

2017 University of Connecticut - Storrs Research and Extension and Connecticut Agricultural Experiment Station - Research Combined Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 06/11/2018

I. Report Overview

1. Executive Summary

The state of Connecticut has two organizations that jointly develop a Plan of Work and Report of Accomplishments: the Connecticut Agricultural Experiment Station (hereafter designated CAES) and the University of Connecticut Storrs Agricultural Experiment Station and Cooperative Extension System (hereafter designated UConn).

The 2017 report includes six program areas. CAES and UConn jointly address program areas 1-4. These include: (1) food safety, (2) food security and food systems, (3) human and animal health, and (4) sustainable environments. The remaining two program areas, (5) 4-H and youth development, and (6) community and economic development, are conducted by UConn only.

This report offers specific examples of successful research and Extension public engagement programs conducted by CAES and UConn. Funds are allocated separately to the two institutions. Accordingly, we have separately detailed successes from these programs, an approach that formalizes accountability for funds received by each institution.

In this 2017 report, we highlight the following accomplishments:

Food safety research and education focused on improving safe food practices by producers, processors, and consumers; and improving the safety and quality of value-added dairy products.

During the reporting period, research and outreach in food security and food systems provided Integrated Pest Management training to growers, reduced food insecurity, increased resilient food systems across spatial scales, and prevented the introduction and spread of plant pests and pathogens.

Human and Animal Health programs addressed knowledge of residents and the media on ticks, mosquitoes, bed bugs and mold. We also identified nutrition and exercise lifestyle factors essential to successful aging, developed new technologies to reduce the risk of chronic diseases, and improved human and animal health through diagnostic testing and vaccine development.

Sustainable environment programs addressed homeowners' knowledge of watershed protection, and soil and water quality; reduced the number of lakes and ponds with invasive aquatic plants; improved climate mitigation strategies and their adoption; and improved pesticide safety and application through trainings, biologically based alternatives, and pesticide-free turf management.

Youth development in Connecticut was conducted primarily through 4-H and focused on creating safe, healthy, well-educated children and teens through clubs, after-school programs, and interactive learning experiences. Science, technology, engineering and math (STEM) curricula are an integral part of the youth development and activities. Youth also participated in citizenship and volunteer programs.

Community and economic development programs addressed the individual and community. Examples included increasing engagement among adult learners, economic development of communities through asset building and greenways, and connecting communities and individuals with emergency preparedness resources.

Total Actual Amount of professional FTEs/SYs for this State

| Year: 2017 | Extension | | Research | |
|------------|-----------|-------------------|----------|-------------------|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 62.0 | {No Data Entered} | 90.0 | {No Data Entered} |
| Actual | 61.5 | 0.0 | 84.0 | 0.0 |

II. Merit Review Process

1. The Merit Review Process that was Employed for this year

- Internal University Panel
- External University Panel
- External Non-University Panel
- Combined External and Internal University Panel
- Combined External and Internal University External Non-University Panel
- Expert Peer Review

2. Brief Explanation

The Merit Review process for CAES and UConn combines internal and external review. The peer review, conducted by disciplinary scientists, ensures the scientific merit and relevance of proposed projects. Administrators in the respective organizations also review new Hatch or Extension projects. The Director (or a designee of the Director) provides final approval on all submitted projects. External peer review is used when publications or proposals generated from existing projects are submitted to journals and funding agencies, respectively.

Both organizations rely heavily on stakeholder input to identify new areas for research and Extension engagement programs. Stakeholders are often involved in the co-creation of knowledge through applied research programs. Engagement with stakeholders provides a unique and critical relevance review - stakeholders help define and shape projects that are directly relevant to their production systems or environmental sustainability.

UConn is transitioning to a competitive process for distribution of capacity funds to projects. The competitive process will be phased in over three years. Project proposals will address NIFA and state of Connecticut agricultural priority areas, and follow the steps outlined above for approval.

III. Stakeholder Input

1. Actions taken to seek stakeholder input that encouraged their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals

- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public

Brief explanation.

CAES and UConn organize multiple conferences, workshops and public meetings throughout the year. These events create opportunities for research and Extension faculty and staff to disseminate results of programs to stakeholders. Events also serve as opportunities to gather input on existing and future programs. For example, Plant Science Day, organized by CAES, brings over 1,000 visitors (including more than 100 children) to the Hamden research facility. Similarly, more than 300 agricultural producers attended UConn's Vegetable and Small Fruit Growers Conference. These events offer producers, businesses, and citizens the opportunity to interact directly with scientists and Extension professionals. Informal direct contacts with citizens and businesses convey and shape current and future research and Extension activities.

Formalized stakeholder input is gathered from Advisory groups that meet once or twice throughout the year. Advisory group members represent all facets of agriculture, health, environmental sustainability, and youth development as appropriate for CAES and UConn. Scientists and Extension professionals from CAES and UConn also serve on advisory groups across the state. Participation on these advisory groups informs and shapes research and Extension programs.

Collaboration between CAES and UConn on specific projects and/or workshops and conferences ensures that stakeholder inputs captured by one organization are shared and influences program development in both organizations. UConn is developing and disseminating several surveys for the general public that are being implemented during the 2018 reporting year for future programming priority areas.

2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Use Surveys

Brief explanation.

Formal and informal stakeholder input is gathered across the state (and at national or international meetings) by CAES and UConn. Presentations, interviews, workshops, and conferences offer informal opportunities to meet with impacted stakeholders and gather input. Methods include survey instruments that collect feedback from participants about existing programs, email surveys to potential stakeholders regarding new or proposed programs, and direct comments

captured following sponsored events.

CAES and UConn work directly with grower organizations and environmental groups across the state. We receive direct input from these organizations, and partner with multiple state agencies that address agriculture, health, and natural resources.

As an example, Connecticut is experiencing tremendous growth in the number of microbreweries in the state. CAES has initiated a new research program investigating the yield of different hop cultivars in response to industry interest. The findings are presented at a well-attended annual meeting for microbrewers. Similarly, UConn organized meetings for new and beginning farmers and ranchers to understand their needs and shape Extension programs. Feedback from these producers led to extensive resource development including online learning for new and beginning farmers and ranchers.

CAES and UConn seek out members from underrepresented groups to participate in programs and provide input into strategic areas for research and Extension. UConn offers programs in Spanish to encourage greater access and participation by Hispanic audiences. Feedback from specific ethnic and minority stakeholders on specialty crops resulted in experiments being conducted on several cultivars of a range of specialty crops. UConn conducted external focus groups in two of our planned program areas to identify groups and individuals, and prioritize outreach programming offered.

2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Survey of selected individuals from the general public

Brief explanation.

Both organizations use survey instruments to collect input from program participants. This information improves programs and identifies new program areas. Survey data is collected from workshop participants, conference attendees, and audiences for scientific talks. Needs assessment surveys also gather data and shape programs.

CAES and UConn partner with state and federal agencies on multiple projects and programs. Direct input from state and federal agencies is a key method for collecting input from these groups.

Both organizations are active on social media including Facebook, Twitter, Instagram, Google+, blog sites, and YouTube. These outlets are used primarily to push information. At the same time, stakeholder engagement on social media provides opportunities for public input on research and Extension programs.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

Brief explanation.

Existing programs employ adaptive management strategies that incorporate new information gathered from stakeholder input. We learn from our stakeholders and use that knowledge to update goals and outcomes for our programs. New program areas such as research on the Powassan virus were added to research and Extension portfolios for CAES and UConn. Stakeholder input is also used to inform research proposals submitted for funding.

In Extension programs, stakeholder input received by the local food program and disaster preparedness program has shaped current outreach programs. The local food program shifted focus from purchasing promotion to one of increasing knowledge and support for local foods based on interview and focus group feedback. The disaster preparedness and climate adaptation programs worked closely with their stakeholders and used feedback from focus groups to plan the next phase of programming. Examples of this included a webinar series and student projects planned for the spring 2018 semester, that are a result of stakeholder input in the climate adaptation program.

Brief Explanation of what you learned from your Stakeholders

We learned that stakeholders are very insightful and have the capacity to co-create knowledge that is critical to their economic and environmental sustainability. Our programs are more effective when they address and account for stakeholder input. We learned that addressing agriculture, health, and sustainability issues across the state has relevance to regional, national, and international challenges. The feedback we received did not cause major changes in our programs, however we made changes that create more useful programs to our stakeholders. This feedback allows us to utilize our limited resources in the most effective manner, and deliver research and Extension programs that will have greater impact.

IV. Expenditure Summary

| 1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS) | | | |
|---|-------------------|-------------------|-------------------|
| Extension | | Research | |
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| {No Data Entered} | {No Data Entered} | {No Data Entered} | {No Data Entered} |

Institution Name: Connecticut Agricultural Experiment Station -

| 2. Totaled Actual dollars from Planned Programs Inputs | | | | |
|--|---------------------|----------------|----------|-------------|
| | Extension | | Research | |
| | Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| Actual Formula | 0 | 0 | 975814 | 0 |
| Actual Matching | 0 | 0 | 4658277 | 0 |
| Actual All Other | 0 | 0 | 814776 | 0 |
| Total Actual Expended | 0 | 0 | 6448867 | 0 |

Institution Name: University of Connecticut - Storrs

| 2. Totaled Actual dollars from Planned Programs Inputs | | | | |
|--|---------------------|----------------|----------|-------------|
| | Extension | | Research | |
| | Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| Actual Formula | 1782330 | 0 | 1157026 | 0 |
| Actual Matching | 1783051 | 0 | 1157026 | 0 |
| Actual All Other | 4766935 | 0 | 5289315 | 0 |
| Total Actual Expended | 8332316 | 0 | 7603367 | 0 |

| 3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous | | | | |
|---|---|---|---|---|
| Carryover | 0 | 0 | 0 | 0 |

V. Planned Program Table of Content

| S. No. | PROGRAM NAME |
|---------------|------------------------------------|
| 1 | Food Safety |
| 2 | Food Security and Food Systems |
| 3 | Human and Animal Health |
| 4 | Sustainable Environments |
| 5 | 4-H/Youth Development |
| 6 | Community and Economic Development |

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Food Safety

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|---|-----------------|-----------------|----------------|----------------|
| 306 | Environmental Stress in Animals | 0% | | 20% | |
| 307 | Animal Management Systems | 0% | | 17% | |
| 502 | New and Improved Food Products | 0% | | 5% | |
| 503 | Quality Maintenance in Storing and Marketing Food Products | 0% | | 15% | |
| 711 | Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources | 50% | | 3% | |
| 712 | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins | 50% | | 30% | |
| 723 | Hazards to Human Health and Safety | 0% | | 10% | |
| | Total | 100% | | 100% | |

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

| Year: 2017 | Extension | | Research | |
|-------------------------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 2.0 | 0.0 | 3.4 | 0.0 |
| Actual Paid | 1.6 | 0.0 | 6.3 | 0.0 |
| Actual Volunteer | 0.0 | 0.0 | 0.0 | 0.0 |

2. **Institution Name:** University of Connecticut - Storrs

Actual dollars expended in this Program (includes Carryover Funds from previous years)

| Extension | | Research | |
|---------------------|----------------|----------------|----------------|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 201593 | 0 | 41442 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 201593 | 0 | 41442 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 0 | 0 | 280471 | 0 |

2. Institution Name: Connecticut Agricultural Experiment Station -

Actual dollars expended in this Program (includes Carryover Funds from previous years)

| Extension | | Research | |
|---------------------|----------------|----------------|----------------|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 0 | 0 | 127553 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 0 | 0 | 948685 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 0 | 0 | 23899 | 0 |

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research under this program is developing more efficient and sensitive analytical methods to detect toxic chemicals and heavy metals in food, and seeks to determine if these constituents are present at allowable levels. Decisions on safety depends on tolerance levels established by the US Environmental Protection Agency (EPA) or the Food and Drug Administration (FDA). Progress was made on all objectives in this program. The activities, services, and events are designed to assist a broad, diverse group of stakeholders by disseminating scientific information to the public through the media, publications, and exhibits. People will have equality of service, ease of access to scientific results, and the ability to see laboratories and field plots. The outputs include numbers of samples tested, scientific publications, and talks and interviews. For example, the Department of Analytical Chemistry reported out results on more than 1680 samples in the current period, with 80% being food or food-related. The following activities were executed: (1) new analytical methods were developed or validated and new instrument platforms were evaluated, (2) information on analytical test results was shared with stakeholders at open house events, in scientific displays at agricultural fairs, and in scientific publications, (3) oral presentations were given to civic groups and professional societies, and (4) laboratories were opened to allow adults and youth to meet staff members, see analytical equipment, and ask questions about programs and findings. Direct interactions with a broad base of stakeholders allows public input on the program. Non-traditional stakeholders are reached at agricultural fairs and other public venues when they visit displays. Results of these activities lead to specific outcomes such as removing tainted or adulterated food items from the

markets, enabling law enforcement investigations of poisoning cases, and greater public awareness of research on food safety.

Curriculum and training sessions were presented by Extension educators for the Food Safety Modernization Act (FSMA), Good Agricultural Practices (GAP), and HACCP (Hazard Analysis and Critical Control Points). Home cooks, consumers and food service personnel were educated through a website, courses, and workshops. During the reporting period, 412 participants were trained through Extension courses. Each year, twelve articles on food safety topics are written and distributed to newspaper and media outlets statewide. Internal tracking of these articles shows wide reach that extends beyond Connecticut.

Collaborators on the food safety program include the Department of Agriculture, Department of Public Health, and Department of Consumer Protection. UConn also works with the University of Rhode Island and the University of Massachusetts on educational outreach. FSMA regulations are still challenging agricultural producers statewide. UConn programming for producers and processors leveraged the expertise of our partner organizations to train farmers. Our advisory group includes farmers and regulators, and continues to meet and gather information regarding educational outreach needed.

2. Brief description of the target audience

All individuals have a stake in ensuring a safe food supply. Our efforts focus on audiences that include: food producers and importers, food processors, managers of supermarkets, state and federal public health officials and regulators, state and federal legislators and their staff members, educators, Extension specialists, researchers in the food sciences, and the general public.

Of the audiences reached through Extension programs during this reporting period, 39% were women, and 26% identified as non-caucasian. Extension educators market programs to under-represented audiences through partner agencies and other non-government organizations. Additionally, we have partnered with the 4-H program and other local organizations to reach youth audiences with food safety education outreach.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

| 2017 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---------------|------------------------|--------------------------|-----------------------|-------------------------|
| Actual | 4482 | 1338 | 2345 | 479 |

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

| 2017 | Extension | Research | Total |
|--------|-----------|----------|-------|
| Actual | 3 | 27 | 30 |

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Expert services, consultations

| Year | Actual |
|------|--------|
| 2017 | 109 |

Output #2

Output Measure

- Formal Extension outreach programs

| Year | Actual |
|------|--------|
| 2017 | 17 |

Output #3

Output Measure

- Face to face general group education sessions/workshops

| Year | Actual |
|------|--------|
| 2017 | 42 |

Output #4

Output Measure

- Fact sheets, bulletins and newsletters written or edited

| Year | Actual |
|------|--------|
| 2017 | 1 |

Output #5

Output Measure

- Training of undergraduate and graduate students and post-doctoral scientists

| Year | Actual |
|-------------|---------------|
| 2017 | 79 |

Output #6

Output Measure

- Individual Consultations

| Year | Actual |
|-------------|---------------|
| 2017 | 99 |

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|--------|---|
| 1 | Number of stakeholders gaining knowledge about food safety |
| 2 | Number of state and federal regulatory agencies making decisions on test results |
| 3 | Improve food safety through adoption of safe food practices by producers, processors and/or consumers |
| 4 | Approaches/techniques developed for inactivating foodborne pathogens |
| 5 | Improve the safety and quality of value-added dairy products |
| 6 | Increased Knowledge About Seafood Safety |

Outcome #1

1. Outcome Measures

Number of stakeholders gaining knowledge about food safety

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|-------------|---------------|
| 2017 | 1783 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There is great concern over the contamination of food with toxic pesticides or heavy metals. Regulators, food producers, retail operators, consumers, and consumer advocacy groups want assurances that foods contain safe levels of these constituents. Federal and state regulators request analyses of foods and enforce laws by recalling contaminated products from commerce. These programs include fresh and manufactured foods, as well as animal feeds, including raw and processed products. For chemicals such as mycotoxins, which are metabolites produced by mold and other fungi that can contaminate food, severe toxicity is evident at very low concentrations (parts per billion) and detection at such levels in complex foods is difficult. For certain pesticides, long term exposure to low doses may be linked to chronic disease. As new methods and analytical platforms become available, these protocols must be validated and shown to be both accurate and robust. As new analytes become of concern, protocols must be adopted and validated so as to accurately detect and quantify these contaminants.

What has been done

The Department of Analytical Chemistry at CAES conducts a surveillance program for human food under the FDA-led Manufactured Foods Regulatory Program Standards (MFRPS) and for animal feed under the FDA-led Animal Food Regulatory Program Standard (AFRPS). The CT Department of Consumer Protection (DCP) and the CT Department of Agriculture (DoAg) are partners for the MFRPS and AFRPS, respectively. Technical methods have been validated according to ISO guidance for both programs and involve unknown pesticide/mycotoxin analysis by simultaneous gas chromatography with triple quadrupole mass spectrometry (GC-MS/MS) and liquid chromatography with high resolution mass spectrometry (LC-MS/MS), as well as total arsenic analysis by inductively coupled plasma mass spectrometry. Results are reported back to the appropriate regulatory agency in a timely fashion.

Results

In late 2017, the Department of Analytical Chemistry analyzed 121 samples of food for pesticide residues. Of the 121 samples analyzed, 60 (49.6%) contained a total of 129 pesticide residues. Of these 60 samples, there were 3 samples each containing a total of 4 violative residues. These violations were turned over to DCP and FDA for regulatory response. There were 44 different pesticide active ingredients found at an average concentration of 0.210 µg/Kg, and the average number of pesticide residues per sample was 2.15.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|--|
| 711 | Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources |

Outcome #2

1. Outcome Measures

Number of state and federal regulatory agencies making decisions on test results

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|------|--------|
| 2017 | 4 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Department of Analytical Chemistry at CAES is asked by other state and federal agencies to analyze foods for adulteration with pesticides, poisons and heavy metals as part of surveillance and emergency response activity to ensure safety of the food supply. When foods are found to be contaminated with these constituents at unacceptable levels, regulatory agencies may remove or prevent food products from entering the marketplace. In certain circumstances, law enforcement response may occur.

What has been done

The Department Head of Analytical Chemistry serves on the CT Laboratory Preparedness Committee, which meets the first Monday of each month. This group includes representatives for Public Health, CT Poison Control, the 14th Civil Support Team of the National Guard, US Postal Inspection, CT Homeland Security, the FBI WMD Coordinator, CT State Police ESU, and the CT

DEEP Spill Response Team. The focus of this group includes incidents related to food safety and food security within the state.

Results

In February of 2017, the CAES Department of Analytical Chemistry was contacted by the FBI and the CT Department of Public Health regarding a potential poisoning case at Yale University. The incident involved a community coffee machine and 4 staff members became ill over a six-hour period after consuming the coffee. Various samples were submitted by the Yale University Police Department, including coffee, water from several sources, mugs/cups and the coffee machine itself. The analytical request was for sodium azide, a poison similar to cyanide, and our laboratory received the call because no other laboratory in the state could provide the analysis. CAES staff utilized several FDA validated methods; azide was detected in several of the liquid samples, with concentrations ranging from 10-340 mg/L. The subsequent law enforcement and University response was guided by these findings. Our results were later confirmed by the FBI laboratory in Quantico, VA.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|--|
| 711 | Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources |

Outcome #3

1. Outcome Measures

Improve food safety through adoption of safe food practices by producers, processors and/or consumers

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|------|--------|
| 2017 | 412 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The CDC estimates that each year roughly 48 million people get sick; 128,000 are hospitalized; and 3,000 die of foodborne illness. Produce outbreaks have been traced to farmers and packing facilities of all sizes. As a result, wholesale customers are requesting that produce farmers submit to a Good Agricultural Practices audit. In January 2016, the Food Safety

Modernization Act (FSMA) Produce Safety rule was enacted.

Produce farmers need to determine if they must comply with the FSMA rule, what parts of the FSMA rule they need to comply with, and by when. They also must determine their eligibility for exemptions. All those that must comply with the standards outlined in the FSMA rule must attend a Produce Safety Alliance approved training program. Farmers may need additional help as they navigate through this process due to limited resources of both personnel and funds. Farmers who do not need to comply with the FSMA rule may need to prepare for and submit to a GAP audit.

What has been done

UConn Extension offered 2.5 day courses on the FSMA Preventive Controls for Human Foods Rule at multiple locations. Farm visits provided one-on-one education for developing a farm food safety plan. Lectures were presented to students of child care programs regarding implications of foodborne illness for vulnerable populations and safe food handling. A three-day International HACCP Alliance approved Hazard Analysis Critical Control Point (HACCP) food safety course required for USDA/FSIS plants. We also provided Produce Safety Alliance Grower Training Courses, Meat and Poultry HACCP Courses, and an Annual Food Safety Training for the Elderly Nutrition Program in the state of Connecticut.

Results

During the reporting period, there were 412 participants through 12 different food safety programs. Participants in the meat and poultry courses indicated that all participants, including those that were new to the business, either learned new concepts or reinforced practices that they already employed in their plants. In the GAP Addendum training, 100% of participants indicated that the workshop provided them with the tools they needed to write a food safety plan. Attendees at FSMA courses report that based on the training they are now able to comply with safety rules. Farmers who may not need to comply are attending the course as a proactive measure to address the safety of their products.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|----------------|---|
| 711 | Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources |
| 712 | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |

Outcome #4

1. Outcome Measures

Approaches/techniques developed for inactivating foodborne pathogens

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Improve the safety and quality of value-added dairy products

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|-------------|---------------|
| 2017 | 400 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Unpasteurized milk and milk products can be a vehicle of food-borne illness. Small-scale producers are often considered a higher risk. Consumer interest driving rapid growth of small-scale dairy manufacturing operations throughout the United States has resulted in a need to better understand and identify the risks associated with this industry. Based on previous outbreak information and lack of validated control strategies, there is a critical need for actionable, science-based interventions to mitigate these threats.

What has been done

A Hatch Multistate project, Accession No. 1003888, integrated risk-based research and outreach to improve food safety and reach target populations including producers, regulators, and inspectors as well as those who advise them. Over 400 environmental samples were collected from surfaces in artisan cheese production facilities to determine and evaluate overall hygiene and the presence of pathogenic bacteria. Test results identified the presence of *Listeria monocytogenes* and Shiga-toxin producing *Escherichia coli* (STEC) on non-food contact sites thereby characterizing the risk that this organism poses to the small-scale dairy industry.

Results

Science-based interventions to prevent and mitigate food safety threats were developed including antimicrobial dip treatments, coating applications and acidification-based brine treatment protocols. One-on-one technical assistance and training was provided to small-scale cheese producers to implement changes to control and eliminate contaminants. Data from follow-up visits detail the reduction in hygiene indicator numbers and the elimination of pathogens from contaminated sites. Study results contributed to the American Cheese Society Code of Best Practices and to an online food safety training course for cheese producers. In addition, small-scale cheese producers reported a combined total of 12 fulltime jobs were created to share the

task of maintaining the new food safety procedures and practices.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|---|
| 712 | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |

Outcome #6

1. Outcome Measures

Increased Knowledge About Seafood Safety

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|------|--------|
| 2017 | 75 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to the Seafood HACCP training website, foodborne illness caused by microorganisms or naturally occurring toxins is the primary food safety risk. Illness is usually associated with improper harvesting, handling, storage, or preparation. Keeping seafood safe is critical to the long-term success of seafood markets.

Before a bowl of clam chowder or a freshly grilled swordfish steak ends up on a restaurant diner's plate, specially trained seafood handlers will have been working to eliminate any risk of contamination or hazards that could cause illness. Many of those handlers learned their skills in training programs offered by Connecticut and Rhode Island Sea Grants, including a three-day course in September of 2017. The course is nationally standardized and developed by the Seafood HACCP (Hazard Analysis and Critical Control Points) Alliance of seafood scientists.

What has been done

Three-day training courses take place at the Avery Point campus of UConn. In the September training, 22 seafood processors, wholesalers and dealers in products ranging from sushi to oysters to soups learned how to identify and control hazards associated with fish and shellfish to keep the public safe and their businesses running smoothly. Completion of the HACCP classes are required by a 1997 federal Food and Drug Administration regulation.

Regulators, industry members, and students receive a certificate of training completion from the Association of Food and Drug Officials. Back at their workplaces they write site-specific plans

for potential seafood safety hazards for their products, applying HACCP principles.

Results

The training certifies 75 to 100 seafood processors and regulators each year. The program has trained more than 2,000 individuals in HACCP principles over the past 20 years. Sessions are offered alternately between Avery Point and URI in Narragansett. No exam is given to students at the end of the class, but they build experience developing plans for different seafood products as a group exercise to help them immediately apply what they learn once they return to their own businesses.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|---|
| 711 | Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources |
| 712 | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Competing Programmatic Challenges
- Other (Unanticipated loss of staff)

Brief Explanation

At CAES, one scientist vacancy within this planned program remains open and is in the process of currently being filled; the scientist will work on emerging contaminants of concern in food. Separately, three Post-doctoral Research Scientists that are funded on federal grants (US FDA, USDA AFRI, NSF) continue to work directly on this program. These are critical positions because the discipline requires the testing of toxic organic chemicals and heavy metals in a range of products by a number of advanced methods on sophisticated equipment. Other staff scientists and technicians that work on state projects with state funds also spend time working on Hatch-funded programs. Although objectives and goals were met, we do note that competitive federal grant-funded positions are now a critical component of this program.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Information on research and service results was obtained during the program by written and oral comments received at public meetings, the CAES annual open house event, guided tours of the laboratory, civic groups' meetings, professional conferences, and at research exhibits. Observations made during interactions with stakeholders inform staff about program effectiveness and value.

Extension programs were evaluated with post-program evaluation forms that identified new awareness and/or knowledge of concepts and plans to implement changes in safe food handling behaviors. Follow up surveys to participants in FSMA information sessions

were implemented and data is being evaluated.

Key Items of Evaluation

The key items of evaluation and data collection were stakeholders' written and oral responses concerning food analyses; constructive written feedback from grant reviewers for competitive grants; and responses and corrective actions by the State, USDA, and US FDA to remove suspect or adulterated products from commerce. Google Scholar indicated that articles written in previous years by CAES scientists were recognized and cited by scientists in this field (total citations exceeded 1900 during the reporting period).

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Food Security and Food Systems

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|--|-----------------|-----------------|----------------|----------------|
| 202 | Plant Genetic Resources | 10% | | 0% | |
| 205 | Plant Management Systems | 25% | | 0% | |
| 206 | Basic Plant Biology | 10% | | 50% | |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants | 10% | | 15% | |
| 216 | Integrated Pest Management Systems | 10% | | 0% | |
| 601 | Economics of Agricultural Production and Farm Management | 10% | | 0% | |
| 603 | Market Economics | 0% | | 25% | |
| 604 | Marketing and Distribution Practices | 5% | | 5% | |
| 605 | Natural Resource and Environmental Economics | 5% | | 0% | |
| 607 | Consumer Economics | 10% | | 0% | |
| 704 | Nutrition and Hunger in the Population | 5% | | 5% | |
| | Total | 100% | | 100% | |

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

| Year: 2017 | Extension | | Research | |
|-------------------------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 5.0 | 0.0 | 20.3 | 0.0 |
| Actual Paid | 3.9 | 0.0 | 18.5 | 0.0 |
| Actual Volunteer | 22.3 | 0.0 | 0.0 | 0.0 |

2. Institution Name: University of Connecticut - Storrs

Actual dollars expended in this Program (includes Carryover Funds from previous years)

| Extension | | Research | |
|---------------------|----------------|----------------|----------------|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 312274 | 0 | 116747 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 312275 | 0 | 116747 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 551044 | 0 | 388810 | 0 |

2. Institution Name: Connecticut Agricultural Experiment Station -

Actual dollars expended in this Program (includes Carryover Funds from previous years)

| Extension | | Research | |
|---------------------|----------------|----------------|----------------|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 0 | 0 | 650366 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 0 | 0 | 2278333 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 0 | 0 | 479386 | 0 |

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research objectives are to develop novel pest control methods, to understand mechanisms of infection and disease, and to develop high yield resistant cultivars. Activities, events, services, and new crops assisted a diverse group of stakeholders. Activities included: (1) scientists conducted workshops for stakeholders, (2) scientists participated in over 150 organizations and societies, (3) experiments were performed on research farms and growers' properties, (4) cultivar trials on specialty butternut squash, okra, brussels sprouts and hops were completed, (5) pathogens of tree species were investigated, (6) stakeholders received information on IPM strategies, (7) research findings were disseminated by displays at agricultural fairs and through talks to civic groups, (8) staff members utilized traditional and social media to provide information on scientific discoveries, (9) staff members educated teachers and indirectly reached youth, and (10) diagnostic plant and insect services were provided. Field experiments solved problems or provided information on new crops. Outcomes included reduced pesticide use, greater understanding and control of pathogens, development of resistant cultivars, the introduction of new specialty crops, and increased farm income. Researchers directly addressed 9,215 citizens' inquiries and conducted 15,900 diagnostic tests. Scientists serve as members in at least 150 professional organizations, which enables stakeholders to directly comment on research and findings. Non-traditional stakeholders were reached at agricultural fairs when they visited displays, as well as through traditional and social media. The annual CAES open house allowed 1,183 stakeholders, including 100+ children, to hear presentations on research. Approximately 160 talks were given to convey findings and to receive public

feedback. Publications in peer-reviewed journals or articles written for the general public reached traditional and non-traditional stakeholders.

Extension activities in Food Security and Food Systems included urban agriculture, risk management, business planning, IPM training, and educational outreach through consultations, online media, and publications. Extension educators produced online resource materials such as fact sheets, impact statements and newsletter articles for agricultural audiences, local and regional newspapers, and trade publications. During the reporting period, our team produced one online seminar for our YouTube channel focused on garden hot topics, four farm energy videos, one agricultural benchmarking video, and four agricultural risk management videos.

The Master Gardener program had 17 statewide signature projects. Each of these helps the community where it is located. For instance, the People's Harvest garden in Pomfret, CT donated 4,000 pounds of fresh produce to the local soup kitchens. Our 622 active volunteers in the program donated a total of 37,938 hours to their communities, and tracked this information in our online reporting system. We also provided 3,164 hours of instruction through the Master Gardener program. The food justice program recruited 2,226 volunteers who donated 11,695 hours to their communities during this reporting period. Our team also conducted 3 Hatch research projects related to this planned program area.

2. Brief description of the target audience

The target audience includes consumers, farmers/producers, agency and organizations that serve or handle food, food-related businesses/processors, farmers' market staff and vendors, seafood industry processors, dealers, harvesters, importers, regulatory personnel, researchers, and policy makers. Additional audiences include teachers, the media, food bank personnel, beekeepers, maple syrup producers, seed companies, and water company officials. Women, minority organizations, and children are under-represented and underserved groups targeted under this program. For example, in the Solid Ground Training Program, 52% of our audience was women, and almost 25% identified as non-caucasian. Efforts were also focused on interactions with teachers and students. For example, the Put Local On Your Tray Program reached teachers and students in 45 school districts.

The Master Gardener program worked throughout 2017 to create a hybrid course model with online and in-person components. The hybrid model debuted with the 2018 class, and is being marketed to underserved and diverse audiences as it allows a more flexible schedule. The curriculum from the Master Gardener program was translated into Spanish several years ago and is used by the urban agriculture program to reach Hispanic audiences. The Solid Ground program also offers courses in Spanish. Courses not offered in Spanish have translators available.

3. How was eXtension used?

Several CAES staff members are registered in eXtension with consumer horticulture, youth, pesticide environmental stewardship, bee health, grape, eOrganic, and urban IPM communities of practice. New findings, fact sheets, links to Station material, and answers to questions have occasionally been provided to the national eXtension service (www.extension.org).

The UConn Home and Garden Education Center is registered as an eXtension Ask the Expert and responded to 285 phone calls from 22 states and 4 countries during the reporting year. Two examples of responses we have received are: "Oh my goodness ~ This Response from the Cooperative Ask an Expert is over-the-top Amazing! THANK YOU!", and "I feel like you covered Every contingency that I was concerned about. I feel like I have real tangible direction for my concerns."

An Extension educator from UConn works with the Marine Aquaculture Community of Practice through eXtension.

V(E). Planned Program (Outputs)

1. Standard output measures

| 2017 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|--------|------------------------|--------------------------|-----------------------|-------------------------|
| Actual | 32138 | 12409 | 2809 | 11580 |

2. Number of Patent Applications Submitted (Standard Research Output)
Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed
 N/A

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

| 2017 | Extension | Research | Total |
|--------|-----------|----------|-------|
| Actual | 2 | 43 | 45 |

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Face to face general group education sessions/workshops

| Year | Actual |
|------|--------|
| 2017 | 240 |

Output #2

Output Measure

- Individual consultations

| Year | Actual |
|------|--------|
| 2017 | 573 |

Output #3

Output Measure

- Fact sheets, bulletins and newsletters written or edited

| Year | Actual |
|-------------|---------------|
| 2017 | 45 |

Output #4

Output Measure

- Training of undergraduate and graduate students and post-doctoral researchers

| Year | Actual |
|-------------|---------------|
| 2017 | 84 |

Output #5

Output Measure

- Formal Extension outreach programs

| Year | Actual |
|-------------|---------------|
| 2017 | 38 |

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|--------|--|
| 1 | Number of homeowners, growers, students and/or media reporters gaining knowledge on insect pests and plant pathogens |
| 2 | Number of growers gaining information on IPM practices |
| 3 | Reduce food insecurity in the state of Connecticut and across the Northeast |
| 4 | Increase the percent of locally grown food that is purchased by Connecticut citizens |
| 5 | Increase sustainable, diverse and resilient food systems across scales |
| 6 | Improved national and global capacity to meet growing food demand |
| 7 | Prevent introduction and spread of non-native plant pests and pathogens in agriculture |

Outcome #1

1. Outcome Measures

Number of homeowners, growers, students and/or media reporters gaining knowledge on insect pests and plant pathogens

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|-------------|---------------|
| 2017 | 23854 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The hemlock woolly adelgid, (HWA), *Adelges tsugae*, is a non-native, extremely damaging pest from Japan that has decimated native North America eastern or Canadian hemlock, and Carolina hemlock in the forest and urban landscape from Georgia to Maine and west to Ohio. The winter generation of HWA is vulnerable to unpredictable winter conditions, especially in the northeast. This is significant to homeowners, arborists and forest managers alike, as the degree of HWA winter mortality influences the subsequent damage potential to hemlocks, and therefore the need for management and control.

What has been done

A CAES scientist has collected winter mortality data for HWA in Connecticut for 17 years (2000-2017) and analyzed for patterns in each of the three climatic divisions of Connecticut: northwest, central and coastal. Temperature data for analyses were obtained from the nearest official weather stations (National Oceanic and Atmospheric Administration), research stations or on site temperature data loggers

Results

HWA winter mortality was strongly correlated with minimum subzero (0 F) daily winter temperatures in three climatic divisions of Connecticut. HWA can either be killed during sudden cold snaps or during prolonged extreme cold. Coastal HWA is less cold hardy than interior populations of HWA. It was demonstrated that minimum winter temperatures ranging from -11 to -6 F (depending on climatic division in Connecticut) resulted in >90% HWA winter mortality and have substantially reduced spring HWA populations and the need for chemical control of HWA. In addition, the release of the commercially available biological control *Sasajiscymnus tsugae* after severe winter mortality can target those HWA survivors and increase the impacts of HWA biocontrol as *S. tsugae* feeds continuously from spring to fall

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|---|
| 205 | Plant Management Systems |
| 206 | Basic Plant Biology |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants |
| 216 | Integrated Pest Management Systems |

Outcome #2

1. Outcome Measures

Number of growers gaining information on IPM practices

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|------|--------|
| 2017 | 500 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Fire blight, caused by the bacterial pathogen *Erwinia amylovora*, is difficult to control due to the limited number of treatment options. Antibiotics used to be the only effective option for controlling fire blight, lost its effectiveness in many regions of the U.S. due to the development of antibiotic resistance in the pathogen populations. In addition, agricultural use of antibiotics raises concerns over negative impacts on the environment and on human health. In October 2014, the NOSB terminated the use of streptomycin in organic fruit production in the U.S. Effective, environmental friendly, non-antibiotic management options of fire blight are in urgent need.

What has been done

In collaboration with Biosafe Inc, we tested the efficacy of various combinations of non-antibiotic treatments in comparison to antibiotic treatment in controlling fire blight. A plant-sanitizing product (Oxidate 2.0) was combined with a biological control agent (BlossomProtect) at two different rate (0.3% and 1%) and was applied to Gala apple trees infected with fire blight pathogen. The disease incidence was evaluated two weeks after the inoculation. In 2016, microorganisms associated from apple stigmas were isolated from 4 apple cultivars and were screened for their biocontrol effect against *E. amylovora*. Microbes with biocontrol activities were identified and the mechanisms of control were investigated.

Results

Trees treated with Blossom Protect (one-time application at 80% bloom) followed by 0.3% Oxidate (applied at 100% bloom and 24 hrs afterwards) exhibited significant reduction in blossom blight (25%) similar to streptomycin (20%, one application at 100% bloom). These results suggest that the combination of the plant sanitizing material with a biological control may be an effective organic fire blight management strategy in the Northeast. In the search for biological control agents, we recovered an apple-stigma-habiting strain *Pseudomonas fluorescens* strain 250. This bacterium can actively produce an antimicrobial compound that potently inhibits the growth of *E. amylovora*. Further characterization has revealed the antimicrobial compound as anthranilic acid. The minimal inhibitory concentration of the compound was also determined.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|---|
| 205 | Plant Management Systems |
| 206 | Basic Plant Biology |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants |
| 216 | Integrated Pest Management Systems |

Outcome #3

1. Outcome Measures

Reduce food insecurity in the state of Connecticut and across the Northeast

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|------|--------|
| 2017 | 2226 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Contemporary food systems are shaped to generate profits and power for those who can maximize sales via the large scale production and distribution of inexpensive food. The problem is this system places far less value on the principles of sustainability, environmental integrity, economic vitality, and social equity. A sustainable food system can meet our needs for fresh, healthy, affordable food today without jeopardizing the ability of future generations from doing the

same. This is a global issue that we are addressing locally, statewide, and regionally in New England. In Connecticut, 12% of households experience food insecurity, 33% of children are overweight or obese (more than half of whom are Hispanic and African American), an estimated one out of five residents eat no vegetables daily, 33% of our census tracts live more than a half mile from a healthier food retailer, and only 10% of our cropland is used to harvest fruits and vegetables.

What has been done

UConn Extension sustainable food systems outreach and training programs included a multi-faceted approach to addressing the issue. Put Local On Your Tray promotes local food in school cafeterias. Service-learning programs include Connecticut Food Justice VISTA Project, Summer Meals Outreach Team VISTA Project, and FoodCorps Connecticut (UConn has an advisory board role on FoodCorps). The Solid Ground Training Program is offered for new farmers.

Tools and unique workshops were developed and implemented. The CSA Price Study has tracked prices by county for the last four consecutive years to inform producers of average CSA prices. During this reporting period we conducted the 2017 CSA Price Study, with new analysis of organic versus non-organic prices. Taste of Mansfield is a collaborative project led by UConn Extension to introduce more citizens to locally grown food through communication initiatives, events, and community meals in one town. Our goal is that the successful implementation in one town will become a model for expansion to other Connecticut towns.

Justice Talks are a six part series on civic engagement designed and implemented for CT Food Justice VISTA Members. Each session is two hours long and features a new topic with relevant materials and interactive discussion. The Agriculture Re\$ource Fair is a half-day event that introduces beginning farmers to available services.

Results

The impact of these combined efforts increased public awareness and support of local food systems, improved access to healthy, affordable food, increased stakeholder collaboration, and fostered emerging leaders in the field.

During the reporting period, 45 school districts were reached through Put Local On Your Tray. A YouTube video for school food service directors was shared to increase knowledge on USDA procurement methods, and the amount of local food used in schools. Our 13 VISTA members recruited 2,226 volunteers for the food justice program, and the volunteers donated 11,695 hours to their communities.

The Solid Ground program offered 26 core trainings for new and beginning farmers at seven partner locations, with a combined attendance of 268 people. Of this audience, 33% are looking to start producing food in the next year, while 67% are already growing or selling food. Some of these courses were offered in Spanish. Any course that was not offered in Spanish had translation available. 25 new farmers received one-on-one consulting from an expert in soil health or vegetable crop production.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|----------------|--|
| 601 | Economics of Agricultural Production and Farm Management |
| 604 | Marketing and Distribution Practices |
| 605 | Natural Resource and Environmental Economics |
| 607 | Consumer Economics |
| 704 | Nutrition and Hunger in the Population |

Outcome #4

1. Outcome Measures

Increase the percent of locally grown food that is purchased by Connecticut citizens

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Increase sustainable, diverse and resilient food systems across scales

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|-------------|---------------|
| 2017 | 622 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Lack of access to healthy and locally grown food affects nutrition and obesity rates. Studies show that food deserts are common in lower income neighborhoods and communities. In Connecticut, food deserts are found in Fairfield County, where Bridgeport and Danbury are located (two of the poorest cities in Connecticut), that also report the two largest Hispanic populations with 32% and 24% of total population respectively. The Master Gardener program at UConn shifted the educational focus of the program away from landscape gardens and towards food producing gardens and container gardens that can be grown in urban areas.

What has been done

The Master Gardener program educates approximately 190 new participants each year. During the reporting period there were 622 active volunteers. Master Gardener volunteers work through their local UConn Extension Center and the Bartlett Arboretum in Stamford to provide horticultural-related information to the community, with a shifting focus towards urban community gardens, and younger residents with no prior gardening experience.

Over the last few years, there has been a resurgence in food production questions and interest from the public, and Master Gardener programs and volunteers focused on building diverse and

resilient food systems. Parts of the Master Gardener curriculum were adopted by the urban agriculture program that operates in Fairfield County. Course sections were translated into Spanish and utilized by our Hispanic students.

Results

During the reporting period 32 Garden Master classes were offered to volunteers and the general public. Of the participants, 196 self-identified as either Hispanic, Asian, Pacific, or African American. Food related courses included: Sustainable Farming Design, Gardening for the Ages, Plant Pruning Basics, Do-it-Yourself Plant Breeding, Get a Jump on Spring Vegetables, and Raspberry Cultivation. In total there were 3,164 hours of instruction provided.

Our 622 active volunteers donated 37,938 hours to their communities. Included in this time was 14 signature projects. One of these is the People's Harvest Garden, a 1+ acre garden. Produce harvested was donated to local soup kitchens. Local youth groups visited People's Harvest and learned about raising vegetables, sustainable techniques, IPM, the environment and food security. The garden was started by the 2005 Master Gardener interns and continues today with our volunteers. Over 4000 pounds of produce was donated to the local soup kitchens during the reporting period.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|--|
| 601 | Economics of Agricultural Production and Farm Management |
| 604 | Marketing and Distribution Practices |
| 605 | Natural Resource and Environmental Economics |
| 607 | Consumer Economics |
| 704 | Nutrition and Hunger in the Population |

Outcome #6

1. Outcome Measures

Improved national and global capacity to meet growing food demand

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|------|--------|
| 2017 | 1 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Today, about 10,000 acres on 952 farms in Connecticut are devoted to vegetable production with a cash value of \$36.4 million. Vegetable growers responding to a state survey requested that field trials be conducted on butternut squash, Brussels sprouts, and okra. These crops were grown by 92%, 87%, and 35% of the growers responding to the survey, respectively.

What has been done

At our two experimental farms, CAES conducted field trials on 10 cultivars each of butternut squash, Brussels sprouts, and okra.

Results

Our research has shown that cultivar selection can dramatically increase yields and profits for the grower. For butternut squash, by growing cultivar Waltham instead of Atlas, the grower can produce almost 14,000 more squash per acre. At a retail price of \$2.49/squash, the grower could potentially gross almost \$35,000 more per acre by growing Waltham instead of Atlas. For Brussels sprouts, by growing Jade Cross instead of Igor, the grower can produce over 10,300 more pounds per acre. At a retail price of \$5.28/lb, the grower can gross almost \$55,000 more per acre by growing Jade Cross instead of Igor. For okra, by growing the cultivar Zarah instead of the cultivar Red Burgundy, the grower could potentially produce 18 more pods per plant or over 174,000 more pods per acre. At a retail price of \$2.99/12 pods, the grower could potentially gross over \$43,000 more per acre by growing Zarah instead of Red Burgundy.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|----------------|--|
| 601 | Economics of Agricultural Production and Farm Management |
| 604 | Marketing and Distribution Practices |
| 605 | Natural Resource and Environmental Economics |
| 607 | Consumer Economics |
| 704 | Nutrition and Hunger in the Population |

Outcome #7

1. Outcome Measures

Prevent introduction and spread of non-native plant pests and pathogens in agriculture

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|-------------|---------------|
|-------------|---------------|

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Accurate plant diagnosis or pest identification is important to provide farmers, professional growers, home gardeners, and landscape professionals with timely, effective recommendations for the prevention and control of plant problems. A secondary benefit is advancing agricultural security. According to USDA NASS, Connecticut has 9,293 acres in vegetable production. Rapid identification of significant pests or pathogens aids in the protection of plant health and productivity, and minimizes environmental impact. With an accurate plant diagnosis or pest ID, gardeners, farmers, professional growers and landscape professionals can respond rapidly and effectively to manage problems with a minimum of chemical pesticide use.

What has been done

The UConn Plant Diagnostic Laboratory runs a fee-based diagnostic laboratory that identifies and diagnoses plant and pest problems for commercial clientele and homeowners. The lab maintains a USDA Plant Protection and Quarantine permit that allows them to receive samples from out of state and select regulatory agents. The lab plays a key role in identifying and responding to significant pest or pathogen introductions into Connecticut or the Northeast region, in cooperation with other diagnostic laboratories from the National Plant Diagnostic Network (NPDN).

Diagnostic methods used include images, microscopy, incubation, serology, nematode extraction (from soil or plant tissue) and cultural isolation. Staff participated in NPDN training to recognize and handle exotic and invasive insects and diseases. They also provide educational training to Master Gardeners, consumers and professionals. Training focuses on recognition and response to pest outbreaks, and diagnosis and management of plant pests and diseases problems using Integrated Pest Management (IPM).

Results

Accurate identification of plant problems or pests leads to timely, effective, sustainable, and often more economical management. The UConn Plant Diagnostic Lab processed 763 samples from private and commercial clients, of which 100 samples were submitted via the Plant Sample Submission app. Samples included fruits and vegetables, nursery crops, and ornamental and vegetable greenhouse crops.

Frequent submissions during peak growing season included caterpillars on brassicas, rose slug sawfly, late blight, downy mildew, Spotted Wing Drosophila, Asian longhorned beetle, cicada killer wasps, powdery mildews on various hosts, especially cucurbits, tomato hornworm, potato leafhopper on several hosts, anthracnose on several hosts, and Mexican bean beetle. Many other diseases and insects were also diagnosed with management recommendations provided.

Lab staff collaborate with colleagues when plant problems appear to be widespread in commercial crops. Unusual outbreaks and pests or symptoms of concern are monitored. Science-based advice is provided to reduce pesticide use and improve plant health through diagnostic services, educational programs and consultations with growers.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|---|
| 205 | Plant Management Systems |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants |

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Staff changes, media influences)

Brief Explanation

A number of scientists have IPM and related investigations as part of their research and all goals laid out under this planned program were met. In addition, new scientists hired in this program continue to expand their active lines of research within this planned program. As such, meeting and/or exceeding future targeted outcomes is anticipated.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Researchers conducted a number of evaluation studies during this reporting period and verified that there were knowledge changes in stakeholders. Moreover, 200 site visits and 160 talks enabled direct evaluation of acceptance of new crop cultivars, IPM strategies, and cultivation practices.

Extension used a variety of formative and summative assessment tools. In our service learning programs, we used mid-year evaluations and end-of-year evaluations for service members, and use progress reporting tools to record direct and indirect impacts on clients. In our farmer training programs, we used post-workshop evaluations. In our farm-to-school pilot programming, we used an evaluation tool designed for K-12 students in response to taste tests. Master Gardener participants are administered knowledge tests before achieving certification. Extension courses are evaluated by our team of educators through survey research and exit interviews.

Key Items of Evaluation

Google Scholar verified recognition of published articles within this program written by research staff at CAES. There were over 700 citations for this planned program; direct contacts within the program exceeded 24,000, including nearly 2,600 youth. Indirect contacts exceeded 8,600; including over 1,500 youth. On-site observations and evaluations verified success in increased use of IPM and new cultivars, as well as control methods.

In Extension, our core impact areas during the reporting period are 1) advancing business models and practices that will help food producers succeed and be profitable; 2) helping consumers connect to fresh, healthy, affordable food through local food system practices and consumer education; 3) developing the next generation of food system leaders through training, internships, and service learning; and 4) supporting stakeholder

networks that are working on strategies that improve the values of sustainability in our food system. The Master Gardener program is using evaluation results to increase volunteer retention rates and the number of active volunteers serving the program annually.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Human and Animal Health

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|---|-----------------|-----------------|----------------|----------------|
| 301 | Reproductive Performance of Animals | 0% | | 1% | |
| 302 | Nutrient Utilization in Animals | 0% | | 1% | |
| 303 | Genetic Improvement of Animals | 0% | | 2% | |
| 305 | Animal Physiological Processes | 0% | | 7% | |
| 311 | Animal Diseases | 32% | | 26% | |
| 315 | Animal Welfare/Well-Being and Protection | 0% | | 2% | |
| 501 | New and Improved Food Processing Technologies | 0% | | 4% | |
| 610 | Domestic Policy Analysis | 0% | | 4% | |
| 701 | Nutrient Composition of Food | 0% | | 7% | |
| 702 | Requirements and Function of Nutrients and Other Food Components | 0% | | 15% | |
| 703 | Nutrition Education and Behavior | 15% | | 14% | |
| 704 | Nutrition and Hunger in the Population | 5% | | 4% | |
| 711 | Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources | 30% | | 0% | |
| 712 | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins | 0% | | 4% | |
| 722 | Zoonotic Diseases and Parasites Affecting Humans | 0% | | 2% | |
| 723 | Hazards to Human Health and Safety | 15% | | 4% | |
| 724 | Healthy Lifestyle | 3% | | 3% | |
| | Total | 100% | | 100% | |

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

| Year: 2017 | Extension | | Research | |
|------------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| | | | | |

| | | | | |
|-------------------------|-----|-----|------|-----|
| Plan | 1.0 | 0.0 | 9.8 | 0.0 |
| Actual Paid | 0.5 | 0.0 | 13.3 | 0.0 |
| Actual Volunteer | 0.0 | 0.0 | 0.0 | 0.0 |

2. Institution Name: University of Connecticut - Storrs

Actual dollars expended in this Program (includes Carryover Funds from previous years)

| Extension | | Research | |
|-----------------------|-----------------------|-----------------------|-----------------------|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 25190 | 0 | 512669 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 25910 | 0 | 512669 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 806999 | 0 | 2589156 | 0 |

2. Institution Name: Connecticut Agricultural Experiment Station -

Actual dollars expended in this Program (includes Carryover Funds from previous years)

| Extension | | Research | |
|-----------------------|-----------------------|-----------------------|-----------------------|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 0 | 0 | 162799 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 0 | 0 | 1111468 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 0 | 0 | 167795 | 0 |

V(D). Planned Program (Activity)

1. Brief description of the Activity

At CAES, a primary emphasis is on the role of arthropods in transmission of human disease-causing pathogens. The research objectives focus principally on ticks and mosquitoes and include assessing vector competence of local vector populations; evaluating the impact of temperature on vectors, pathogens, vector-pathogen interactions and transmission efficiency; characterization of the genetic diversity and structure of vectors and pathogen populations; investigation of vector-host-pathogen interactions; investigation of invasion biology of exotic vectors; testing biological control strategies for reducing vector populations; and evaluating the role of vertebrates as reservoirs for arthropod-transmitted pathogens. The Tick Testing Program was expanded to include testing for the agents of babesiosis and anaplasmosis. For mosquitoes the objectives include investigating the vectors of encephalitis and related viruses, blood meal sources in mosquitoes, if biological control strategies can control vectors, and which

vertebrates serve as reservoirs for pathogens. Surveillance activities were expanded to include the Zika virus. Research on the role of mosquito midgut proteins and other metabolites in controlling flavivirus susceptibility were continued. Investigations on the role of invasive plants as refuges for disease-carrying ticks continued, as did assessments of the relationship of deer populations to Lyme disease prevalence. Investigations on bed bug presence and control were continued. Activities focused on the success of control methods were coordinated with public health officials and a tick IPM working group. Public forums on tick-borne diseases and bed bugs were held. CAES scientists helped organize and participated in a national symposium on integrated tick management. A new CDC-funded Center of Excellence was formed and is entitled "Northeast Regional Center for Excellence in Vector-Borne Diseases." Additional studies are being carried out on the genomic ecology of the microsporidia, which are single-celled, intracellular parasites of all animal species.

UConn Extension and Storrs Agricultural Experiment Station programs address research and outreach activities focused on human and animal health. These include: identifying nutrition and exercise lifestyle factors essential to successful aging; developing new technologies to reduce the risk of chronic diseases; safeguarding human and animal health through diagnostics and vaccine development; conducting workshops and webinars; providing training to relevant stakeholder audiences, counseling, and assessments; and producing online resource materials such as fact sheets, impact statements and news articles. Our Connecticut Veterinary Medical Diagnostic Laboratory had 2,434 active private clients, and worked with 26 UConn departments, 64 local police departments or animal control officers, 4 Departments of Agriculture from states other than Connecticut, 19 universities other than UConn, and 13 other Veterinary Diagnostic Laboratories.

UConn researchers received two patents in animal health. Participation in 1 Hatch Multistate research project, and 3 Hatch projects occurred during this reporting period.

2. Brief description of the target audience

Target audiences include all individuals with a stake in preventing disease and improving the health of humans and animals. Producers, processors, retailers, regulators, members of the scientific community and consumers are all part of the target audience. This program benefits a broad range of stakeholders, including local and national public health officials, elected officials, regulators, and the public at large.

Underserved audiences are included in the target audience, and actively engaged through programs, partners, and stakeholders. For example, UConn Communications created a Science in Seconds video on the work of our Veterinary Diagnostic Laboratory on tracking established and emerging tick-borne diseases. The video has 1,283 views on YouTube and that number doubles when analytics from UConn's site where the YouTube video was embedded are included. The partnerships of the Diagnostic Laboratory and other research and Extension programs introduces our work to audiences we might not otherwise reach. Marketing and communication efforts will continue to focus on these audiences.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

| 2017 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---------------|---------------------------|-----------------------------|--------------------------|----------------------------|
| Actual | 12690 | 14816 | 322 | 2965 |

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2017
 Actual: 2

Patents listed

1. Attenuated African Swine Fever Virus Vaccine Based in the Deletion of MGF Genes. 12/27/16.
2. Attenuated African swine fever virus strain induces protection against challenge with homologous virulent parental virus Georgia 2007 isolate. 10/11/16.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

| 2017 | Extension | Research | Total |
|--------|-----------|----------|-------|
| Actual | 3 | 118 | 121 |

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Faces to face general group education sessions/workshops

Year Actual
 2017 322

Output #2

Output Measure

- Individual consultations

Year Actual
 2017 39

Output #3

Output Measure

- Fact sheets, bulletins and newsletters written or edited

Year Actual
 2017 5

Output #4

Output Measure

- Training of undergraduate and graduate students and post-doctoral researchers

| Year | Actual |
|-------------|---------------|
| 2017 | 706 |

Output #5

Output Measure

- Formal Extension outreach programs

| Year | Actual |
|-------------|---------------|
| 2017 | 21 |

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|--------|--|
| 1 | Number of residents gaining knowledge of ticks, mosquitoes, bed bugs, and mold |
| 2 | Number of media reporters gaining knowledge of ticks, mosquitoes, bed bugs, and mold |
| 3 | Improved human and animal health through adoption of dietary and other behavioral activities by practitioners and consumers. |
| 4 | Identify nutrition and exercise lifestyle factors essential to successful aging |
| 5 | Develop new technologies to reduce risk of chronic diseases |
| 6 | Improved human and animal health through diagnostic testing and vaccine development |

Outcome #1

1. Outcome Measures

Number of residents gaining knowledge of ticks, mosquitoes, bed bugs, and mold

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|-------------|---------------|
| 2017 | 14259 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The prevalence of tick-associated diseases continues to increase in the U.S. There were 36,429 cases of Lyme disease reported to the CDC in 2016. The prevalence of infection in 4,197 human parasitizing blacklegged ticks in Connecticut was 31% for Lyme disease agent, 6% for anaplasmosis and 7% for babesiosis. The abundance of lone star tick, *Amblyomma americanum*, the primary vector of the causative agents for human monocytic ehrlichiosis, and human and canine granulocytic ehrlichiosis, respectively, has been increasing in Connecticut. The application of pesticides remains the primary methods for tick control, and there is growing interest in biological and natural methods. Meanwhile, outbreaks of mosquito-borne diseases continue to pose serious risks to the public. Since the emergence of West Nile virus in 1999, more than 40,000 human cases and 1,900 deaths have been reported; more than 3 million human infections are estimated. Eastern Equine Encephalitis (EEE) virus strikes at irregular intervals in the northeastern U.S., with an estimated case fatality rate of 33-50%. Bed bug and related inquiries remained the leading inquiry with 33% (n= 2,782) of the identifications performed by the Insect Information Office, a 23-fold increase since 2007.

What has been done

An integrated tick management (ITM) project was initiated in 2013 and completed in 2016 to determine if an IPM approach could reduce the abundance of the tick *Ixodes scapularis* and the entomological risk of tick-borne disease. This tick is the main vector for several human disease-causing pathogens. The strategies included spraying the entomopathogenic fungus *Metarhizium anisopliae*, rodent targeted bait boxes, and deer reduction. Studies using a rodent-targeted Lyme disease vaccine bait were initiated in 2015. A non-vaccine marked bait study in 2014 found that over 90% of white-footed mice utilized the bait. Mosquito projects included mapping the distribution and predicative modeling of the invasive Asian tiger mosquito (*Aedes albopictus*) at the northern limit of its range. Mosquitoes were sampled from up to 91 statewide trapping sites from 1997-2017 to track the establishment and range expansion of this species in Connecticut. In

addition, *Ae. albopictus* larvae were monitored in tire habitats and tires were retrieved from the field in the spring and flooded to evaluate overwintering success of hatching larvae. Population genetics of *Culiseta melanura*, the principle vector of EEE virus has been studied throughout eastern U.S.

Results

A 3-year ITM program to control blacklegged ticks was implemented in 2013. The combination of fipronil-based bait boxes and broadcast application of entomopathogenic fungus had the most impact; questing nymphs were reduced 78-95% within each year and *Borrelia burgdorferi*-infected questing nymphal *I. scapularis* encounter potential was reduced by 66% in the third year of the study. A three-year overwintering survival study for *I. scapularis* under differing conditions of snow and leaf litter in began in the winter of 2016-2017. Survival in Connecticut ranged from 93% with snow and leaf litter cover to 77% with no snow or leaf litter cover. *Ae. albopictus* was first detected during statewide surveillance in 2006. This species was detected every year since then, except for 2010, with increasing abundance and distribution. Field-collected females tested positive for Cache Valley and West Nile viruses, highlighting the threat posed by this mosquito. *Ae. albopictus* overwintered in Connecticut under mild winter conditions as shown by recovery of larvae hatching in spring and by early seasonal detection of larvae and adults. Recent activities on the microsporidia include protein analysis of a tandem duplication of manganese superoxide dismutase and tertiary structural analysis; genome sequencing of a *Vairimorpha necatrix*; classical ecology of aquatic microsporidia in Crustacea; and development of the microsporidial portion of the Silkworm pathogen database.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|--|
| 722 | Zoonotic Diseases and Parasites Affecting Humans |
| 723 | Hazards to Human Health and Safety |

Outcome #2

1. Outcome Measures

Number of media reporters gaining knowledge of ticks, mosquitoes, bed bugs, and mold

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|------|--------|
| 2017 | 69 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The media often seek information on mosquitoes, ticks, bed bugs and associated pathogens. There is also interest in information on how arthropod vectors impact the spread of disease. Zika, West Nile, Eastern Equine Encephalitis (EEE), and related viruses constitute ongoing threats to human health by causing severe illness or death. Since its introduction into the United States in 1999, West Nile virus has sickened tens of thousands of people resulting in nearly 2,000 deaths. The first human fatality of EEE virus occurred in CT during 2013. Emerging viruses such as Zika and Powassan create great concern among the general public. Public health officials have requested studies on the ecology of mosquitoes, viruses and biological control of mosquitoes.

What has been done

There were at least 69 reporters who sought information on bed bugs, mosquitoes and encephalitis viruses by interviewing CAES scientists. Stakeholders specifically note concerns over viruses such as Zika, West Nile and Eastern Encephalitis that cause human illnesses. Last year more than 195,000 mosquitoes were tested for viruses. Viruses cultured from mosquitoes were identified by advanced molecular techniques. Results were conveyed to the general public via press releases, social media and through coordinated efforts with the Connecticut Department of Public Health. Tens of thousands of residents and stakeholders were kept informed of recent research findings and the significance of new scientific advances.

Results

Sixty-nine separate interactions with the press resulted in dozens of articles on bed bugs, ticks, mosquitos and other disease carrying arthropods. The original articles were re-distributed by dozens of additional media venues that ran the original stories and content. These results had impact because mosquito control programs targeted the most important mosquito species and state residents took precautions to avoid mosquito bites. The long-term benefit continues to be healthy human and domestic animal populations, as well as situational awareness regarding new emerging diseases such as Zika and Powassan virus.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|--|
| 722 | Zoonotic Diseases and Parasites Affecting Humans |
| 723 | Hazards to Human Health and Safety |

Outcome #3

1. Outcome Measures

Improved human and animal health through adoption of dietary and other behavioral activities by practitioners and consumers.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Identify nutrition and exercise lifestyle factors essential to successful aging

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|-------------|---------------|
| 2017 | 1 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

By 2030, the US population will have approximately 70 million people aged 65 years or older. As humans age they lose muscle. This can lead to debilitating age-related muscle loss, or sarcopenia. Nutrition and exercise are lifestyle factors central to successful aging.

What has been done

Yoga, one of the top ten practices in Complementary and Alternative Medicine, is an alternative mode of exercise that is growing in popularity, particularly among women. UConn Hatch research project, Accession No. 1000907 studied the benefits of yoga with increased protein intake in healthy, active middle-aged women and men. Study results show yoga contributes to the maintenance of lean body mass and improved quality of life with aging.

Results

The physical benefits of yoga include strength, flexibility, improved balance, reduced body fat and improved health outcomes. Although body weight and body mass index were similar, body fat was lower and muscle mass higher for the yoga group vs the control group. Yogis burned more fat at rest than their non-exercising counterparts and had lower rates of protein synthesis and breakdown. This reduced rate of protein turnover may be associated with maintenance of muscle mass resulting from routine yoga practice. The effects of yoga on the use of protein by the body suggests that this form of exercise offers a multitude of benefits that support healthy, active aging. The comparatively low stress of yoga on joints makes it accessible and easier for older adults to sustain. It is less dangerous than weight training, which can result in injury if done improperly. The study is part of a growing body of scientific research linking yoga to health benefits including reduced stress, lower blood pressure, and improved health in cancer patients.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|----------------------------------|
| 703 | Nutrition Education and Behavior |

Outcome #5

1. Outcome Measures

Develop new technologies to reduce risk of chronic diseases

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|------|--------|
| 2017 | 1 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

When foods are fortified or enriched, they become functional foods. But the biological efficacy of nutrients in functional foods is hardly realized if there is limited bioavailability when the foods are ingested. Bioavailability is the proportion of a nutrient absorbed and therefore able to produce a particular effect. Many nutrients, such as vitamins and phytochemicals, are known to have a low bioavailability.

What has been done

UConn Hatch project, Accession No. 1007112, is researching the use of nanotechnology to improve the bioavailability of those nutrients and eventually help treat and prevent chronic diseases when foods are fortified with them. Researchers are studying ways to extract, purify and characterize naturally-occurring biomaterials from egg yolk, and then utilize such biomaterials to design nanoscale carriers for water-insoluble nutrients. Both high-density and low-density lipoproteins are purified from egg yolk, and have been tested as small, safe, and effective nanoscale carriers to deliver curcumin, a water-insoluble phytochemical, and boost its absorption and enhance its health benefits.

Results

Study results have discovered new biomaterials: two natural lipoproteins were extracted and purified from egg yolk and their physical and chemical properties were comprehensively characterized. Also, two types of nanoscale delivery systems have been developed to encapsulate nutrients and dry powders. Discovery of new naturally-occurring biomaterials from food products (egg yolk) and development of nanoscale carriers using such biomaterials would

enable food scientists to explore new ways of nutrient fortification to enhance their biological activity and thus reduce the risk of chronic diseases.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|------------------------------|
| 701 | Nutrient Composition of Food |

Outcome #6

1. Outcome Measures

Improved human and animal health through diagnostic testing and vaccine development

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|------|--------|
| 2017 | 2434 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Diagnostic testing and vaccine development are critical components to safeguarding human and animal health. Human and animal health issues in Connecticut include rabies, Lyme Disease and other tickborne diseases, E. coli, and swine influenza.

The Connecticut Veterinary Medical Diagnostic Laboratory (CVMDL) at UConn incorporates the land grant university mission of service, teaching, and research in their daily practices. They are the only laboratory in New England accredited by the American Association of Veterinary Laboratory Diagnosticians.

What has been done

CVMDL services include: histology, immunohistochemistry, mastitis, microbiology, molecular diagnostics, pathology, parasitology, serology, and virology. There are 165 types of tests offered among all service areas. CVMDL is the assigned laboratory for any non-human rabies test cases in Connecticut.

Emerging diseases pose a threat to human and animal health. Researchers track emerging diseases and develop new protocols and vaccines based on present issues. For example, when the Zika virus emerged as a human health issue in 2016, a UConn researcher worked on creating a vaccine that is both effective and economical.

A number of diagnostic procedures and tests assist veterinarians and animal owners in

diagnosing Salmonellosis or other possible diseases. Services available include dead animal necropsy evaluations, sample culturing for pathogen identification and antimicrobial sensitivity testing, and screening blood samples for export movement or flock certification.

Results

CVMDL had 2,434 active private clients. The most common tests conducted were: tick testing, rabies, necropsy, salmonella, and mastitis. Domestic and wild animal species are tested on a weekly basis for rabies. For example, 44 bats were submitted in 2017 for rabies testing.

CVMDL tested 397 ticks in 2017. Unlike many other labs, CVMDL can test for 8 tick-borne diseases in a single test. Deer ticks are tested for *Borrelia burgdorferi*, *Anaplasma phagocytophilum*, *Babesia microti*, and *Borrelia miyamotoi*. Dog Ticks are tested for *Francisella tularensis*, *Rickettsia rickettsia*, *Ehrlichia* species. Lone Star ticks are tested for *Ehrlichia* species, *Francisella tularensis*, and *Borrelia lonestari*. Brown Dog ticks are tested for *Rickettsia rickettsia* and *Ehrlichia* species.

The tick identification process determines the species of tick, life stage, and degree of blood engorgement, all of which are factors that may impact transmission of pathogens to the person or animal (the host). Ticks may then be tested for the DNA of pathogens that are known to be transmitted by that tick species. Results are reported within three to five days. The information obtained from testing ticks is useful when consulting with physicians or veterinarians about further actions by a client.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|--|
| 311 | Animal Diseases |
| 722 | Zoonotic Diseases and Parasites Affecting Humans |
| 723 | Hazards to Human Health and Safety |

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Competing Public priorities
- Competing Programmatic Challenges
- Other (Staffing changes)

Brief Explanation

A combination of federal and state grant funds were available for this program; at CAES shifts in scientists' work times from state projects to Hatch projects did occur. There were no delays in re-hiring temporary workers on grant funds, which is critical as traps and other techniques used require technical expertise not present among the general public. A new CDC-funded Center of Excellence has had significant positive impact on outputs from this program, including the hiring of post-doctoral research scientists. There were no changes in public policy, priorities, or research areas that impacted this program.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

As in previous years, evaluations were conducted to assess program effectiveness. Verbal feedback from municipal and public health officials, as well as the general public, indicated significant interest in work conducted and results generated under this planned program. Our programs use surveys and exit interviews to identify gaps in Extension outreach and to enhance future programs.

Key Items of Evaluation

Researchers collected data mainly by on-site evaluations conducted following talks to specific civic or professional groups, as well as at our annual open house and other public venues. Significant direct interactions with traditional and social media, as well as with stakeholders, continued at CAES. Direct interactions were with over 10,300 individuals, including 302 youth; there were 69 direct interactions with reporters and the media. During this reporting period, there were a total of 850 citations in Google Scholar for scientists in this program.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Sustainable Environments

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|---|-----------------|-----------------|----------------|----------------|
| 102 | Soil, Plant, Water, Nutrient Relationships | 20% | | 12% | |
| 112 | Watershed Protection and Management | 10% | | 10% | |
| 123 | Management and Sustainability of Forest Resources | 10% | | 2% | |
| 131 | Alternative Uses of Land | 10% | | 5% | |
| 132 | Weather and Climate | 10% | | 5% | |
| 133 | Pollution Prevention and Mitigation | 0% | | 4% | |
| 135 | Aquatic and Terrestrial Wildlife | 0% | | 10% | |
| 141 | Air Resource Protection and Management | 0% | | 5% | |
| 202 | Plant Genetic Resources | 0% | | 7% | |
| 205 | Plant Management Systems | 10% | | 20% | |
| 215 | Biological Control of Pests Affecting Plants | 10% | | 5% | |
| 216 | Integrated Pest Management Systems | 20% | | 5% | |
| 605 | Natural Resource and Environmental Economics | 0% | | 10% | |
| | Total | 100% | | 100% | |

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

| Year: 2017 | Extension | | Research | |
|-------------------------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 4.0 | 0.0 | 6.9 | 0.0 |
| Actual Paid | 6.6 | 0.0 | 7.8 | 0.0 |
| Actual Volunteer | 0.0 | 0.0 | 0.0 | 0.0 |

2. Institution Name: University of Connecticut - Storrs

Actual dollars expended in this Program (includes Carryover Funds from previous years)

| Extension | | Research | |
|---------------------|----------------|----------------|----------------|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 608001 | 0 | 486168 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 608001 | 0 | 486168 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 1573883 | 0 | 2016564 | 0 |

2. Institution Name: Connecticut Agricultural Experiment Station -

Actual dollars expended in this Program (includes Carryover Funds from previous years)

| Extension | | Research | |
|---------------------|----------------|----------------|----------------|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 0 | 0 | 35096 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 0 | 0 | 319791 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 0 | 0 | 143696 | 0 |

V(D). Planned Program (Activity)

1. Brief description of the Activity

For CAES efforts, the research objectives are: to identify processes that control pollutant fate in the environment; develop methods to remediate contaminated soil and water; characterize the spread of, and methods to control, invasive aquatic plants; and to determine the causes of sudden vegetation dieback (SVD) and its impacts on sediment-atmosphere carbon exchange. The environmental pollution program covers both fundamental and applied aspects, and deals with pesticides, volatile organic compounds, dyes, hormones and hormone-mimicking compounds, pharmaceuticals, petroleum hydrocarbons, munitions chemicals, and engineered nanomaterials. Studies are conducted on the binding of organic pollutants to soil particles; the nature of the organic matter and black carbon in the soil and their effects on adsorption of contaminants; the bioavailability of contaminants in soil and black carbon particles; the design of catalysts for trapping and degrading chemical pollutants in soil, water and air; and novel approaches for water treatment based on advanced oxidation chemistry. The Invasive Aquatic Plant Program (IAPP) tracks occurrences of invasive aquatic plants, tests novel control strategies, and provides public outreach via talks, workshops and an invasive aquatic plant webpage that serves as an online repository for aquatic vegetation maps, herbarium specimens, and research results. IAPP has performed over 332 lake surveys since 2004, and found approximately 60 percent contain one or more invasive plant species. IAPP has published numerous research articles, and presented at hundreds of public education events. A large number of state residents are served directly by visits to infested lakes, identification of problems, and assistance with management. We are monitoring cases of SVD throughout CT and RI, and

we are measuring soil gas fluxes to monitor soil carbon cycling, as well as characterizing how microbial communities respond to SVD.

Extension outreach efforts were conducted through multiple programs. Pesticide safety education training was offered throughout the state to farmers, municipal officials, and other individuals. UConn Extension conducted eighteen programs, workshops, and conferences providing re-certification education for 492 pesticide applicators and 1533 other individuals. A Municipal Grounds and Sports Turf Academy short course was designed for grounds crews at the municipal level to develop a better understanding of the basic agronomic necessary to maintain safe playing surfaces. Extension faculty is leading a collaborative program focused on the impact of climate adaptation on Connecticut communities. The UConn Climate Corps brings together undergraduates enrolled in the environmental majors with town officials, to the benefit of both groups. A Hatch multi-state project enhanced the use of biologically-based alternatives to pesticides.

Training is provided to relevant stakeholder audiences through workshops and webinars, online materials, and individual consultations. An online training course is under development for the pesticide safety education program.

2. Brief description of the target audience

Target audiences for these programs include elected municipal officials, municipal land use staff and commissioners, researchers, city/town volunteers and citizens, state environmental and agriculture regulators, land trusts and other conservation organizations, private land owners, master gardeners, teachers, and students. Efforts were made to contact under-represented and under-served groups, including women, members of minority organizations, and children. Many Extension programs are a partnership with another organization, and Extension leverages our partnerships to recruit under-represented and under-served groups. For example, pesticide and turf education programs sought out urban areas for test plots and one-on-one Extension visits. Additional outreach to urban areas via phone and email was conducted prior to programming to ensure that all audiences knew of available trainings. Women outnumbered male participants for programs where demographic data was collected. Youth were reached through presentations in schools on living shorelines and other sustainable environment topics that tie into school curricula. Educators also work on the state Envirothon annually engaging high school audiences with environmental issues.

3. How was eXtension used?

An Extension educator serves on the Climate Science Learning Network Advisory Board for eXtension. Our educators have also worked with eXtension on invasive species initiatives.

V(E). Planned Program (Outputs)

1. Standard output measures

| 2017 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---------------|------------------------|--------------------------|-----------------------|-------------------------|
| Actual | 20249 | 11218 | 641 | 300 |

2. Number of Patent Applications Submitted (Standard Research Output) Patent Applications Submitted

Year: 2017

Actual: 1

Patents listed

1. Buddleia plant named 'UCONNBD610'. 12/20/16

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

| 2017 | Extension | Research | Total |
|--------|-----------|----------|-------|
| Actual | 7 | 73 | 80 |

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Face to face general group education sessions/workshops

| Year | Actual |
|------|--------|
| 2017 | 513 |

Output #2

Output Measure

- Individual consultations

| Year | Actual |
|------|--------|
| 2017 | 562 |

Output #3

Output Measure

- Fact sheets, bulletins and newsletters written or edited

| Year | Actual |
|------|--------|
| 2017 | 77 |

Output #4

Output Measure

- Training of undergraduate and graduate students and post-doctoral researchers

| Year | Actual |
|------|--------|
| 2017 | 249 |

Output #5

Output Measure

- Formal Extension outreach programs

| Year | Actual |
|-------------|---------------|
| 2017 | 133 |

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|--------|--|
| 1 | Number of homeowners gaining knowledge about watershed protection and soil and water quality |
| 2 | Number of lakes and ponds surveyed and/or cleared of invasive aquatic plants |
| 3 | Improved climate mitigation strategies and their adoption |
| 4 | Development of new knowledge in land use resource protection |
| 5 | Increase knowledge and use of geospatial technologies |
| 6 | Enhanced use of biologically-based alternatives to pesticides |
| 7 | Increased knowledge of pesticide safety and application |
| 8 | Increased Knowledge of Pesticide Free Sport Turf Management Practices |

Outcome #1

1. Outcome Measures

Number of homeowners gaining knowledge about watershed protection and soil and water quality

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|-------------|---------------|
| 2017 | 75 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Pollution affects human safety and health, and threatens the vitality of the natural environment. We have addressed broad issues related to understanding the fate and biological accessibility of pollutants in the environment and the development of novel methods for removing pollutants from waste streams and decontaminating water and soil.

What has been done

Projects on fate and remediation of chemical contaminants carried out in 2017 included the design of carbon catalysts for trapping and degrading the quarantine and pre-shipment (QPS) fumigants; the bioavailability of polycyclic aromatic hydrocarbons (PAH) in soil using an in vitro human gastrointestinal model; and novel approaches for water treatment based on peroxide chemistry.

Results

Activated carbon (AC) is widely used as an adsorbent in water and air purification. We showed that AC can also catalyze base hydrolysis of alkyl bromides. We set out to develop a method for removing the fumigant methyl bromide from vent streams resulting from quarantine and pre-shipment fumigations. In the context of QPS fumigants, AC serves as both trap and catalyst for hydrolysis of methyl bromide to harmless byproducts, methanol and bromide salts. Modification of the surface with quaternary ammonium surfactants greatly increases the surface-catalyzed rate. Studies on bioavailability of PAHs in soot particles were conducted after the soot particles were aged in soil. These studies found that only a small percentage of PAHs are transferred from the soot to the soil during aging, but the soil reduces the bioavailability of PAHs in other ways. Studies on water treatment found that peroxymonosulfate can be an effective chemical oxidant for the breakdown of organic pollutants in water. Biochar, the carbonaceous product of waste pyrolysis that has attracted interest in agriculture for its positive benefits on soil fertility, has been reported in the literature to suppress nitrous oxide emissions when mixed into the soil, at least

temporarily. Nitrous oxide is a potent greenhouse gas, much of it originating from agriculture. We showed that nitrous oxide adsorbs strongly and reversibly to biochar particles, offering a cause for the temporary reduction in nitrous oxide emissions by biochar.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|--|
| 102 | Soil, Plant, Water, Nutrient Relationships |

Outcome #2

1. Outcome Measures

Number of lakes and ponds surveyed and/or cleared of invasive aquatic plants

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|------|--------|
| 2017 | 15 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Extensive growth of invasive aquatic weeds such as Eurasian watermilfoil (*Myriophyllum spicatum*) and Brazilian waterweed (*Egeria densa*) can significantly reduce water quality and alter native aquatic habitats. Stakeholders requested assistance with determining the species of aquatic vegetation and for integrated weed control.

What has been done

CAES staff mapped native and invasive aquatic vegetation in 4 new and 10 previously surveyed water bodies. The effects of 10 years of winter drawdown on invasive plants were quantified in the state's largest lake, as was a recent introduction of the plant eating grass carp (*Ctenopharyngodon idella*). Tests on controlling a new introduction in the state - Brazilian waterweed (*Egeria densa*) - in Fence Rock Lake with bottom placement of herbicide were successful and no regrowth occurred in 2017. Tests with benthic barriers in Lake Quonnipaug showed nuisance aquatic plant control in the beach area could be accomplished with a one month placement before swim season.

Results

After 11 years of surveillance, nearly 60 percent of Connecticut lakes and ponds have been shown to contain invasive plants. These plants cover approximately 10 percent of the combined

area of all Connecticut lakes and the problem is increasing. The coverage of Eurasian watermilfoil shows a negative relationship to drawdown depth and duration in Candlewood Lake. Tests on controlling Brazilian waterweed found bottom placement of the herbicide Diquat resulted in near complete control the following year. We have largely restored Bashan Lake to pre-infestation conditions after years of selective fall herbicide applications. Long-term benefits will be protection of native lake ecosystems and prevention of associated economic losses.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|--|
| 102 | Soil, Plant, Water, Nutrient Relationships |

Outcome #3

1. Outcome Measures

Improved climate mitigation strategies and their adoption

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|------|--------|
| 2017 | 15 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With almost the entire state of Connecticut in the Long Island Sound watershed, land use management, restoration, and adaptation to climate adaptation impacts are critical to preserving the integrity of Connecticut's coastal habitats and associated water quality, as well as for habitats and water quality throughout the state.

What has been done

Many undergraduate students at UConn feel that climate change is the environmental issue of our time, and have increased interest in the topic. At the same time, many communities across Connecticut are struggling with how to adapt to climate change, and how to marshal the resources needed to do so. To address these complementary needs, Extension faculty associated with the Center for Land Use Education and Research (CLEAR) have developed the Climate Corps, a multi-departmental collaboration at UConn that combines Extension outreach, classroom instruction and service learning to create a unique assistance program for Connecticut communities. Students enroll in a class during the fall semester and work in-the-field with

Extension educators and town officials during the following spring semester.

Results

Climate adaptation includes working on land use planning and coastal hazards recognized by municipalities as well as management and restoration projects. In order for the students to really understand how climate change can affect local policies and operations, they need a firm grasp on how decisions are made at the town level. There was a focus on local decision-making and on the federal and state legal frameworks that towns operate in during the class. The fall 2017 Climate Corps course had 15 students. There were also two undergraduate interns that worked on climate-related Extension projects in 2017.

Extension educators gave 10 presentations to audiences statewide with total participation of 454 people. A coastal certification program was offered through the Master Gardener program. Four fact sheets were developed based on questions from a Climate Adaptation Academy workshop on legal issues in the age of climate adaptation. A webinar presented major points and issues addressed by the fact sheets. All resources, including webinar recordings, are available on the climate adaptation website.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|-------------------------------------|
| 132 | Weather and Climate |
| 133 | Pollution Prevention and Mitigation |

Outcome #4

1. Outcome Measures

Development of new knowledge in land use resource protection

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Increase knowledge and use of geospatial technologies

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Enhanced use of biologically-based alternatives to pesticides

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|------|--------|
| 2017 | 1 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Public concern about pesticide use in urban areas where children may come in contact with pesticide material has energized the demand for pest management programs that rely on fewer chemical insecticides. In addition, a report by the national Academy of Sciences indicated that homeowners tend to use as much as ten times more chemicals per acre on their lawns than farmers use on agricultural land.

What has been done

UConn participation in Hatch Multistate project NE1332, evaluated use of flowers as a biological control to protect cold vegetable crops from the caterpillar pest complex (diamondback moth, imported cabbageworm, etc.). Researchers evaluated each plant type for natural enemies that visited the flowers for nectar and shelter. Results documented a high diversity of natural enemies visiting the flowers; 14 families representative of insect parasitoids and 9 families of mostly insect predator. Notably, the insects did not reach pest status or negatively impact plant quality and most plants in vicinity of the cut flowers did not suffer damage from leaf feeding beetles.

Results

Based on study results several cut flowers examined are recommended for natural enemy attraction and conservation; Ammi majus, Gomphrena globosa Vegas White, Celosia argentea cristata Kurme and C. argentea cristat triangle mix. These flowers have pest resistant qualities and several varieties such as the Gomphrena cultivars produce interesting and aesthetically pleasing seed pod that can be used as a dried component in flower arrangements. In addition, Ammi majus was selected for further studies with cabbage because of the high diversity, type and number of natural enemies it attracted. The long term goal of this research is to assist agricultural managers and home gardeners with plant selection as a method to control identified pest species, while reducing harmful chemical use and cost, as well as producing beneficial flowers.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|------------------------------------|
| 205 | Plant Management Systems |
| 216 | Integrated Pest Management Systems |

Outcome #7

1. Outcome Measures

Increased knowledge of pesticide safety and application

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|-------------|---------------|
| 2017 | 0 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Pesticides are prevalent in agricultural production to hinder pests, diseases, and plant pathogens while maintaining high yields. Rigorous federal testing is required before use, but there are still serious health concerns raised by organizations and individuals.

What has been done

The goals of UConn's Pesticide Safety Education Program (PSEP) are to ensure that anyone applying pesticides uses them safely. Pesticides are important tools for pest management, but must be respected and handled in a manner that protects the applicator, the public, the environment and our food supply.

State-approved educational programs offered by UConn covered the following pesticide issues: exposure and personal protective equipment, drift reduction technology, environmental fate of pesticides and ground water protection, calibration and equipment maintenance, signs and symptoms of pesticide poisoning and first aid, storage of pesticides, and the importance of pesticide security, pesticide laws and regulations. Other re-certification programs included pest identification and management focusing on the judicious use of pesticides and alternatives to pesticides such as biological controls.

Results

UConn Extension conducted eighteen programs, workshops, and conferences providing re-certification education for 492 pesticide applicators and 1533 other individuals. The Extension Pesticide Applicator Ornamental and Turf Short Course is a 24-hour face-to-face course that is team taught. The revised EPA Worker Protection Standard (WPS) was reviewed including, key provisions, resources for keeping up to date on implementation and training materials. "How to Comply" manuals for growers were distributed and used as text for the workshops in three half day workshops and two 2.5 hour training sessions. Additional presentations were made to

commodity groups and at the Connecticut Farm Bureau annual meeting. A webpage dedicated to the WPS has been maintained with updated information on training materials and sources. A listserv has been created and used to relay information regarding new training resources for growers.

Two seasonal assistants traveled to 25 towns to assess school properties, one to assess school landscapes, and the other to assess athletic fields. Visits are made twice each season and have been completed since the spring of 2015.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|--|
| 102 | Soil, Plant, Water, Nutrient Relationships |
| 112 | Watershed Protection and Management |
| 205 | Plant Management Systems |
| 216 | Integrated Pest Management Systems |

Outcome #8

1. Outcome Measures

Increased Knowledge of Pesticide Free Sport Turf Management Practices

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|------|--------|
| 2017 | 300 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Turfgrass is often overlooked by residents but is one of the most abundant crops in the state, and an important part of the economic engine in Connecticut. Direct sales from the turfgrass industry are around \$2.5 billion, with a total economic impact of \$2.9 billion. Lawn care services are the largest turfgrass sector in the state, followed by golf courses, and lawn care retailing.

In 2010, the state banned all Environmental Protection Agency (EPA) registered lawn care pesticides on athletic fields at public and private schools with pre-kindergarten through 8th grade students. Connecticut and New York are the only states in the country with the pesticide ban. Research and outreach education done by the UConn team is critically important, and on a national stage.

What has been done

Educational programming designed by Extension faculty is multifaceted, utilizing research and demonstration to address misinformation, and providing turfgrass managers with science-based solutions and best management practices. The EPA and the Connecticut Department of Energy and Environmental Protection are funding field research evaluating several different management regimes over time.

The eight management strategies being tested include organic low, organic high, pesticide-free low, pesticide-free high, integrated pest management (IPM), integrated systems management (ISM), calendar-based, and a mow-only control. These management regimes are being evaluated on plot areas managed as a home lawn, as well as an area managed as an athletic field.

Results

Research on these plots is unique in that it occurs on actual fields in use and not at a research facility. Three fields were selected at three separate locations based on the high intensity traffic they receive. Treatments were initiated in September 2016 and over seeding was repeated in the spring and fall of 2017.

Another complementary research study quantified the amount of dislodgeable foliar pesticide residue remaining following a pesticide application. The study is evaluating four different commonly used active ingredients for weed control on sports fields. The results of this research could help improve recommendations for minimizing potential exposure risks, and help lawmakers make science-based decisions concerning future legislation.

In addition to the field research and demonstrations, a smart phone app was released for Apple and Android that helps turf managers and homeowners select the correct fertilizer, and purchase the proper amount. Videos in the app demonstrate fertilizer spreader calibration and application techniques.

Extension outreach is an important component of research at a land-grant institution. The biannual Turf Field Day is held in even years at the Research Farm, and draws a crowd of over 300, including 40 commercial exhibitors from all over New England. In March 2017 the team hosted a sports turf workshop at UConn. Future workshops are being developed as research continues and needs of turfgrass managers evolve.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|--|
| 102 | Soil, Plant, Water, Nutrient Relationships |
| 205 | Plant Management Systems |
| 216 | Integrated Pest Management Systems |

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Competing Public priorities
- Other (Staff changes)

Brief Explanation

There were no external factors that negatively affected outcomes during this reporting period. However, the current economy, changes in state or federal appropriations, and

resulting staff changes remain the primary external factors that could affect outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Direct stakeholder participation in the invasive aquatic weed program, including associated workshops and town meetings, remains the primary venue for results evaluation. Pre- and post-tests are given to participants in Extension programs. Survey research is used to evaluate knowledge gained, program effectiveness, and future needs. Research plot evaluation dictates Extension programming in turf grass areas as stakeholders need the latest updates to effectively manage their fields.

Key Items of Evaluation

Written information on evaluation forms following workshops held in different towns was an important information collection method for program assessments. During this reporting period, there were nearly 1700 citations (Google Scholar) for scientific articles written by several scientists for the planned program. These citations indicate that knowledge was gained by scientists and potentially used in their studies.

Video footage was shot during the sports turf management workshop and is being edited into a YouTube video. A soil testing video is also under production. The team is working on developing more online materials at the request of stakeholders' evaluation results.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

4-H/Youth Development

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|----------------------------------|-----------------|-----------------|----------------|----------------|
| 205 | Plant Management Systems | 15% | | 0% | |
| 307 | Animal Management Systems | 15% | | 0% | |
| 703 | Nutrition Education and Behavior | 15% | | 25% | |
| 724 | Healthy Lifestyle | 15% | | 25% | |
| 806 | Youth Development | 40% | | 50% | |
| | Total | 100% | | 100% | |

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

| Year: 2017 | Extension | | Research | |
|-------------------------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 7.0 | 0.0 | 0.1 | 0.0 |
| Actual Paid | 4.7 | 0.0 | 0.0 | 0.0 |
| Actual Volunteer | 49.6 | 0.0 | 0.0 | 0.0 |

2. Institution Name: University of Connecticut - Storrs

Actual dollars expended in this Program (includes Carryover Funds from previous years)

| Extension | | Research | |
|---------------------|----------------|----------------|----------------|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 444590 | 0 | 0 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 444590 | 0 | 0 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 657644 | 0 | 14314 | 0 |

2. Institution Name: Connecticut Agricultural Experiment Station -

Actual dollars expended in this Program (includes Carryover Funds from previous years)

| Extension | | Research | |
|---------------------|----------------|----------------|----------------|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 0 | 0 | 0 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 0 | 0 | 0 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 0 | 0 | 0 | 0 |

V(D). Planned Program (Activity)

1. Brief description of the Activity

Our 4-H/Youth Development planned program offers hands-on opportunities in science, technology, engineering, and mathematics (STEM), leadership, citizenship, and healthy living. Youth have the opportunity to: (1) explore the environment and nature, (2) grow their own food with all types of gardens, (3) learn about technology and robotics, (4) develop photography or drama skills, and (5) care for animals.

Youth ages 7-19 can be part of a club, be an individual member, attend 4-H Camp, go on a field trip, or have their new skills evaluated at a 4-H Fair. Our adult volunteers contribute to individual events, short-term or long term projects with national curriculum, on-going group activities, and through committee membership. Training and support is offered for all volunteers through UConn Extension.

2. Brief description of the target audience

Target audiences are youth, families, school personnel, youth-serving agencies and organizations, community organizations, and agency staff. Volunteers involved with youth and adults are also a target audience. We reach underserved audiences in the state through multiple partnerships and marketing initiatives. 4-H FANS IM established linkages with the New Haven FoodCorps program for sustainability of future programming. Food Corps helps sustain garden and nutrition programming at both Hill Central and West Rock STREAM Academy, and introduces new youth members to the 4-H program.

The 4-H FANS program has clubs and after school activities in Danbury, Meriden, New Haven, Waterbury, and Windham. The 4-H mentoring program works in Waterbury and New Haven. Partnering

with non-government organizations and schools allows our 4-H program to reach diverse audiences who are not part of the traditional 4-H model. These cities are also under-represented in overall 4-H enrollment.

The 4-H Education Center at Auerfarm in Bloomfield is a forty-year old institution that changes and adapts to the interests and needs of suburban and urban youths and families. More than 10,000 children visit the farm each year and learn basic principles of food production, plant science, animal husbandry and environmental education. The farm serves school groups throughout the year and hosts its own 4-H club that helps develop the resources on the sprawling property that includes barns, gardens and an orchard.

3. How was eXtension used?

An Extension educator serves as eXtension in an Ask the Expert capacity for equine related questions, many of the questions come from 4-H and youth audiences.

V(E). Planned Program (Outputs)

1. Standard output measures

| 2017 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---------------|------------------------|--------------------------|-----------------------|-------------------------|
| Actual | 9761 | 24767 | 19250 | 28436 |

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

N/A

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

| 2017 | Extension | Research | Total |
|---------------|-----------|----------|-------|
| Actual | 1 | 0 | 1 |

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Face to face general group education sessions/workshops

Year

Actual

2017 20

Output #2

Output Measure

- Individual consultations

| Year | Actual |
|-------------|---------------|
| 2017 | 254 |

Output #3

Output Measure

- Fact sheets, bulletins and newsletters, written or edited

| Year | Actual |
|-------------|---------------|
| 2017 | 3 |

Output #4

Output Measure

- Formal Extension outreach programs

| Year | Actual |
|-------------|---------------|
| 2017 | 61 |

Output #5

Output Measure

- After-school programs (sites), conducted or organized

| Year | Actual |
|-------------|---------------|
| 2017 | 87 |

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|--------|--|
| 1 | Youth demonstrate increased knowledge or skills in one or more of the three 4-H program emphasis areas |
| 2 | Number of youth developing knowledge or skills in science, technology, engineering and math (STEM) |
| 3 | Increase in the health and wellbeing of youth participating in 4-H program activities |
| 4 | Increase positive impact on communities through volunteer mentors |

Outcome #1

1. Outcome Measures

Youth demonstrate increased knowledge or skills in one or more of the three 4-H program emphasis areas

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of youth developing knowledge or skills in science, technology, engineering and math (STEM)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|-------------|---------------|
| 2017 | 12961 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The United States ranks 27th among developed nations with college students receiving science or engineering degrees. It is critical to engage youth in STEM related fields of study and introduce them to possible career opportunities in these areas. Nearly all of the 30 fastest growing occupations in the next decade will require at least some background in STEM. Women and minorities are under-represented in science careers and a diverse pool of trained scientists is needed to frame and solve problems and educate others.

Sixty three percent of high school graduates are not prepared for college-level science and 57 percent are not prepared for college level math. Only 1 in 5 STEM college students feel their K-12 education prepared them for STEM college courses. 4-H programs provide youth with hands-on, engaging STEM experiences that build excitement around STEM topics and careers.

What has been done

STEM is a term on the minds of parents, educators and young people alike. To address this growing interest, 4-H hosts an annual statewide conference, 4-H Adventures in STEM, at the UConn-Storrs campus. This year's event included hands-on workshops for youth aged twelve to eighteen years with the opportunity to develop new skills in science, technology, engineering and

math.

While the 4-H STEM program is state-of-the-art, its roots are in the agricultural engineering, small gas engine and genetics projects that have long been key parts of the 4-H program core. The 4-H Apple Pi Robotics Club is the single largest club in the state and is located in New Haven County. It is a club for boys and girls, and wins robotics competitions around the country. There are several 4-H Saturday Science programs held around the state offering youth the chance to explore a variety of STEM topics and have fun.

4-H Environmental Science Day in collaboration with the Connecticut Audubon Center in Glastonbury, was held on August 21, 2017. It brought youth aged ten and over and volunteer leaders together for a lively day of exploring the Connecticut River floodplain.

Results

There were 14,853 technology and engineering 4-H projects in 2017. Of these, 12,961 were STEM related. Sixty-three youth attended the CT 4-H Adventures in STEM Conference at the UConn Storrs Campus where they participated in a variety of STEM related workshops. The following workshops were presented that day: Cows, Chips and Farm Animal Genetics; Understanding Nutrition Fact Labels; Liquid Nitrogen, UConn Chemistry Club; Plant Genetic Engineering; Clicks, Chirps and Buzzes: The Science of Seeing with Sound; Be a Plant Doctor for a Day; The Science of Dairy Food Products: UConn Dairy Club; Paradoxical Machines: Engineering Ambassadors, School of Engineering; and LEGO Robotics Design Challenge.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|---------------------------|
| 205 | Plant Management Systems |
| 307 | Animal Management Systems |
| 806 | Youth Development |

Outcome #3

1. Outcome Measures

Increase in the health and wellbeing of youth participating in 4-H program activities

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|------|--------|
| 2017 | 1235 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Obesity is a complex disorder based on genetics, environment, development and behavior. According to the CDC, 17% of all youth ages 2 to 19 are obese. This rate has not changed since 2003-04. Children from low-income households are at greatest risk for developing obesity given the high calorie, but poor quality diets and limited opportunities for physical activity. Poor diet quality and lack of physical activity over a lifetime place adults at much greater risk for a multitude of chronic diseases such as cancer, hypertension, cardiovascular disease, and diabetes.

What has been done

Youth are taught to prepare healthy and nutritious meals through their 4-H projects. UConn Extension had 1,235 youth participate in food and nutrition projects in 2017. The Connecticut Food and Nutrition Show is a statewide 4-H program held annually. This event provides participants with an opportunity to present, display, and explain the nutritional food they have prepared as well as use some of the additional skills they have learned in the food and nutrition project. Youth participants also display the knowledge and skills they have learned about food and nutrition during the interview process with judges. Youth had the opportunity to showcase their skills with top chefs and receive feedback to improve their food and nutrition skills.

The 4-H FANs program focuses on fitness, nutrition, gardening and fun. During the school year students met weekly to participate in fun activities designed to teach healthy eating, exercise and gardening. Summer Story Days, held on Wednesdays, included guest readers and food demonstrations where students created healthy snacks. Families attending took home a bounty of fresh vegetables from the students' garden, and recipes from our team of educators.

Results

Three Community Garden Harvest Days attracted many families, community members and partners. A New Haven Register reporter attended one of the three events at West Rock STREAM Academy and wrote an article about the event and program. A Willimantic newspaper reported on the program at Sweeney School.

Twenty youth participated in a "cooking with bugs" event organized as part of the Bug Week programming hosted by UConn Extension. Youth were 4-H members and non-members. Another program sought to teach youth about food safety and locally grown and processed foods, so we established the New England 4-H Grilled Cheese Contest. It teaches science, food preparation and public speaking, but offers it in a way that kids see as cool and fun. Eight youth from Connecticut are selected through a competitive process to participate at the Eastern States Exposition each year. They work with chefs throughout the summer to prepare for the contest.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|----------------------------------|
| 703 | Nutrition Education and Behavior |
| 724 | Healthy Lifestyle |
| 806 | Youth Development |

Outcome #4

1. Outcome Measures

Increase positive impact on communities through volunteer mentors

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|-------------|---------------|
| 2017 | 1653 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Research has shown that caring adults play an absolutely essential role in the healthy development of youth. The mission of the Connecticut 4-H Youth Development program is to help youth make good decisions, and develop leadership and citizenship skills, while improving self-confidence. All youth need support and positive experiences to grow to their fullest capacity and to become productive adult citizens.

What has been done

The Connecticut 4-H Mentoring Project is a prevention program designed to assist youth in acquiring knowledge, building character, and developing life skills in a fun learning environment that will help them become self-directing, productive members of society. Waterbury and Bridgeport have participated in the Connecticut 4-H Mentoring Project for 7 years, and are presently serving 120 youth, ages 10-14.

The ACES 4-H Club at Whitney East/West high school works with teens with special needs, and helps students develop confidence, communicate more effectively and enjoy events and competitions beyond their community. Another example, FC 4, is a positive youth development program where youth gain skills, contribute to their communities, and have ownership of their groups - making decisions and experiencing the consequences.

Results

In 2017, 99,180 hours were donated by 1,653 4-H youth and adult volunteers in all citizenship areas, with an approximate value of \$2.39 million to the communities served.

"I never miss 4-H, my mentor thinks I'm special" says a mentee from the Connecticut 4-H Mentoring project. A parent says, "my child is never sick on 4-H day." Family Nights are a critical component of the program. These nights are designed to foster family bonds through fun and experiential learning. Each night has an activity related either to building trust, family support, positive family communications, working together, problem solving, or family traditions. Families

eat a light dinner, complete and process the activity. Field trips to the Big E, apple picking, and county fairs also provide an opportunity for youth and their families to learn new things about the world, and each other, while having fun.

The Beaudoin Karate Academy has grown into a major part of the 4-H Mentoring project, with about 45 youth participating in workshops that meet twice a week throughout the year. Four of the staff volunteer their time as trainers and mentors for the 4-H members, enabling youth to participate in local and regional contests, earn their karate belts, and demonstrate their skills at agency functions as well as the 4-H Fair.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|-------------------|
| 806 | Youth Development |

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Competing Programmatic Challenges

Brief Explanation

The economy and competing programs are challenges to the planned program area. Extension educators are using competitive grant funds and innovative programming to maintain program outcome levels.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Pre- and post-questionnaires were completed by youth and physical measures were recorded for 4-H FANS youth participants. Some programs utilize focus groups and post-program interviews. The 4-H FANS program uses a proprietary online app to collect evaluation data specific to concepts that align with the construct of positive youth development.

One participant had attended a Farmer's Market where the 4-H FANS program prepared yogurt parfaits as the food tasting and demonstration for that event. The participant returned at the next event date and shared that he had purchased non-fat greek yogurt, low-fat granola and fruit as an alternative breakfast option. He expressed his gratitude to the program for providing him the recipe, and that the preparation time for making the parfait was quick and easy.

Youth have shared with the volunteer adult leader at a 4-H FANS program that they want lettuce to make a salad at home with their families. Youth have also voluntarily identified various beverage options within the school to be good or not so good choices. For example, one teacher had a diet Snapple and they identified it as not being a good choice.

Key Items of Evaluation

Pre-post analyses reveal youth have increased knowledge and are enacting this knowledge by choosing healthy food and beverage choices. Youth data also shows trends toward

increased exercise habits.

UConn 4-H is adopting 4-H Common Measures evaluation instruments for all 4-H programs. Implementation will begin in 2018. Additionally, 4-H is using a lesson study approach to formatively reflect on program effectiveness and implement changes as appropriate

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Community and Economic Development

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|--------------|--|-----------------|-----------------|----------------|----------------|
| 724 | Healthy Lifestyle | 25% | | 50% | |
| 801 | Individual and Family Resource Management | 25% | | 50% | |
| 802 | Human Development and Family Well-Being | 25% | | 0% | |
| 903 | Communication, Education, and Information Delivery | 25% | | 0% | |
| Total | | 100% | | 100% | |

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

| Year: 2017 | Extension | | Research | |
|-------------------------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 1.0 | 0.0 | 0.1 | 0.0 |
| Actual Paid | 1.8 | 0.0 | 0.0 | 0.0 |
| Actual Volunteer | 0.4 | 0.0 | 0.0 | 0.0 |

2. Institution Name: University of Connecticut - Storrs

Actual dollars expended in this Program (includes Carryover Funds from previous years)

| Extension | | Research | |
|---------------------|----------------|----------------|----------------|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 190682 | 0 | 0 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 190682 | 0 | 0 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 1177365 | 0 | 0 | 0 |

2. Institution Name: Connecticut Agricultural Experiment Station -

Actual dollars expended in this Program (includes Carryover Funds from previous years)

| Extension | | Research | |
|---------------------|----------------|----------------|----------------|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 0 | 0 | 0 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 0 | 0 | 0 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 0 | 0 | 0 | 0 |

V(D). Planned Program (Activity)

1. Brief description of the Activity

Connecticut citizens are linked to Extension specialists and current research priority areas identified by our stakeholders through the Community and Economic Development planned program. Critical issues include (1) community planning, (2) improving conditions for families and communities through leadership development, and (3) preparedness training.

Specific activities in the planned program include: workshops, trainings, health fairs, continued promotion of YouTube videos for children on healthy homes; volunteer training programs; online material such as fact sheets, and impact statements and news disseminated through social media.

2. Brief description of the target audience

Parents, youth, children, teachers, elected officials and policy makers are target audiences for this planned program. Through collaboration with our partner organizations, such as schools, state agencies, and town governments we are reaching larger numbers of diverse and under-served audiences. We are also striving to reach new audiences through a variety of communication methods. Our Tools for Healthy Living video is available in American Sign Language. The People Empowering People (PEP) program is offered in Albanian at one location. Several PEP locations offer the program in Spanish.

3. How was eXtension used?

V(E). Planned Program (Outputs)

1. Standard output measures

| 2017 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---------------|------------------------|--------------------------|-----------------------|-------------------------|
| Actual | 1015 | 25 | 5918 | 230 |

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

N/A

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

| 2017 | Extension | Research | Total |
|---------------|-----------|----------|-------|
| Actual | 2 | 0 | 2 |

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Face to face general group education sessions/workshops

| Year | Actual |
|------|--------|
| 2017 | 24 |

Output #2

Output Measure

- Individual consultations

| Year | Actual |
|------|--------|
| 2017 | 172 |

Output #3

Output Measure

- Fact sheets, bulletins and newsletters written or edited

| Year | Actual |
|-------------|---------------|
| 2017 | 6 |

Output #4

Output Measure

- Training of undergraduate and graduate students or post-doctoral researchers

| Year | Actual |
|-------------|---------------|
| 2017 | 36 |

Output #5

Output Measure

- Formal Extension outreach programs

| Year | Actual |
|-------------|---------------|
| 2017 | 28 |

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|--------|--|
| 1 | Program participants demonstrate increased leadership, parenting, or financial management skills |
| 2 | Increased Economic Development of Communities |
| 3 | Increase knowledge and engagement in adult learners |
| 4 | Connecting Communities and Individuals with Emergency Preparedness Resources |

Outcome #1

1. Outcome Measures

Program participants demonstrate increased leadership, parenting, or financial management skills

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Increased Economic Development of Communities

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|-------------|---------------|
| 2017 | 10 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Connecticut's economy has struggled to rebound following the economic downturn of 2009. Annual job growth has been lower than national averages, and large keystone businesses have moved to neighboring states. Local governments have suffered due to these economic struggles and these conditions have caused municipal governments to think differently about how to build the vibrant economy that Connecticut once had.

What has been done

UConn Extension implemented the First Impressions Program in an effort to help Connecticut towns reflect on their current strengths and resources and promote community sustainability. The program employs an outside perspective from trained volunteers who tour communities enrolled in the program. Volunteer teams undertake unannounced visits, record observations, and give constructive feedback to the exchange community. Team members receive training and follow procedures and reporting guidelines using a response manual to ensure that evaluations and final reports are thorough and uniform. These reports are often used as part of broader community assessment or planning processes to inform community policy and action.

Results

First Impressions provided the framework for ten towns in CT to evaluate their strengths and weakness in a holistic and participatory way. This asset-based community development strategy is a positive and constructive way to approach growth and improvement for local communities, and many report having fun along the way.

The program brought research-based information into community discussions and was used to support decision-making by town planners, community leaders, and business owners. As one participant reported, "We're going to use the information as we update the Plan of Conservation and Development; possibly to help us identify some initial projects to tackle."

The long term goal of this program is to allow communities to gain efficiencies through municipal sharing and cooperation, make improvements to their public spaces and environment, or obtain external funding.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|--|
| 724 | Healthy Lifestyle |
| 903 | Communication, Education, and Information Delivery |

Outcome #3

1. Outcome Measures

Increase knowledge and engagement in adult learners

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|------|--------|
| 2017 | 4000 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A big challenge for adults in retirement is how to stay busy and challenged with the newly inherited free time. Retirees often lose the social connection and stimulation that the former work environment offered. One way to ensure a satisfying retirement is to continue learning. Lifelong learning offers the opportunity to stay challenged, interact with others and gain new knowledge.

What has been done

The UConn Extension Center for Learning in Retirement (CLIR) provides meaningful and serious intellectual activities for retirees and other adults from all walks of life. The program conducts informal educational classes in a relaxed atmosphere. There are no academic requirements. Participants relax and learn. CLIR classes are offered in two formats: single classes and courses. A single class is one hour-and-a-half. A course consists of two or more classes scheduled in successive weeks. All presenters volunteer their time, are experts in their field from UConn and other surrounding universities. Participants pay a minimal fee per session and can attend as many classes as desired.

Results

In 2017, over 4000 contact hours were documented with participants attending one or more CLIR programs. Participants benefit from lifelong learning by attending interesting and engaging classes. Lifelong learning helps keep participants engaged in a diversity of topics. In addition, the program provides an interactive social opportunity and a chance to form new friendships. One participant said, "It has helped me maintain my mental capabilities by exposing me to a variety of experts in many fields." Each year CLIR generates approximately \$6,000 to help maintain its own program funding source. CLIR has been serving adult learners for over 25 years.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---------|--|
| 724 | Healthy Lifestyle |
| 802 | Human Development and Family Well-Being |
| 903 | Communication, Education, and Information Delivery |

Outcome #4

1. Outcome Measures

Connecting Communities and Individuals with Emergency Preparedness Resources

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

| Year | Actual |
|------|--------|
| 2017 | 4 |

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Outbreaks, disasters and storms can create severe issues for residents, businesses, and

municipal officials. Some hazards are unavoidable, but preparedness can mitigate the consequences of these emergencies. UConn mitigates the impact of emergencies and disasters in Connecticut through research-based outreach education that helps Connecticut towns and its residents become prepared.

What has been done

UConn Extension programs support commercial agriculture, communities, and individuals in preparing for and recovering from disasters. Thirteen affiliated educators have varied areas of expertise, such as animals and plants, agricultural economics, family finance, natural resources, food safety, CPR and 4-H youth. All of these experts educate others in preparedness as a small component of their work in Extension and academia and are joined together in the united efforts of the Extension Disaster Education Network (EDEN). The task of EDEN fits within the efforts of other UConn groups, and helps people understand the importance of preparedness and putting a plan in place.

Results

One educational effort is working with Connecticut coastal town leaders and individuals so that they can make sound decisions in advance of major storms such as hurricanes and nor'easters. Programming includes building living shorelines to combat erosion, workshops to teach horse owners what to do in an emergency situation, facilitating safety and survival training for commercial fishermen, and communicating how to prepare for a power outage or emergency evacuation.

The UConn EDEN website provides curated resources and education information of other organizations. It is one the main ways that individuals can learn about preparedness.

Focus groups met in four coastal communities, East Lyme, Old Lyme, Groton and Stonington. During the reporting period a diverse group of community representatives participated, including fire marshals, emergency/health managers, social services, school and library personnel, housing/senior center directors and beach association members. Their knowledge about local residents and resources is guiding the team to reach audiences with functional needs; people living alone without family nearby; people with limited English proficiency; part-time residents or visitors; the large and mobile military service population; seniors and families.

A talk on disaster preparedness for equine owners was replicated in three locations, with over 35 attendees at each venue. Of attendees responding to the evaluation, 100% reported increased knowledge on short and long term preparedness.

4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|----------------|--|
| 801 | Individual and Family Resource Management |
| 802 | Human Development and Family Well-Being |
| 903 | Communication, Education, and Information Delivery |

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Public Policy changes
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

At one emergency preparedness event, the function was attended primarily by aging residents including some with functional needs. Participants were urged to register with Eversource, the energy utility, and to connect with local officials prior to a storm so emergency responders can provide support if an evacuation is advocated by local officials.

Post-program evaluation survey results show that the program increased participant confidence in handling disaster situations, increased participants' knowledge in how to prepare for disasters and supported behavioral intentions to develop disaster plans.

Of the respondents attending the equine disaster event, 100% stated that they fulfilled their objectives by attending the talk, 100% felt that their skills in handling disasters would improve, 100% felt that their confidence in handling disasters increased, 100% felt that their knowledge of the 4 phases of emergency management increased, 100% gained an overview of the emergency management system, 100% increased their knowledge of how to prepare in the short term, 100% increased their knowledge of how to prepare in the long term, 100% learned what to put in a first aid kit, 100% learned what to put in the disaster kit, 100% increased their knowledge of ways to identify their horse in disaster situations, 100% learned about the different resources for disaster preparedness, 66% learned the importance of biosecurity, 88% learned to look out for small animals needs too, 100% increased their knowledge of causes of barn fires, 100% increased their knowledge of prevention of barn fires, 100% learned about water sources for fires and how they differ, 88% learned about the types of fire extinguishers and how they differ, 88% increased their knowledge about fire detection with sprinklers, smoke detectors and heat detectors, 55% will find out if they are in a flood plain, 88% will create a disaster plan for fires, 100% will create a disaster plan in general, 100% had their skills reinforced, 100% will practice what they learned, 100% will be more confident in facing different disaster situations, 100% said the talk fulfilled their expectations and 100% would recommend the talk to others.

Key Items of Evaluation

Four focus groups were organized and led by the project evaluator with support from team members. The information was used to develop targeted workshops on evacuation and sheltering in place, preparing an emergency supply pack, developing a communication plan, food safety, household preparation inside and outside, and compiling important financial and other records. Towns have worked with the Sea Grant educator to improve websites and create story maps of evacuation routes. A bilingual flier was created to post in

rental properties where transient residents may not be aware of procedures and resources to utilize if storms occur.

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

| | |
|---|--|
| Childhood Obesity (Outcome 1, Indicator 1.c) | |
| 0 | Number of children and youth who reported eating more of healthy foods. |
| Climate Change (Outcome 1, Indicator 4) | |
| 0 | Number of new crop varieties, animal breeds, and genotypes with climate adaptive traits. |
| Global Food Security and Hunger (Outcome 1, Indicator 4.a) | |
| 0 | Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources. |
| Global Food Security and Hunger (Outcome 2, Indicator 1) | |
| 0 | Number of new or improved innovations developed for food enterprises. |
| Food Safety (Outcome 1, Indicator 1) | |
| 0 | Number of viable technologies developed or modified for the detection and |
| Sustainable Energy (Outcome 3, Indicator 2) | |
| 0 | Number of farmers who adopted a dedicated bioenergy crop |
| Sustainable Energy (Outcome 3, Indicator 4) | |
| 0 | Tons of feedstocks delivered. |