she said. "It's nice to be able to help people when they need it most," she also claimed.

## 4-H Mentoring Program

Youth in Waterbury continued benefitting from the 4-H Mentoring project during the pandemic. The 4-H Mentoring Project is a prevention program where youth gain knowledge, build character, and develop life skills. It is a fun learning environment that helps them become self-directing, productive members of society.

We had 45 youth aged nine through 14 participating during the reporting year. Mentoring is a proven strategy for helping at-risk youth achieve a better future. They are more likely to succeed with the extra support of a caring, consistent adult mentor.

The program increased their interpersonal skills and strengthened family bonds through the 12-month mentoring program. The three project components, mentoring, 4-H activities, and family nights, all contributed to positive impacts.

The 4-H Mentoring Project provided youth and their families opportunities to broaden their horizons with positive involvement in all that UConn 4-H offered. It was a win-win for both agencies we partnered with, and for young people and their families.

## Financial Literacy Program

An Extension educator presented one lecture on personal finance basics to seniors in an Agriculture and Natural Resources class in the College of Agriculture, Health and Natural Resources (CAHNR) at UConn.

Many students have a very limited understanding of personal finance. This workshop gave them a chance to try out life as a young adult making common spending decisions. Inputs were the time for the extension educator and student worker to prepare and lead the workshop. We modified the workshop from an in-person activity to an online version with PowerPoint slides. We simplified the exercise a bit because we knew that when it is done in person, participants can go at their own pace, but we would need to wait until everyone was ready to proceed to the next step for the online version. The workshop is now available in a version that can be done online for small groups.

The participants had the chance to experience through the simulation a bit of what it is like to be a young adult making spending decisions. In another training, teens in Danbury imagined their future lives as young working adults making financial decisions about how they would manage their expenses.

This five-session series was provided to assist families and individuals dealing with financial challenges during the pandemic. The workshop was designed to reach people who may be experiencing financial challenges currently. More people are experiencing financial difficulties as a result of the pandemic.

Extension Educators partnered with Essex Library Association to provide a basic financial education workshop series to help people deal with financial challenges. The series was adapted to include information and resources current during the pandemic.

The online workshop was designed to help people be better prepared for unexpected events that have financial implications. Many people do not have an emergency fund and are not prepared for unexpected expenses. This workshop was developed to explain why it is a good idea to be prepared, ways they can go about doing so, and action steps they can take.

### **Critical Issue: Sustainable agriculture and food supply**

Capacity funds supported 12 CAES and 15 UConn research projects related to this critical issue. Research highlights include:

- A Hatch project led by Dr. Julia Kuzovkina, accession number 1010591, found that there was no significant difference between the number of pollinators that visited the introduced willows (S365, SX64, and S. 'Onondaga') and the pollinators that visited the native willows. The introduced willows provide the same extent of ecosystem services as natives, which substantiated the use of nonnatives. Farmers involved in biofuel production and those whose crops benefit from pollinator activities can benefit from the findings by selecting specific groups of willows. In addition, a method for willow identification was developed during this study which helps to improve the species delimitations.
- Dr. Kim Stoner's Hatch project, accession 1025562, aims to understand the effect of ornamental pesticides on honeybees. By chemical, genetic, and microscopic analysis of pollen collected from bees that visited nurseries, the study found that bees were only collecting a tiny minority of their pollen from the nurseries, and that only a few of the nursery pesticides could be detected in the bee pollen. This is important information for nursery managers and beekeepers in Connecticut, as they make decisions to keep the food supply safe.
- A Hatch project led by Dr. Jason White, accession number 1014829, found that soil adjuvants can greatly alleviate the phytotoxicity and plant accumulation of certain chemical contaminants in the soil. Graphitic carbon nitride reduced the accumulation of cadmium and arsenic in rice tissue by up to a third, and nanoscale zero-valent iron reduced the

concentration of the toxic contaminant pentachlorophenol by over 80% while increasing yield and the soil removal rate. These findings open up new strategies for phytoremediation.

- Connecticut is home to a vibrant agricultural community that includes the greenhouse and nursery industry, dairy, diversified livestock, poultry, fruits and vegetables, and specialty crops. Many organizations and agencies have a unique role to play serving the statewide agricultural and food audiences. Our Extension educators develop and provide programs, training, one-on-one consultations, and other initiatives to support a vibrant agricultural economy in the state.

One of every nine residents in Connecticut struggled with food insecurity before COVID-19. For many individuals and families, challenges surrounding food insecurity increased when the pandemic arrived and continued throughout 2020. The stress associated with food insecurity challenges one of the most basic human needs and deepens income and health disparities.

Our Extension programs address both the need for a vibrant agricultural economy and food insecurity issues by closing the gap between the two issues. We have over 42 Extension programs working on this critical issue, and the following are examples of their impact.

- 300 jobs supported by Connecticut Sea Grant through 46 aquaculture companies involved in shellfish restoration work.
- 208 plant samples were diagnosed at the UConn Laboratory.
- 1,644 participants in the Solid Ground Program since its inception have produced \$1.3 million in crop value.
- 7 elementary schools have hydroponic tower gardens through our 4-H program that instructs students about growing their own food.
- 1,268 participants in our Artisan Cheese course, a collaboration with the Innovation Center for U.S. Dairy, University of Wisconsin Madison, Cornell, and NC State.

Work in our Master Gardener program touches all our critical issues. During 2021, the program had:

- 1,508 class participants
- 102 classes
- 120,640 hours (about 14 years) of learning
- 35,267 hours (about 4 years) volunteering

The following are three examples of Extension programs in this critical issue:

### **Integrated Pest Management Program**

The UConn Integrated Pest Management (IPM) Program continues making great strides in developing and implementing sustainable methods for pest control throughout Connecticut.

Vegetable integrated pest management education was delivered to over 690 vegetable growers and stakeholders every week from May to September 2021 through 19 weekly vegetable pest alert emails focusing on pests, pest management and decision making, and safe pesticide use. The email open rate was 25-30% per week.

We had 23 students enrolled in our online Vegetable Production Certificate course in the winter of 2021. The course had seven modules, each module with a self-paced video, supplemental materials, and a short quiz. Of the 23 students who enrolled in the course, 14 received a course certificate. In a post-course evaluation survey, 11 respondents indicated their knowledge on the subjects increased from an average of 52% before the course to 86% after the course.

In collaboration with the UConn Home & Garden Education Center, more than 208 physical plant samples were processed during 2021. Several hundred digital samples (submitted via email) and phone calls were also processed. Sample types submitted this year included agronomic field crops, specialty fruit and vegetables, landscape ornamentals, and ornamentals from nurseries and greenhouses. Samples were accepted from both homeowners and commercial clients from all eight Connecticut counties, as well as from Massachusetts and New York. The UConn Plant Diagnostic Lab is part of the National Plant Diagnostic Network, an internationally recognized consortium of plant diagnostic laboratories funded in part by the USDA National Institute of Food and Agriculture and the US Department of Homeland Security.

### **Aquaculture Program**

The COVID-19 pandemic hit the aquaculture industry particularly hard. It was facing catastrophic sales losses that would have forced many out of business. Connecticut Sea Grant Extension helped keep industry members afloat during the pandemic by involving them in shellfish habitat restoration work. We kept people working at a time when the shellfish marketplace collapsed

and there was little if any revenue generated from sales. We have 46 companies in Connecticut that employ over 300 individuals. The economic impacts to these families and businesses would have been devastating.

Part of this effort included creating a Shellfish Restoration map. We collaborated with a group of our partners and stakeholders. Industry professionals, regulators, municipal shellfish commissions, and others can use the map. Our efforts to strengthen the industry are continuing with several new initiatives.

#### 4-H Youth Development Program

UConn 4-H's first tower gardens are in seven different elementary schools in Litchfield County. In 2021, students learned the importance of agriculture and sustainably grown food. Seven schools were gifted with hydroponic growing systems and curriculum. Then, we supported each school to help instruct their students about the importance of agriculture, growing your own food sustainably, and incorporating STEM concepts in food production. Additionally, local 4-H club members mentored the 140 younger learners through a school, 4-H based enrichment programs.

This was the beginning of a collaborative effort between 4-H clubs and members across the state and the elementary schools in their communities. Our goal is to start a much larger project to help UConn 4-H members collaborate with younger community members. Teaching elementary students about the environment, agriculture, and sustainability through a hands-on-learning approach helps foster a population that understands where their food comes from, how it is grown, and how to do so sustainably. We also leveraged our USDANIFA grant funded projects to further enhance agriculture's economic viability in Connecticut.

Overall, the broader impacts of our agriculture and food work support food security, sustainable landscapes, workforce development, and health initiatives in Connecticut. Our educators continue helping agricultural businesses create stronger businesses that can support the growing demands for food and agricultural crops from Connecticut producers. All sectors are integral to ensuring a vibrant agricultural economy in Connecticut, and their strength further develops the industry's resilience to challenges like the COVID-19 pandemic.

#### **Critical Issue: Sustainable landscapes across urban-rural interfaces**

Capacity funds supported 3 CAES and 10 UConn research projects related to this critical issue. Research highlights include:

- CAES researchers studied improved methods for treatment and analysis of agricultural runoffs and other wastewater. Joseph Pignatello's Hatch Project, 1018681, found that a harmless biodegradable molecule called PICA (picolinic acid) is a safer and more effective replacement for the use of iron salts in treatment of wastewater. The Hatch project led by Sara Nason, accession 1019062, helped develop new so ware and methods for screening of PFAS, a widespread contaminant in agricultural soil and drinking water. These studies will help develop strategies to improve water quality for both agricultural and human consumption in urban-rural interfaces.
- A UConn Hatch project led by Dr. Beth Lawrence, accession number 1020626, studied the ecological restoration of commercial cranberry bogs in Southern New England. Study findings have important implications for management of restoration activities to promote the establishment of wetland vegetation and increase plant diversity. For example, restored wetlands may not be intercepting nitrate-rich groundwater, limiting nitrogen removal, which has important implications for restoration design.

We have 33 Extension programs working in the sustainable landscapes' initiative. Some results of these programs include:

- 58 towns conducted Green Snow Pro training to reduce road salt use and improve environmental water conditions.
- 391 virtual attendees participated in the UConn Native Plants and Pollinators Conference. 93% of evaluation respondents said that the conference provided practical, usable ideas, and 95% stated they are likely to use what they learned from the program in their landscaping, designing, or growing plants for pollinators next year. One participant said: "Today's conference was a HOME RUN! Great information. Stimulating...Thanks for all you do to educate and minister to the green industry. I'm psyched to go out and save the world. Rejuvenated and inspired!"
- 51 participants completed the redesigned and online Ornamental and Turf Short Course.
- 2,193 projects in STEM areas were completed by 4-H youth members.
- 151 participants in 4 new online land use and environment learning classes.

The following are three examples of Extension programs in this critical issue:

## **Nutrient Management Program**

Farmers are under increasing pressure to protect the environment. Recent research has shown that soils can become saturated with phosphorus (P). When this happens, P becomes soluble and can move with rain runoff into streams. Phosphorus concentrations in streams at the parts per billion levels have been shown to increase algae blooms and eutrophication of surface water. Excessive nitrogen applications have also been leading to high nitrates in water sources.

On-farm Extension workshops during the reporting period demonstrated best management practices to divert clean water and to prevent soil erosion using vegetative cover are helping with solutions to these runoff problems. Our Extension educator also spoke at meetings hosted by the Farm Bureau, Natural Resources Conservation Service, and others. Farmers received individual assistance with their nutrient management plans and on implementing conservation practices.

Extension's nutrient management educator is working with three farms on developing accurate as applied maps for farm applications. Current as applied maps provided by GPS systems are inaccurate on smaller New England farms. Our small irregularly shaped fields require spreaders to negotiate tight turns. Current generation software does not calculate the differences in applied rates between the inside and the outside of a turn. Preliminary measurements using equipment on one of the farms has resulted in a 30% decrease in application rate on the outside of a turn versus the inside of the turn. The three farms continue piloting the so ware, and it will be shared with other producers in the state and on the regional and national levels in the next reporting year.

The Adapt-N computer program is managed by our environmental Extension educators and enables more accurate topdressing of nitrogen on field corn. Soil testing at the UConn lab reduces excess fertilizing of field crops. Our Extension educator works with farms statewide to assure that every field is tested before spreading in the spring and fall, with over 4,000 acres (about twice the area of Philadelphia Airport) total in the program. To improve the water quality of Connecticut's waters, livestock producers are encouraged to limit nutrient application by soil testing, diverting clean water away from manure waste; and maintaining vegetation on fields to prevent erosion and waste runoff. A grant-funded Extension project worked with 20 farms in Connecticut on implementing these practices, and ongoing support for these and work at other farms is supported through our Smith-Lever funding.

Extension faculty from CLEAR are working on several applied research projects in support of better nitrogen (N) management. They are collaborating with the University of Rhode Island and the Environmental Protection Agency (EPA) to create an online tool, N-Sink, to track the movement of N in coastal watersheds. In a project funded by the Long Island Sound Study (LISS) and augmented by Smith-Lever funding, they are using innovative high resolution land cover data to explore the relationship of land use to N export for the over 4,300 small watershed basins in Connecticut. This data informs our Extension education in nutrient management.

## **4-H STEM Education Program**

The United States ranks 38th out of 71 countries in a measurement of math, science, and literacy skills in 15-year-olds. It is critical to engage youth in STEM related fields of study and introduce them to career opportunities in these areas. Most of the 30 fastest growing occupations in the next decade will require at least some background in STEM.

4-H programs provide youth with hands-on, engaging STEM experiences that build excitement around STEM topics and careers. STEM education is offered through 4-H clubs, afterschool programs, Science Saturdays, mini-camps, workshops, conferences, and competitions.

UConn 4-H program shifted programming to continue meeting the needs of youth audiences. Programs included engineering through robotics and mechanics, 4-H summer library programs, and virtual escape rooms. We had 2,193 individual STEM and computer technology 4-H projects during the reporting year.

4-H initiated and supported many robotic programs in the state. In 2021, the 4-H Program in the New England Center brought two 4-H robotics teams to the stage along with a 4-H club from New London County. The robotics groups provided presentations about the 4-H robotics program and demonstrated how the robots work. The 4-H robotics teams also participated in the New England District's FIRST BAE Systems Romi-bot Challenge, which included building, programming and submitting the best time navigating a course against other teams in New England. Teams had to submit both autonomous and teleoperated runs with the robot. The Connecticut 4-H robotics program included 99 youth total. The New England Center is part of the Big E, and approximately 100,000 people visit each day. Visiting the Big E fair was reported as one the youth's best memories of 4-H. One of the 4-H members stated, "I enjoy the public speaking and preparation for it." Another 4-H member reported, "Building and programming robots" were his favorite 4-H activities.

The 4-H program in the New Heaven County-- Guilford Town—provided robotic controls seminars during the pandemic using the Zoom platform. As a part of this program, the 4-H leader set up equipment at a robotic team “Apple Pi” facility so that students could write control code, download the code to the robot and initiate robot action remotely and with camera feedback so that they could see their successes and failures real time. The program continued into the spring of 2021 when limited numbers of students were again allowed to return to the shop and continue their work. Another handful of students continued their coding education with the feature of a unique way of continuing a “hands-on” learning approach. These activities allowed for a large part of the team to continue their STEM learning activities despite the in-person interruptions caused by COVID.

The 4-H program leader also drove the financial planning process at Apple Pi. With a yearly budget of just over \$30,000 per year, he helped keep the team on sound financial ground and has positioned the team with over 2 years of funds, held in abeyance should for some reason the team’s major financial backers were to disappear.

The robotics program in Hartford County has its own “Cinderella” story – big dreams and the amazing efforts of many to make it a success. The 4-H Robotics program started in 2015 with participants who had no idea how to build and program robots. After only one year, the VEX Robotics Project group expanded to include a competition team and a high school VEX Robotics Project group. The team qualified for the World VEX competitions three times. All the teams qualified this reporting period for the Southern New England Championship and earned spots at the World Championships, traveling to NASA to launch their robots.

## Merit and Scientific Peer Review Processes

---

### Updates

None

## Stakeholder Input

---

### Actions to seek stakeholder input that encouraged their participation with a brief explanation

None

### Methods to identify individuals and groups and brief explanation

None

### Methods for collecting stakeholder input and brief explanation

None

### A statement of how the input will be considered and brief explanation of what you learned from your stakeholders

Stakeholder input continues to drive our research and Extension work. We rely on continuous feedback from advisory groups, program participants, partner organizations, community partners, and other relevant parties to further improve our research and extension programming for greater community impact.

## Highlighted Results by Project or Program

---

Type

Projects / Programs

**Projects / Programs without a Critical Issue**

**0**

**Not Provided**