

2012 Connecticut Agricultural Experiment Station - Research Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

There are new research findings to report for The Connecticut Agricultural Experiment Station (CAES) in meeting the research and outreach objectives set forth in 4 planned programs: Global Food Security - Plant and Integrated Pest Management (IPM) Systems; Food Safety; Human and Animal Health; and Soil and Water Quality. Cooperation with extension personnel at UConn, Cornell, and other land-grant universities has helped to transfer new scientific information to a broad base of stakeholders. Collaborations exist with scientists in at least 40 states and 12 countries.

There are current restrictions on hiring new employees on state funds because of budget deficits. We were, however, able to hire a Postdoctoral Research Scientist on a federal grant, as well as two Technicians. Moreover, we shifted some scientist year (SY) commitments from state-funded positions to Hatch projects. These steps increased SY times beyond those listed in the Plan of Work. Although most scientists and other staff members conduct research and outreach activities, we are unable, however, to accurately separate costs for these major initiatives.

Research on plants and IPM systems has led to improved crops, such as the development of a strawberry cultivar (called Rubicon) that is resistant to black vine weevil and a fungus that causes root rot. A patent application has been filed. Of the 88 cultivars, representing 7 different crops, currently under evaluation, 6 are ready for commercial farming. In addition to Rubicon, two cultivars of pak choi, which grow well in Connecticut (CT) and are high-yielding, have been released to help satisfy the demands of a rising Asian population in Connecticut. Three cultivars of vegetable amaranth are being grown commercially. Based on a 6-year study, chardonnay budwood grafted onto selected rootstock continues to reduce grapevine losses due to crown gall (a bacterial infection). Grape growers have gained knowledge of this advance. Their use of high-grafted vines is saving about \$2,070 plus labor costs per acre. Moreover, monitoring for powdery mildew on grapes has led to more efficient use of fungicides.

In the Food Safety Program, CAES scientists continue to assist CT state agencies and the US Food and Drug Administration (FDA) in developing more efficient assay methods to detect toxic chemicals. Decisions on violations are based on tolerance levels established by the US Environmental Protection Agency or the US Food and Drug Administration. During this reporting period, a joint pilot program was conducted by the CAES and the CT Department of Public Health, to test foods for unwanted chemicals and microbials. In response to several consumer complaints that an infant formula was making infants sick, formula samples were analyzed for toxic chemicals. Results indicated no chemical contamination, but the processing of fats was compromised. The formula product was removed from the Women, Infant, and Children's program.

Progress has been made in the Human and Animal Health Research Program and positive outcomes have resulted in changes in behavior. Laboratory tests of 331,806 mosquitoes, collected at 91 trap sites in CT, revealed widespread presence of the West Nile and Jamestown Canyon viruses. Press releases on isolation results warned citizens. Based on surveillance of hundreds of state residents over several years, about 25-40% indicated that they protected themselves by using repellents or by going indoors when mosquitoes were biting. Results have been published on genetic analyses for *Culex pipiens*, an important carrier of the West Nile encephalitis virus, that revealed that there is a complex of closely related subspecies. Moreover, field tests of biological controls (*Bacillus* species) effectively reduced larval *Culex pipiens* populations in catch basins. Public health sanitarians in some towns relied on this knowledge and have switched from chemical larvicides to biological controls. This method of control has replaced the use of methoprene, an insect growth regulator suspected of killing lobsters in Long Island

Sound. Efforts to control *Ixodes scapularis* nymphal ticks in selected sites continue to be successful. In a 14-year study, results indicated that deer reduction to at least 5.1 animals/square kilometer appears to lower the number of human Lyme disease cases. A new grant funded by the Centers for Disease Control and Prevention will support further research on tick control.

In the Soil and Water Quality Program, standard morphological and DNA methods revealed that banned aquatic plants were being sold by CT retailers, including chain stores. Of the 29 chain stores visited, 7% were illegally selling banned plants compared to 56% of 27 independent stores. Application of DNA methods was critical for accurate identification. Store managers or owners were notified and the sale of banned plants ceased. Grass carp controlled invasive aquatic plants in a lake.

Outreach remains a high priority. There have been direct and indirect contacts with adults in CT, respectively. Less frequent direct contact and indirect contacts were noted for youth. Staff members gave 1,216 talks and interviews, made 269 farm visits to solve specific problems, and answered more than 22,300 citizens' inquiries, including 16,897 diagnostic tests. Stakeholders have access to 57 new published peer-reviewed scientific articles and 75 non-peer reviewed fact sheets, CAES Bulletins, newsletter articles, book chapters, and symposia proceedings. Assistance was given to 104 reporters, representing newspapers, television, and radio. An upgraded CAES website continued to be a powerful method of transferring new information to the public. There were 454,760 page views for the Station's website. The average user time per visit was about 10 minutes. A 30-second video on the hazards of moving firewood as related to the emerald ash borer and Asian longhorned beetle was produced for public information and posted on the Station's website.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	34.7	0.0
Actual	0.0	0.0	31.2	0.0

II. Merit Review Process

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

- Expert Peer Review
- Other (Internal administrative and scientific review)

2. Brief Explanation

The review process described in the updated Plan of Work was followed during this reporting period. To evaluate project outlines for Hatch grants, external reviews were received. All scientific proposals submitted to USDA-NIFA or other federal agencies likewise received merit and external peer-review to determine if the planned research had relevance to stakeholders' needs, met program goals, and had sufficient technical structure and resources to conduct the studies. In addition to critiques given by scientists in the discipline, Department Heads, the Vice-Director and the Director were involved in the internal review process. The Director gave final approval of all research proposals and manuscripts. In addition to meeting residents' needs, the likelihood of success and originality of the studies received careful consideration. During 2012, there were 6 Hatch and McIntire Stennis project outlines reviewed and submitted to USDA/NIFA to address state and national needs and to accomplish planned research goals in the following programs; Global Food Security: Plant and Integrated Pest Management Systems (n = 2), Soil and Water Quality (n = 3), and Food Safety (n = 1). Additional expert peer-review was also received on the quality of research results when manuscripts were examined by journal editorial boards and

reviewers and when grant proposals submitted for competitive funds were critiqued by scientific review panels.

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 traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of the general public
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public
- Other (Targeted invitations to legislators and their staff members)

Brief explanation.

Stakeholders participated in CAES research programs and public events. Special conferences and workshops were held on pests of fruit trees and vegetables, bed bugs, and controlling Christmas tree pests. Information was disseminated to state residents living in widely separated towns and cities in the state. Press releases promoted 2 Open Houses in the spring and summer (Plant Science Day). For the latter, a one-page promotional flyer was delivered to at least 92,000 households in an edition of the New Haven Register preceding Plant Science Day. This all day event, held at Lockwood Farm (Hamden, CT) each year on the first Wednesday of August, is open to the public. It would be great benefit for NIFA and NPL's to see the exhibits, hear the talks, and see stakeholder interactions. Attendance at the April event was low (23 persons in the main auditorium), but the public turnout at the August Plant Science Day at Lockwood Farm (723 adults, 160 youths) was excellent. Connecticut Network (CT-N), a public TV station, taped the main speaker's talk and scientists' presentations at Plant Science Day for statewide telecasting. Extensive media assistance targeted the non-traditional stakeholder groups and individuals. Notices of these public events were mailed or e-mailed to 195 press contacts and 5,600 state residents on the Station's contact list to cover traditional stakeholder groups and individuals. Station displays of research, presented at 6 regional or state fairs, and invitations for high school students to tour Station laboratories, provided further opportunities to reach traditional and non-traditional stakeholders. For example, the Norwalk Tree Festival provides stakeholders an opportunity to meet Experiment Station staff; about 1,100 people saw Station displays. An additional 78 students toured laboratories at the Station's main campus in New Haven or heard oral presentations. Survey forms were distributed at both open houses plus at selected exhibits in statewide agricultural trade shows to seek written public comment on research programs and to encourage stakeholder participation. Thousands of citizens saw Station exhibits on agricultural, forestry, and public health topics and had opportunities to bring insect, plant, and soil samples for diagnostic testing. To determine if state residents were pleased with talks given at a spring Open House event, forms were distributed at the end of the event to receive input. Residents who responded were pleased with the program. Survey forms completed by 31 attendees of Plant Science Day indicated that residents came from at least 20 towns and cities of a total of 169 municipalities. Meetings for bedding plant growers, organized by Station scientists and UConn

extension specialists, were attended by 41 persons. All individuals rated the programs as useful. The majority indicated that they would benefit economically based on what they learned. Station staff members served on advisory boards and committees of at least 157 agricultural and environmental civic groups. Invasive aquatic plant problems were identified at meetings of traditional and non-traditional groups and individuals. Moreover, staff members made 269 visits to farms and other properties where pest problems occurred. In many cases, growers participated in research to find solutions for controlling insect pests and plant diseases. Finally, 2 state representatives, 1 state senator, staff in the Governor's Office of Policy and Management and State Office of Fiscal Analysis, and in three congressional offices requested and received information following newspaper articles, other media coverage, or constituent requests.

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
- Open Listening Sessions
- Needs Assessments
- Use Surveys
- Other (Public access to diagnostic laboratories)

Brief explanation.

Collecting input from stakeholders helps to realign research programs. There are several mechanisms in place to identify individuals and groups of stakeholders and to collect input from them. Evaluation forms, distributed to open house, meeting, and workshop attendees, were relied on heavily for stakeholder input. Special e-mail messages and letters, written by state residents, are forwarded by Station staff members to Department Heads and the Director and are then addressed after review. Citizens received responses. A complaint requires a response and follow-up contacts by administrators. Active participation of Station staff members on 157 advisory boards of civic groups, representing different agricultural, forestry, environmental or public health interests, is an excellent way to identify users of Station research findings, receive stakeholder input, identify problems that need to be addressed, and to find solutions. A research project on the Brown Marmorated stink bug (*Halyomorpha halys*) was requested by state residents. Another research project on controlling a fungus that causes boxwood blight was requested by nursery growers. Current research on detecting pesticides and pathogens in honey bees started as a result of requests from beekeepers and fruit growers who are concerned about rising honey bee mortality. Work on removing invasive plants from lakes was initiated when Station scientists attended lake association meetings. Field research on specialty crops was increased at the requests of Hispanic and Asian residents. Members of the microbrewery industry in CT requested research on barley and hops. New cultivars of chestnut trees and grapes are being evaluated at growers' requests. Greenhouse growers requested research on ebb and flow irrigation systems. Station staff members, who were officers of civic groups, recognized the needs of the public and were able to respond. The two annual Open House events of the Station and frequent use of displays at public meetings, trade shows, and science fairs provided opportunities to meet stakeholders who are interested in science issues, and to hear about the problems that need attention. Written survey responses obtained at special listening sessions held by CAES scientists during evenings for growers were especially useful in documenting public input. About 1,216 talks and interviews were given to civic groups and the media. Discussion during question and answer periods following the talks was an effective process in collecting input and in performing needs assessments. Major concerns are conveyed to the Director in writing. Research priorities on food safety, solving crop pest problems, providing new niche crops, and mosquitoes and ticks as transmitters of disease

organisms were set as a result of public input. Phone inquiries from the public and stakeholder access to diagnostic services also revealed important problems that needed attention. For example, pest control operators have indicated that controlling bed bugs continues to be very difficult. Further, frequent attendance at agricultural groups' meetings was very helpful in collecting stakeholder input. A public hearing on a quarantine for emerald ash borer was attended by about 170 citizens, who had opportunities to speak. Pest problems, difficulties in receiving permits for plant shipments and pesticide treatment, and interpreting federal and state plant regulations remain common concerns expressed by meeting participants. Finally, the Science Citation Index was used to identify scientists in other institutions who were recognizing the Station's published works and using new knowledge.

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
- Meeting with the general public (open meeting advertised to all)
- Survey of the general public
- Survey specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Survey specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public
- Survey of selected individuals from the general public

Brief explanation.

Written stakeholder input was received during this reporting period. The correspondence and completed surveys, which were well designed to ask specific questions, were very effective processes in collecting public input on research and outreach programs. Emphasis is being placed on obtaining more written input so that additional in-depth evaluations of program effectiveness can be made and that objectives can be prioritized. Giving research reports, providing displays, and attending meetings of traditional stakeholder groups, such as the Connecticut (CT) Tree Protective Association, CT Nursery and Landscape Association, CT Pomological Society, CT Timber Producers Association, CT Forest and Park Association, Federated Garden Clubs, CT Pest Control Association, CT Academy of Science and Engineering, Christmas Tree Growers, CT Greenhouse Grower Association, CT Urban Forest Council, Northeast Organic Farmers Association, CT Beekeeper Association, Backyard Beekeeper Association, and the Experiment Station Associates, were effective in collecting direct stakeholder input. Meetings for the CT Greenhouse Growers Association were co-organized by a Station scientist and personnel in the UConn extension system. When scientists met with the general public at two Open Houses (advertised to all) and at organized events where exhibits were displayed, input was received from traditional and non-traditional stakeholders. Survey or evaluation forms, which provided for more formal written comments, were forwarded to Department Heads and the Director. All CAES staff members have been instructed to allow sufficient time following invited talks for attendees to ask questions. This process allowed traditional and non-traditional individuals to provide additional input. Inviting high school students and teachers to see CAES laboratories and hear brief presentations on research resulted in collecting written stakeholder input from teachers (mostly non-traditional individuals). The 16,897 diagnostic tests performed for traditional and non-traditional individuals also resulted in stakeholder

input. Finally, meeting with specific traditional and non-traditional individuals, such as state or federal legislative leaders or staff, was another effective method of collecting stakeholder input on research results and budgetary matters. A new, formal system of evaluating the effectiveness of Station research and outreach programs has been implemented by Connecticut's General Assembly. The Appropriations Committee requires all state agencies to report on performance measures and accomplishments as a part of their Results-Based Accountability (RBA) program. The Station's outreach activities and stakeholder input processes are components of the RBA evaluation requirement.

3. A statement of how the input will be considered

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

Brief explanation.

Stakeholder input was considered by Station scientists, and in many cases, written comments were read by the Department Heads and the Director. All written comments received in e-mail messages, letters, or survey forms were reviewed by Station staff members and considered by the appropriate Department Head in re-establishing research priorities or initiating new studies. At the requests of stakeholders, 7,703 inquiries were answered in the Department of Plant Pathology and Ecology. Fungal and bacterial infections of crops and other plants have economic impact and reporting information to the National Plant Diagnostic Network (NPDN) has relevance to other states. However, many other inquiries answered in other departments, such as Entomology and Environmental Science, are not reported to the NPDN. Chrysanthemum white rust continues to be a problem for nursery growers, who requested guidance in disposing of federally regulated plant waste. Despite severe budget cuts, stakeholders want the high quality diagnostic and research services continued at the present level. Growers requested information on rapeseed cultivars for control of plant-parasitic nematodes. Members of the microbrewery industry, a new group of stakeholders, have requested research on hops and barley. Pest control operators notified CAES scientists that chemical control of bed bugs was ineffective. Research on insecticide resistance is in progress. Health officials asked for research on Powassan virus in ticks. Beekeepers and fruit growers expressed concern about declining honey bee populations and requested that analyses be conducted for possible pesticide contamination. Hispanics and Asians requested assistance on introducing new specialty crops. Accordingly, experiments were conducted on 88 cultivars of 7 specialty crops. At the request of stakeholders, training was given on IPM practices. In nurseries, insect infestations of Christmas trees and other economically important crops are having detrimental effects on plant vigor and quality. Field tests were continued in response to stakeholder requests. In other cases, stakeholders were concerned about the following: chemical contamination of foods, forest health, ticks, mosquitoes and viruses, possible health problems associated with invasive plants, mold in buildings, and insect pests of grass turf. Based on written stakeholder responses, research priorities were re-assessed to address current and relevant problems. All written comments received by the Director were discussed with appropriate Department Heads, and in some cases, specific objectives were included in the managers' annual performance goal programs.

Brief Explanation of what you learned from your Stakeholders

Stakeholders have extensive knowledge and experience, which can aid research programs. Potential environmental, economic, or public health impacts became apparent. Damage to fruits and vegetables, caused by spotted wing drosophila (*Drosophila suzukii*) was reported to our entomologists. We were informed that golden bamboo might be another invasive plant. Station scientists and administrators learned that bed bugs are resistant to pyrethroid insecticides and that infestations in buildings are getting worse. Members of lake associations revealed invasive plant infestations and provided feedback on effectiveness of control methods, such as the use of herbicides and lakewater draw-down programs. Nursery growers enlightened Station scientists about new insect damage of Christmas trees and about the increasing problem of insect resistance to certain pesticides. The general public expressed their concerns over product and food safety. We learned that people do not have confidence in the quality of imported foods. Increased surveillance for unwanted chemicals and microbes in foods was requested by the public and the Station responded accordingly. A pilot program was established with the CT Department of Public Health to test foods for toxic chemicals and microbes. Physicians have alerted CAES scientists about the increase in numbers of ticks which transmit the disease organisms that cause Lyme disease, granulocytic anaplasmosis, and human babesiosis. These people described the impact that these diseases had on their lives and the need to develop tick control programs for homeowner properties. We were informed by local health officials that our new methods of controlling mosquitoes in catch basins are working. We learned from foresters that the Asian longhorned beetle and emerald ash borer are spreading in Massachusetts and New York State, respectively. The latter insect has been found in 5 CT towns in New Haven County, one of which was from following-up a report from a stakeholder. We learned from grape growers that fungal infections are a difficult problem to control. Fruit growers have informed CAES scientists that there are bacterial infections on peaches. Finally, CAES scientists learned that biochar might be an ideal soil amendment. Moreover, positive stakeholder input was received from growers and ethnic groups (Hispanic, Brazilian, and Asian) praising the Station's continued efforts to provide information on cultivars of specialty crops, such as jilo, calabaza, edamame, garlic, pak choi, daikon radish, vegetable amaranth, and Chinese cabbage. We learned that crops evaluated by Station scientists were grown commercially and sold in farmers' markets.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	964179	0

2. Totaled Actual dollars from Planned Programs Inputs				
Extension			Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	0	0	964179	0
Actual Matching	0	0	4288885	0
Actual All Other	0	0	1912933	0
Total Actual Expended	0	0	7165997	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	Global Food Security and Hunger - Integrated Pest Management
2	Food Safety
3	Human and Animal Health
4	Soil and Water Quality
5	Climate Change
6	Sustainable Energy
7	Childhood Obesity

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger - Integrated Pest Management

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			20%	
205	Plant Management Systems			25%	
211	Insects, Mites, and Other Arthropods Affecting Plants			15%	
216	Integrated Pest Management Systems			40%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	16.0	0.0
Actual Paid Professional	0.0	0.0	12.5	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. 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	506640	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	2313827	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	401464	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The main research objectives for this program are to develop methods of pest control that require less chemicals and to develop and evaluate plant cultivars that are resistant to insect and plant pathogens and are high yielding. New advances were made on these objectives during the reporting period. Several expected outputs (i.e., activities, services, events, and new crops that reach people) were designed to assist a broad, diverse group of stakeholders by providing products and information that will be used by growers and the general public to solve problems. We expect that some of the new advances will eventually benefit food production internationally. All activities of this planned research program will ensure that people have equality of service and access to research findings. Direct contacts were tabulated from persons served or those in attendance at meetings, workshops, etc. Numbers of indirect contacts with youth were obtained from teachers, who receive CAES assistance and informative new findings in science curricula. The following activities were planned: (1) CAES scientists will partner with stakeholders and participate in their organizations as members or officers, (2) CAES scientists will conduct workshops or special meetings for stakeholders, (3) experiments will be performed on growers' properties as well as on CAES research farms, (4) 88 cultivars, representing 7 different crops, are currently under evaluation, new cultivars of vegetables (e.g., pak choi) and fruits (e.g., strawberry) will be tested, (5) Methods of controlling powdery mildew and crown gall will be developed, dinofuran (Safari) will be tested as a trunk spray for insect pests of trees, (6) diagnostic services will be provided to stakeholders, (7) training on IPM practices and other methodologies will be provided to stakeholders, (8) staff members will disseminate written information on research findings by presenting scientific displays at agricultural fairs and giving talks and interviews to civic groups, (9) staff members will work with the media and provide information on scientific discoveries, and (10) staff members will educate teachers and thereby, indirectly reach youth. Public service is an important component for all output measures. For example, all state residents were allowed to request direct assistance on diagnosing insect or plant disease problems. About 19,504 stakeholders directly received assistance from these activities in this reporting period. CAES scientists are members or officers in at least 101 stakeholder groups. This provides direct opportunities for stakeholder input on the research programs and facilitates reporting of research results. The non-traditional stakeholders were reached at agricultural fairs when they visited or inquired about CAES displays or newspaper, radio, and TV reports. Based on media statistics for viewers or readers, one can estimate indirect contacts with adults and youth who hear or read about new scientific advances made at CAES and reported by the media. Two open houses were held on CAES properties to allow the public to hear oral presentations on research results and to offer comments. About 745 talks and interviews were given to civic groups and the media to convey research results and to receive direct public input. Research experiments solved problems or provided information on new crops. Whenever possible, these experiments were conducted on farms or other private properties to encourage stakeholder engagement in the research. Results of these output activities led to specific outcomes, such as reducing pesticide use, controlling insects or plant disease pathogens, development of resistant cultivars, the introduction of new specialty crops, and increased farm income. Scientific publications in peer-reviewed journals or articles written for the general public reached traditional and non-traditional groups of stakeholders.

2. Brief description of the target audience

Diverse target audiences include under-served and under-represented stakeholders. CAES does not receive extension funds but, nonetheless, serves a variety of farmers who grow vegetables, fruits, nursery stock, cattle, and flowers. CAES scientists worked with the University of Connecticut extension specialists in planning growers' meetings. Progress was made in reporting new findings to the national extension service (www.extension.org) to reach stakeholders nationally. Five scientists at CAES are participating as members of communities of practice. The broad goals of the CAES research programs also include work on forestry and environmental problems. Accordingly, target audiences include landscapers, landscape architects, conservation officers, foresters, arborists, beekeepers, maple syrup producers, seed companies, and persons in the wood-products industry. Efforts were also made to reach government and water company officials, horticulturalists, groundskeepers, pest control operators,

pesticide manufacturers and retailers, environmental regulators, extension specialists, and municipal officials. Scientists and government officials are also important target audiences for new experimental results. This research program is mainly designed to reach the general public, which includes non-traditional stakeholder groups. Homeowners, who have interests in agriculture and forestry, have access to laboratories and scientific results as well as equality of service. Women, members of minority organizations, and children are examples of under-represented and under-served groups, important target audiences. Efforts will be made to reach Brazilian, Hispanic, Asian American, African American, and Native American populations as well as elementary and high school students. New scientific information will be transferred to teachers to develop educational curricula, and, thereby, indirectly reach youth.

3. How was eXtension used?

Although The Connecticut Agricultural Experiment Station does not receive extension funding and is not an official institution with eXtension, five CAES staff members in this program are registered with eXtension with the 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).

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	11659	75124	2684	21014

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

Patent Applications Submitted

Year: 2012
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	28	28

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Total research papers

Year	Actual
2012	90

Output #2

Output Measure

- # of site visits to conduct research and solve problems

Year	Actual
2012	269

Output #3

Output Measure

- # of talks and interviews given to stakeholders

Year	Actual
2012	745

Output #4

Output Measure

- # of responses to stakeholders' inquiries

Year	Actual
2012	18661

Output #5

Output Measure

- # of diagnostic tests performed

Year	Actual
2012	6691

Output #6

Output Measure

- # of new IPM intervention strategies judged to be effective

Year	Actual
2012	3

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of homeowners and growers gaining knowledge on insect pests and plant pathogens
2	# of homeowners and growers learning practices to control plant and household pests
3	# of media reporters gaining knowledge on research results
4	# of students learning agricultural skills by attending talks, courses, or training sessions
5	# growers adopting IPM practices
6	# of cultivars introduced into farming operations

Outcome #1

1. Outcome Measures

of homeowners and growers 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
2012	15124

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Homeowners and commercial farmers grow grapes for wine production. Although winegrapes and wineries are a relatively new industry in Connecticut, the winegrape industry is one of the most rapidly expanding types of agriculture in the state, with over 40 wineries, comprising approximately 320 acres. The anticipated value of wine produced in Connecticut for 2011 is about \$10 million. Several key factors directly contribute to the competitiveness of the winegrape crop, one of which is the yearly and ongoing challenge of diseases, particularly fungal diseases. When left unchecked, these diseases can significantly reduce the viticultural and economic value of the crop, as measured by harvestable product (yield) and quality (infected fruit rarely produce high quality wine). One disease of widespread concern in Connecticut and other northeastern states is powdery mildew caused by *Erysiphe necator* (sy. *Uncinula necator* (Schw.)). Because this disease can occur every season, numerous applications of fungicides are usually necessary in order to avoid devastating infections and associated losses in quality fruit suitable for winemaking.

What has been done

In collaboration with colleagues in other states and winegrape growers, a network of cell phone-based remote access weather stations were established in vineyards throughout southern New England (Hamden, CT; Windsor, CT; Griswold, CT; New Preston, CT; Colchester, CT; Newport, RI; Deerfield, MA). Each station measures temperature, relative humidity, sunlight, wind speed and direction, rainfall, leaf wetness and soil temperature every 15 minutes. The data are sent back to a central location once per hour where they are accessible via the internet. The resultant data are used to calculate disease risk assessment reports, which are made available to growers and the general public via Internet postings and direct e-mail alerts. On-site weather station data are used to calculate disease risk assessments, which are delivered to the winegrape growers on a weekly basis. Early in the season, disease risk assessments are also used in conjunction with scouting of each vineyard to assess inoculum levels that are critical for primary infections.

Results

Disease-risk information alerts the growers to possible disease problems in their vineyards. Using information about local weather events and inoculum levels to more precisely predict conditions that are favorable for fungus infections, homeowners and commercial winegrape growers are now able to eliminate unneeded fungicide applications, while maintaining the economic value of the crop. The short-term benefits of eliminating one fungicide application can save a grower approximately \$55.00 per acre (~\$40.00 in cost of fungicide + ~\$3.00 in cost of fuel + ~\$12.00 in cost of labor per acre). When these cost reductions are multiplied over the season for 320 acres of commercial production, they factor into substantial savings (\$17,600) for the winegrape growers. The long-term benefits associated with fewer fungicide applications include minimizing the potential for fungicide resistance to develop in the powdery mildew fungus, more responsible environmental stewardship, and protecting the health of both the vineyard workers and the consumer.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #2

1. Outcome Measures

of homeowners and growers learning practices to control plant and household pests

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1866

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

People living in cities want to grow vegetables in community gardens near their homes. Vacant land, such as previously abandoned industrial sites, are potential garden plots. However, there is concern among residents and municipal officials about the presence of lead, mercury, arsenic, cadmium, and other chemicals in the soil. Homeowners requested assistance on chemical analyses and how to grow vegetables in raised beds.

What has been done

During a 6-year study, 174 soil samples from 25 potential garden plots in 10 cities and towns were analyzed for unwanted chemicals. Scientists at The Connecticut Agricultural Experiment Station taught adults and youth how to grow vegetables in non-contaminated soil or in raised beds when heavy metals were detected in the soil.

Results

Soil samples from 8 garden sites were contaminated with one or more heavy metals. Remedial action consisted of training homeowners on the construction of raised beds containing fresh, uncontaminated topsoil. The concerns about potential food safety issues were addressed. People in Bridgeport, Hartford, New Haven, and Waterbury had bountiful supplies of fresh vegetables. Surplus produce was donated to food banks and soup kitchens to help mitigate hunger. These results had immediate impacts by increasing agricultural output, providing nutritious foods to the needy, and by establishing safe garden plots that can be used for several years. Long-term benefits include a healthy human population and reduced costs for fresh vegetables.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

of media reporters gaining knowledge on research results

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Growers and homeowners requested new knowledge on how to grow specialty crops with little or no pesticides. Farmers wanted to reduce pesticide costs and worker exposure to these chemicals and desired to have marketable crops that are in public demand. Media reporters recognized the public's interest in having a cleaner environment and, likewise, sought new knowledge on managing crop systems so that this information can be transferred to a diverse group of

stakeholders.

What has been done

Reporters interviewed scientists, saw laboratories, and visited field research plots. There were at least 13 newspaper articles or other news releases on plants and IPM systems covering a wide range of topics, such as specialty crops, honey bee pollination, insect pests, trees, gardening, and homeowner plantings. Station scientists gave 745 talks and interviews. At the summer Plant Science Day event, public television (CTN) recorded talks given by scientists on plant systems and pests and telecasted the presentations to state residents via a cable network.

Results

Reporters learned about the detection of the emerald ash borer in CT, effects of weather on plant health, effects of neonicotinoid pesticides on honey bees, plant damage caused by deer, and the introduction of new specialty crops. Nearly all (92%) reporters accurately transferred new findings in written form to stakeholders. For example, a newspaper reporter learned that the mild winter advanced crop growth by about 3 weeks and that strawberries would be available for harvest ahead of normal schedule. Advanced harvesting was also likely to occur for many other crops. Science citations = 24 for the specialty crops program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems

Outcome #4

1. Outcome Measures

of students learning agricultural skills by attending talks, courses, or training sessions

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	725

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Educating youth, an under-served group, is a major outreach initiative. The goal is to promote science and increase student interest in biology and chemistry. CAES scientists participated as judges in science fairs, showed exhibits and gave demonstrations at agricultural fairs and Plant Science Day. Staff members organized tours of laboratories and experimental plots. Parents want their children to learn about science, including skills of growing crops. Science teachers requested assistance in promoting interests in biology and chemistry and needed material for curricula.

What has been done

Scientists contacted career specialists in high schools in New Haven and invited students to see CAES facilities. During this reporting period, scientists also served as judges in science fairs, displayed exhibits at public events where youth of mixed racial and ethnic backgrounds attended, and gave at least 22 presentations to 371 elementary and high school students and 46 teachers. Students toured laboratories and saw demonstrations on the use of analytical equipment. Students from the Sound School in New Haven and from Waterbury, Connecticut learned how to grow vegetables in community gardens. They grew vegetables for their own use at the research farm and were taught good farming practices.

Results

Students of mixed racial/gender makeup and living in two cities, saw experimental field plots and learned how to grow vegetables, to control plant pests by using mulching practices, and how to fertilize and rotate crops. Elementary and high school students saw live honey bees in a demonstration case and learned about the biology and importance of honey bees. High school students learned about research on testing different cultivars and about chemical analyses used to ensure food safety. These efforts to change knowledge in students about agriculture had impact. The students, who learned how to grow vegetables, shared their knowledge with family members and neighbors, who were participating in urban community garden programs. Students learned about food banks and donated surplus produce. Based on feedback from teachers, there was increased interest among students in science. New knowledge on gardening was incorporated in science programs in elementary schools and helped to reach other students (e.g., indirect contacts with youth). The expected long-term benefits are a better educated youth population and increased interests in science.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

growers adopting IPM practices

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Plant-parasitic nematodes, such as the northern root-knot nematode (*Meloidogyne hapla*), damage roots of vegetable- and fruit-bearing plants and, consequently, negatively impact agricultural production. Methyl bromide and other soil fumigants are now more restricted in use because they deplete the earth's ozone layer. Growers have asked for assistance in finding alternative methods of nematode control.

What has been done

Field studies were conducted with green manure of Brassica species to determine if glucosinolates released from the decaying plant materials can control *M. hapla* in large-scale agricultural fields where tomatoes are grown.

Results

Bioassay results revealed an 80% mortality rate for *M. hapla* when sinigrin, a predominant glucosinolate, was present in high concentration. These results had immediate impact because an alternative method of nematode control was identified that can be used in Connecticut and abroad for the production of tomatoes, peppers, and carrots. Compared to the use of conventional biofumigants, \$500 to \$1,000 per acre can be saved in treatment costs when Brassica species are used as a cover crop and nematicide. For 50 acres of farmland requiring biofumigation in Connecticut, there is a potential savings of about \$25,000 to \$50,000 if green manure of Brassica species is used. Strawberry and vegetable growers have adopted this integrated pest management program. Long-term benefits include protection of the earth's ozone layer, a boost in global agricultural production, less pesticide exposure for farm workers, and farmland preservation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems

Outcome #6

1. Outcome Measures

of cultivars introduced into farming operations

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Today, about 11,000 acres on 733 farms in Connecticut are devoted to vegetable production with a cash value of \$30.2 million. Vegetable growers responding to a state survey requested that field trials be conducted on personal-sized watermelons.

What has been done

Field tests revealed that the cultivar "Bravo" yielded over 10,000 more watermelons per acre.

Results

At a retail price of \$4.99 per fruit, a grower can potentially gross about \$50,400 more per acre with "Bravo" than growing another popular cultivar "Vanessa". Ten vegetable growers are including this crop in their farming operations. In addition to increased revenue for farming operations, other benefits include providing a nutritious food for the consumer and preservation of farmland.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
205	Plant Management Systems
216	Integrated Pest Management Systems

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 (Staff changes, media influences)

Brief Explanation

The loss of an IPM specialist in a prior reporting period and recent resignation of a scientist hired about 4 years ago adversely affected outcomes because the new knowledge could not be effectively transferred to more growers. This vacancy will not be refilled because of a large state budget deficit and hiring freeze. Nonetheless, the actual quantitative target outcome of 4 growers adopting IPM practices was met because other scientists are working to develop IPM programs in commercial nurseries, orchards, and vegetable fields.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Planned evaluation studies were conducted during this reporting period. "After only" evaluations verified that there were knowledge changes in reporters. "During program" evaluations showed that there were knowledge changes in 371 students, whereas "before and after" program on-site evaluations and observations indicated that there were positive outcomes in more effective control of Christmas tree pests. Moreover, a survey of 220 farmers revealed that 77 were growing cultivars of Pak Choi that had been field tested at Experiment Station research farms.

Key Items of Evaluation

The Science Citation Index verified recognition of published articles on plant systems written by 28 scientists. There were 576 citations for this entire planned program. Twelve of 13 published news articles showed that substantial knowledge changes had occurred in reporters. The remaining one news article had minor misquotes of information. Likewise, feedback from 5 teachers verified knowledge changes in youth. On-site observations and evaluations verified success in improved IPM monitoring and control methods.

V(A). Planned Program (Summary)

Program # 2

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
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources			100%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	4.0	0.0
Actual Paid Professional	0.0	0.0	0.3	0.0
Actual Volunteer	0.0	0.0	1.2	0.0

2. 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	43579	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	44144	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	60589	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The main research activities are to develop more efficient analytical methods to detect toxic chemicals in food and other consumer products, to determine if consumer products are safe, and to determine if pesticides are causing honey bee mortality. A pilot collaboration program was established in a previous reporting period with the CT Department of Public Health to test foods for unwanted chemicals and microbials. Decisions on whether or not foods are "safe" depends on tolerance levels established for chemicals by the US Environmental Protection Agency (EPA) or the Food and Drug Administration (FDA). Good progress was made on all objectives. The activities, services, and events that reach people are designed to assist a broad, diverse group of stakeholders by mainly 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 state-generated outputs include numbers of food samples tested, scientific publications, and talks and interviews. The following activities were planned: (1) new analytical chemistry procedures will be developed, (2) staff members will disseminate new information on analytical test results to visitors at open house events and in scientific displays at agricultural fairs, (3) oral presentations will be given to civic groups, and (4) laboratories will be opened to allow adults and youth to meet staff members and see analytical equipment. Direct interactions with a broad base of stakeholders provide a mechanism for public input on the research program. Non-traditional stakeholders are reached at agricultural fairs when they visit Station displays. Two open house events are scheduled annually on Station properties to allow the public to hear oral presentations on research results and to offer comments. Results of these activities will lead to specific outcomes, such as removing tainted or adulterated food items from the markets and greater public awareness of research on food safety.

2. Brief description of the target audience

A diverse group of targeted audiences includes: state and federal public health officials and regulators, state and federal legislators and their staff members, food producers and importers, managers of supermarkets, educators, extension specialists, researchers in the food sciences, and the general public. Women, members of minority organizations, and children are examples of under-represented and under-served groups who are expected to receive benefits.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	609	9750	74	1950

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

Patent Applications Submitted

Year: 2012
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	3	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Total research papers

Year	Actual
2012	8

Output #2

Output Measure

- # of talks and interviews

Year	Actual
2012	99

Output #3

Output Measure

- # of tests performed

Year	Actual
2012	978

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of stakeholders gaining knowledge of food safety
2	# state and federal regulatory agencies making decisions on test results

Outcome #1

1. Outcome Measures

of stakeholders gaining knowledge of food safety

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	400

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There have been several instances when foods were contaminated with toxic chemicals or microorganisms. Food producers, retail operators, and consumers want safe foods. Federal and state regulators request analyses of foods and enforce laws by recalling contaminated products from commerce. These programs include livestock feed, such as alfalfa.

What has been done

Fifteen consumer complaints were received for Nutramigen-based products as part of the Women, Infants, and Children (WIC) Program. This number of complaints far exceeds that of any other product in the WIC Program. The complaints ranged from off-color or appearance; in these cases, the infant was not given the formula. However, in the majority of cases, the infants consumed the formula and symptoms ranged from projectile vomiting to diarrhea. Both liquid and powdered samples were delivered to the Department of Analytical Chemistry at The Connecticut Agricultural Experiment Station (CAES) for chemical analysis and the CT DPH Laboratory for microbial analysis. Samples were extracted and analyzed for over 850 pesticides, poisons, and toxins. Since the samples appeared to have large globular fat-like material in the solution, an acid hydrolysis method was also performed to determine total fat content.

Results

All samples were found to be free of chemical and microbial contamination. The acid hydrolysis results indicated that the fat content matched the label claim. A final determination was made indicating that the emulsification of the fats in the formula was compromised and that this effect was likely exacerbated by exposure to low temperature. The precise cause of this phenomenon is not known but may be the result of a formulation issue during manufacturing and processing. No other complaints have been found outside of CT, but due to new restrictions in the state mandating Bisphenol A-free containers, manufacture and processing of this product for CT occurs separately. In consultation with CAES chemists, DPH laboratory personnel, and Department of

Consumer Protection officials, this product has been removed from the CT State WIC nutrition program and replaced with an alternative product from another manufacturer. This change in actions will prevent human illnesses. Stakeholders gained knowledge of the test findings and the actions taken to correct the problem.

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

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
2012	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Food and other products are tested for unwanted chemicals to determine if they are in compliance with labels or safe to use by consumers. People are concerned about potentially contaminated products. State and federal regulatory officials are mandated to enforce consumer protection laws. In the 1970's, urea-formaldehyde foam insulation was first used by homebuilders and homeowners as a wall cavity filler to increase energy efficiency. By the 1980's, concerns arose over the release of formaldehyde vapor during the curing process and during the breakdown of old materials. Preliminary data showed that emissions rates as low as 100 parts per billion caused toxicity to humans. Observed effects in some people exposed at these levels included watery eyes, nose irritations, wheezing and coughing, fatigue, skin rash, severe allergic reactions, burning sensations in the eyes and throat, nausea, and difficulty in breathing. Consumers and health officials were concerned about the safety of these spray-foam insulations.

What has been done

A consumer complaint was lodged with the Connecticut Department of Consumer Protection (DCP) Trade Practices Division regarding the potential presence of urea formaldehyde in the insulation of a specific manufacturer based in New York State. DCP inspectors obtained six

samples of different types of insulation offered by this manufacturer. For comparison as a positive control, staff members in the Department of Analytical Chemistry at The Connecticut Agricultural Experiment Station (CAES) acquired spray foam insulation known to contain urea formaldehyde. A significant amount of method development was conducted by CAES analysts.

Results

Upon completion of the method development, all six regulatory samples contained formaldehyde. Four of the samples contained levels ranging from 20-52 parts per million; the other two samples contained levels of 2000-2100 parts per million. These levels are the total amount of formaldehyde in the dry product. Toxicity data above are based on vapors outgassing from the solid material. Results were submitted to the DCP Trade Practices Division, who in turn shared the findings with the State of Connecticut Department of Construction Services. On September 23, 2011, the Deputy State Building Inspector wrote a letter to the manufacturer of the product, indicating that the product was in violation of Connecticut General Statutes (Section 29-277) and, therefore, could not be installed in any building in the State. A variety of non-formaldehyde spray foam insulations are now commercially available. These changes in actions will prevent human illnesses.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Competing Programmatic Challenges
- Other (Staff changes)

Brief Explanation

One scientist retired on August 1, 2008, and with the current hiring freeze in place and continued budget cuts, this vacancy was not filled. This is a critical position because the discipline requires the testing of toxic heavy metals (e.g., lead, arsenic, cadmium, and mercury). However, a Postdoctoral Research Scientist hired last year on a federal grant continues his work. Other scientists, who were working entirely on state projects with state funds, have been reassigned to either part or full-time status on Hatch-funded programs. Work continues in the Department of Analytical Chemistry and planned program objectives were met. Grant-funded positions are now a critical component for food safety programs.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Information on research and service results was obtained "during the program" written evaluations and oral comments received at public meetings (1 Open House), civic groups' meetings, and at Station exhibits. Positive feedback was received from stakeholders. Observations made during interviews with stakeholders revealed positive stakeholder sentiment about program effectiveness and value.

Key Items of Evaluation

The key items of evaluation and data collection were as follows: stakeholders' written responses concerning food analyses; constructive written feedback from grant peer-reviewers for a competitive USDA grant; and responses and corrective actions by the State of Connecticut to remove subpar infant formula from commerce. The Citation Index indicated that articles written in previous years by 2 scientists were recognized and cited by scientists in this field (total citations = 5 during the reporting period).

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
722	Zoonotic Diseases and Parasites Affecting Humans			85%	
723	Hazards to Human Health and Safety			15%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	10.0	0.0
Actual Paid Professional	0.0	0.0	11.6	0.0
Actual Volunteer	0.0	0.0	11.4	0.0

2. 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	323785	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1627487	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	673232	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The main research objectives are to determine the chief mosquito vectors of encephalitis viruses, the sources of blood meals in engorged mosquitoes, if biological control agents can control mosquitoes and ticks, and to determine which vertebrate hosts are reservoirs for arthropod-transmitted pathogens. Major advancements continue to be made on all objectives. The expected outputs are designed to benefit federal, state, and local public health officials, physicians, veterinarians, and the general public. State-generated outputs mainly include scientific publications, talks and interviews, identifying and testing ticks for the Lyme disease agent, and numbers of state residents served directly by answering inquiries. For activities, staff members will (1) conduct research on tick and mosquito control and disseminate information on research findings by giving talks and media interviews, (2) analyze ticks and mosquitoes for disease agents, (3) answer public inquiries, and (4) inform public health officials on control methods. All activities strongly emphasize public service and include traditional and non-traditional stakeholders. Two open house events are planned annually on Station properties to allow the public to hear oral presentations on research findings and to offer comments. Results of these activities will lead to specific outcomes, such as more efficient or environmentally sound methods of tick and mosquito control and prevention of human illnesses.

2. Brief description of the target audience

Research on human and animal health benefits a broad range of stakeholders. Research findings were directly transferred to scientists via peer-reviewed journals and conferences. The general public was reached and participated in events by means of agricultural fairs, open houses, TV, radio, and newspaper articles. Media reporters frequently requested information for stories. Oral presentations were given to public health officials in meetings and, as requested, to civic groups. Also, state residents were allowed to submit ticks through local health departments for identification and analysis for the Lyme disease agent. Results were reported to public health officials who then informed the residents. General information on tick-related research was also provided. Fact sheets and other information were posted on the CAES website and made available to everyone. Although these communication venues allowed for extensive contacts with the public, special efforts were made to reach underserved and under-represented groups. Information on ticks and mosquitoes was printed in Spanish. A fact sheet on bed bugs was printed in Spanish, Chinese, and French. Displays at agricultural fairs and open houses were designed to interest children as well as adults. There has been ongoing cooperation with the Yale Peabody Museum to provide new information on mosquitoes and ticks to develop science curricula for middle and high school students. The Yale program, funded by a \$1.3 million Science Education Partnership Award and supported by the National Institutes of Health, is expected to impact 18,000 students and hundreds of teachers by 2016. Public participation in agricultural fairs was particularly effective in reaching non-traditional stakeholder groups.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3118	88530	329	19006

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

Patent Applications Submitted

Year: 2012
 Actual: 1

Patents listed

Patent for bed bug control

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	12	12

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Total research papers

Year	Actual
2012	14

Output #2

Output Measure

- # of talks and interviews

Year	Actual
2012	284

Output #3

Output Measure

- # of responses to stakeholders' inquiries

Year	Actual
2012	4651

Output #4

Output Measure

- # of ticks identified or tested

Year	Actual
2012	3240

Output #5

Output Measure

- # mosquitoes identified and/or tested

Year	Actual
2012	331806

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of residents gaining knowledge of ticks, mosquitoes, bed bugs, and mold
2	# of media reporters gaining knowledge of ticks, mosquitoes, bed bugs, and mold

Outcome #1

1. Outcome Measures

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
2012	3240

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In areas where Ixodes scapularis ticks abound, human cases of Lyme disease and other diseases are prevalent. Adults of this tick species prefer white-tailed deer (Odocoileus virginianus) as hosts. Increased tick abundance is directly correlated with rising deer populations. Health officials and state residents are concerned about Lyme disease and other tick-associated illnesses.

What has been done

A hunting program, conducted during the fall, was relied on to reduce deer populations at Mumford Cove in Groton, CT (New London County) during 1995-2008. In the ensuing years, surveys were conducted by state health officials with more than 90% of the permanent state residents in this suburban community to monitor the number of human cases of Lyme disease.

Results

During the 14-year study, the deer population was reduced by 87% at the study site. The incidence of Lyme disease in humans decreased by 80% and remained low during 2008. Abundance of the nymphal stage of the tick, which is most important in the transmission of the bacterium that causes Lyme disease, was also reduced. Analyses of field data revealed that reducing deer density to 5.1 deer/square kilometer resulted in a statistically significant reduction in human cases of Lyme disease. These results, although preliminary, had impact because they showed that hunting deer might reduce human risk of contracting Lyme disease if the deer herds were reduced to relatively low densities. The long-term benefit is a healthy human population.

4. Associated Knowledge Areas

KA Code	Knowledge Area
722	Zoonotic Diseases and Parasites Affecting Humans

Outcome #2

1. Outcome Measures

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
2012	49

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Reporters frequently sought information on mosquitoes, ticks, human pathogens, and associated diseases and were interested in new information gained from research on the spread of disease organisms in nature and the status of tick and mosquito population densities. West Nile and Eastern Equine Encephalitis (EEE) viruses constitute ongoing threats to human health in several states by causing severe illness or death. Since its introduction into the United States in 1999, West Nile virus has sickened over 35,000 people resulting in over 1,700 deaths. During this reporting period, there were seven human cases of West Nile virus in CT, but no deaths were reported. Public health officials have requested studies on the ecology of mosquitoes and viruses and biological control of mosquitoes.

What has been done

There were at least 44 reporters who sought information on mosquitoes and encephalitis viruses. More than 2 million mosquitoes were tested for viruses over 13 years. By interviewing scientists, who were conducting field and laboratory investigations, the reporters gained new knowledge of mosquitoes and the three main viruses (West Nile, Eastern Encephalitis, and Jamestown Canyon) that cause human illnesses. Viruses cultured from mosquitoes were identified by RNA analyses. Results were conveyed to the general public via press releases. Tens of thousands of stakeholders were kept informed of recent research findings and the significance of new scientific advances as they relate to the geographic areas they live in.

Results

There were 49 news stories on mosquitoes and viruses. Six reporters wrote multiple articles. Articles written by 40 (91%) of 44 reporters accurately transferred results to stakeholders. Reporters and stakeholders learned *Culex pipiens* is the main carrier of the West Nile virus and that this species is a complex of closely related subspecies of mosquitoes. The media also

learned that the West Nile virus was active in eastern CT and beyond the historical presence of virus in southwestern and south central CT. Stakeholders also learned that biological controls (Bacillus thuringiensis, B. sphaericus, and spinosad) effectively reduced Culex pipiens larvae in catch basins (published in the Journal of the American Mosquito Control Association). 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 is healthy human and domestic animal populations. Science citations = 143 for the mosquito/encephalitis virus research program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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 (Staff changes)

Brief Explanation

Grant funds were available to continue the research program, and there were shifts in scientists' work times from state projects to Hatch projects. New state funds were made available to replace federal dollars cut by the Centers for Disease Control and Prevention. There were no delays in hiring temporary workers on grant funds. The traps used require technical expertise and the use of dry ice (carbon dioxide attracts mosquitoes). The public would not be able to assist on mosquito collections. There were no changes in public policy, competing priorities, or competing programmatic challenges. There continues to be a hiring freeze on state-supported positions.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

"During program" and "after only" evaluations were conducted to assess program effectiveness. The treatment of catch basins in areas where West Nile virus is prevalent was successful in reducing Culex pipiens. Verbal feedback from municipal officials revealed that the use of Bacillus biocontrols were effective in controlling Culex pipiens mosquitoes.

Key Items of Evaluation

Data were collected mainly by on-site evaluations conducted following talks to civic groups. A survey was conducted to assess changes in behavior regarding prevention of mosquito and tick bites, and there were face-to-face interactions with reporters and other

stakeholders. During this reporting period, there were a total of 298 citations for scientific articles written by 9 scientists on ticks and mosquitoes for the entire planned program.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Soil and Water Quality

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
112	Watershed Protection and Management			30%	
133	Pollution Prevention and Mitigation			70%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	4.5	0.0
Actual Paid Professional	0.0	0.0	6.8	0.0
Actual Volunteer	0.0	0.0	4.8	0.0

2. 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	90175	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	303427	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	777648	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The main research objectives are to develop chemical, biological and mechanical methods of controlling invasive plants, to use molecular methods to identify invasive plants, and to develop procedures

to monitor herbicides in water. Good progress has been made on these objectives. The expected outputs are new scientific findings; scientific publications, newsletters, and fact sheets; talks and interviews; and numbers of state residents served directly by analyzing soil samples, identifying invasive aquatic or terrestrial weeds, or controlling these pest plants. These activities, services, or events are designed to provide new information that will be used by the general public and to seek their input on the research program and findings. Participation by members of lake associations in group discussions and workshops are particularly important because these stakeholders must agree on how to remove aquatic weeds from lakes. Options are limited for herbicide treatment and mechanical methods, which can vary in effectiveness depending on the extent of invasive weed infestations. Diagnostic services are available to determine the extent of pollution problems and to determine the success of field experiments. Water quality standards for acceptable herbicide concentrations are those established by the CT Department of Energy and Environmental Protection. Information will also be made available to all stakeholders on the CAES website, in newsletters and fact sheets, and in displays at the open house events or at agricultural fairs. It is also expected that there will be interest from reporters to write articles on the research, thereby enhancing awareness of invasive plant infestations. Results of these output activities will lead to specific outcomes, such as removing pesticides from soil and water, clearing lakes and ponds of invasive aquatic plants, and preventing loss of water quality.

2. Brief description of the target audience

A broad base of stakeholders, including under-represented and under-served persons, is targeted. It is expected that the following stakeholder groups will directly benefit from the research: farmers, lake associations, boaters, homeowners, water company officials, environmentalists, extension specialists, corporate and municipal officials, and pesticide producers. Special efforts will be made to contact and include members of minority organizations, women, and children to provide information and to participate in open house events.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	851	2852	180	570

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

Patent Applications Submitted

Year: 2012
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	14	14

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Total research papers

Year	Actual
2012	20

Output #2

Output Measure

- # of talks and interviews given to stakeholders

Year	Actual
2012	88

Output #3

Output Measure

- # of diagnostic tests performed

Year	Actual
2012	10657

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of homeowners gaining knowledge on pesticide pollution and invasive aquatic plants
2	# of homeowners gaining knowledge about watershed protection and soil and water quality
3	# of lakes and ponds surveyed and/or cleared of invasive aquatic plants

Outcome #1

1. Outcome Measures

of homeowners gaining knowledge on pesticide pollution and invasive aquatic plants

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	931

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Extensive growths of invasive aquatic weeds, such as Eurasian water-milfoil (*Myriophyllum spicatum*) and curly leaf pondweed (*Potamogeton crispus*) can significantly reduce water quality and alter wildlife habitats. Grannis Lake in East Haven, Connecticut, is infested with these invasive plants. Homeowners requested assistance on surveying and controlling both weeds.

What has been done

In a 7-year study, herbicides failed to control the aquatic weeds. A new approach was needed to mitigate the weed problems. A plant-eating fish called grass carp (*Ctenopharyngodon idella*) was then introduced. A total of 200 sterile (triploid) fish were released into the 20-acre lake in 2007.

Results

In May of 2010, survey results indicated that the fish were reducing populations of the aquatic weeds. The lake will be restocked with grass carp to continue to correct the invasive weed problem. These findings had impact because the use of grass carp to control certain species of aquatic weeds is an acceptable method. Long-term benefits will be a clean water supply and a body of water which can be used for recreation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation

Outcome #2

1. Outcome Measures

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
2012	3197

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Homeowners, landscapers, municipal workers, golf course managers, and farmers frequently use fertilizers. In many cases, these chemicals are applied without knowledge of soil quality. This practice can lead to polluted surface and ground water and encourage rapid growth of algae and other invasive aquatic plants. People who own or rent lake-front properties have expressed concern over reduced water quality and the inability to navigate boats in areas where aquatic weed populations are dense.

What has been done

At the request of stakeholders, 4,557 soil tests were performed at our research laboratories in Windsor, CT to determine nitrogen and phosphorous concentrations, acidity, and amounts of organic matter present. Specific results were provided on soil quality, and, as a part of an educational program, written suggestions were made concerning the application of fertilizers and lime to improve soil quality, or a statement was provided that no fertilizers were needed. A state bill to restrict phosphorous use near lakes passed in 2012.

Results

Analyses revealed that 1,117 (24.5% of 4,557 samples) were considered adequate for plant growth and did not require fertilizer applications. These stakeholders, mainly homeowners who submitted soil samples collected from their lawns or gardens, learned that they did not need to purchase fertilizers and, collectively saved about \$22,340. Another important short-term benefit is less fertilizer leaching into surface and ground water. The long-term benefit is a cleaner environment.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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- 112 Watershed Protection and Management
- 133 Pollution Prevention and Mitigation

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	6

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Invasive aquatic plants reduce public access to water, restrict boat navigation, decrease water quality by increasing sedimentation and eutrofication rates, and alter wildlife habitats. People who own or rent lake-front properties have requested assistance on the control of aquatic weeds, such as Eurasian water milfoil, variable water milfoil, curly leaf pondweed, fanwort, common water hyacinth, yellow iris, and watercress. These aquatic plants, however, are sometimes very difficult to identify when conventional morphological methods are used. Scientists, therefore, need more precise molecular techniques.

What has been done

A database of plant DNA sequences for molecular identification of the aquatic invasive and native species was developed for 56 different plants. One hundred and thirty sequences have been submitted to Gen Bank where they are available to researchers worldwide. Novel methods using cesium chloride/ethidium bromide density gradients and ultra-centrifugation have been developed to isolate and purify DNA bands.

Results

The database and molecular sequencing technology were successfully used to identify and distinguish species of banned plants being sold by Connecticut aquarium retailers. Of the 29 chain stores surveyed, 7% sold banned species, compared to 56% of 27 independent stores. These results had impact because all store owners, upon learning about the findings, ceased selling the banned plants. Expected long-term benefits are preserving water quality and reducing costs of mitigating invasive plant infestations. The new technology will greatly aid surveys of lakes and ponds and identifying invasive plants for control programs. Results were published in a scientific journal: Lake and Reservoir Management.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Although there were no external factors that immediately affected outcomes during this reporting period, 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

"Before and after" and "during" evaluations were conducted to document increased knowledge of aquatic plants, whereas "during" evaluations were most helpful in assessing advanced knowledge of stakeholders on soil and water quality issues. More than 70 stakeholders participated in the aquatic weed abatement programs and in town meetings. They followed progress as treatments cleared the weeds from targeted areas.

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 372 citations for scientific articles written by 4 scientists for the entire planned program. These citations indicate that knowledge was gained by scientists and used in their studies.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Climate Change

Reporting on this Program

Reason for not reporting

No activity in this program. Inclusion of this program no longer required.

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	0.0	0.0
Actual Paid Professional	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Volunteer	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 Matching	1890 Matching	1862 Matching	1890 Matching
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 All Other	1890 All Other	1862 All Other	1890 All Other
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

V(D). Planned Program (Activity)

1. Brief description of the Activity

{No Data Entered}

2. Brief description of the target audience

{No Data Entered}

3. How was eXtension used?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

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

Patent Applications Submitted

Year: 2012

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	{No Data Entered}	{No Data Entered}	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

Outcome #1

1. Outcome Measures

{No Data Entered}

V(H). Planned Program (External Factors)

External factors which affected outcomes

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Sustainable Energy

Reporting on this Program

Reason for not reporting

No activity in this program. Inclusion of this program no longer required.

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890

Actual Paid Professional	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Volunteer	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 Matching	1890 Matching	1862 Matching	1890 Matching
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 All Other	1890 All Other	1862 All Other	1890 All Other
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

V(D). Planned Program (Activity)

1. Brief description of the Activity

{No Data Entered}

2. Brief description of the target audience

{No Data Entered}

3. How was eXtension used?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

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

Patent Applications Submitted

Year: 2012

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	{No Data Entered}	{No Data Entered}	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

Outcome #1

1. Outcome Measures

{No Data Entered}

V(H). Planned Program (External Factors)

External factors which affected outcomes

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Childhood Obesity

Reporting on this Program

Reason for not reporting

No activity in this program. Inclusion of this program no longer required.

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890

Actual Paid Professional	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Volunteer	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 Matching	1890 Matching	1862 Matching	1890 Matching
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 All Other	1890 All Other	1862 All Other	1890 All Other
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

V(D). Planned Program (Activity)

1. Brief description of the Activity

{No Data Entered}

2. Brief description of the target audience

{No Data Entered}

3. How was eXtension used?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

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

Patent Applications Submitted

Year: 2012

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	{No Data Entered}	{No Data Entered}	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

Outcome #1

1. Outcome Measures

{No Data Entered}

V(H). Planned Program (External Factors)

External factors which affected outcomes

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}