2008 Connecticut Agricultural Experiment Station - Research Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

There has been continued progress on research and outreach programs in meeting objectives set for all 4 planned programs: Food Safety and Biosecurity, Human and Animal Health, Plant and Integrated Management (IPM) Systems, and Soil and Water Quality. Cooperation with extension personnel at the University of Connecticut (UCONN), Cornell University and other land-grant institutions facilitated the transfer of new scientific information to a broad base of stakeholders. In the Food Safety and Biosecurity Program, there were 2 important events where analyses at The Connecticut Agricultural Experiment Station (CAES) yielded results that had state or national impacts by changing conditions. Pomagranate juice contained unacceptable concentrations of carbendazim (Benomyl). The producer voluntarily recalled 6,746 cases of product from national commerce. In other analyses, the industrial chemical, melamine, was found in candy and cookies. Products were recalled to prevent human illness. These actions prevented adulterated products from reaching consumers. Melamine has no nutritional value, but has entered a variety of products made in China; contaminated baby formula and pet food have caused fatalities. In the Human and Animal Health Research Program, there was a positive outcome that resulted in change in knowledge or behavior. Field trials on tick control revealed that a single spray application of acaricide during the summer was effective in controlling ticks. Results of surveys indicated that the limited targeted seasonal spray approach was being accepted by homeowners and pest control operators. Collaboration with scientists in the Centers for Disease Control and Prevention has resulted in the transfer of new knowledge and control techniques to other states. In another study, a new antibody test was developed to help diagnose West Nile encephalitis virus in horses. The new test verified antibodies produced by 2 vaccines and natural exposure. The new assay will facilitate laboratory diagnosis and be a useful tool for ecological and epidemiological studies of West Nile virus. Research on plants and IPM systems has led to increased profits for growers and less pesticide use. New specialty crops have been introduced to the farm community. Beach plums are ideal for marketing premium jams. Recent field data indicated heavy yields of 36 pounds per plant. At a retail price of $2.00/lb. there is an expected crop value of $52,270/acre. The premium jam sells for $6.40 for an 8 ounce jar. Beach plum plants are now growing on 2 commercial farms. Growers requested assistance on controlling mites and scale insect pests so that quality arborvitae could be shipped from Connecticut. Field tests in 3 selected nurseries revealed that minimal, well-timed applications of short-lived permethrin-based insecticides controlled the targeted pests; 350,000 arborvitae plants (valued at about $12,250,000) were shipped during this reporting period by these nurseries for sale in Connecticut or out-of-state markets. In addition to increased profits, a lower amount of a less toxic pesticide was used, thereby reducing health risks to pesticide users and reducing risk of contaminating ground and surface water sources. There are 22 wineries in Connecticut, which add substantially to local economies when tourists spend money in restaurants, hotels, bed and breakfasts, etc. Locally produced wine is in demand by consumers. Grape growers requested assistance on evaluating Vitis vinifera cultivars, the fruit of which makes excellent wines, to reduce losses due to winter injury. New findings had immediate impact because planting vines on rootstocks more resistant to winter damage resulted in a savings of about $7.40 for each year of lost production per vine, plus costs of about $3.50 associated with plant replacement and labor involved in removing diseased vines and replanting. There is a potential savings of about $126,000 for 90 acres of production covering 3 years of re-establishment costs. This research is a part of NE-1020, a multistate program that has a substantial extension component with Cornell University. Information also has been transferred to a UCONN extension specialist. There has been continued success in restoring water quality in lakes and ponds where invasive plants grow. Low concentrations of an herbicide (2,4-D) removed variable water milfoil from a 10 acre area of a lake. This change in condition was significant because the technique is being used by the town to correct weed infestations. Achieving successful outcomes and impacts depends on effective stakeholder interactions and outreach programs. There have been at least 490,696 direct or indirect contacts with adults and youth in Connecticut plus results of staff members giving talks and interviews, making farm visits, performing diagnostic tests, and answering citizens' inquiries. Stakeholders have access to 120 new peer-reviewed articles or other publications. The assistance of 91 reporters (representing newspapers, television, and radio) and public access to an upgraded Station website continue to be powerful methods of transferring new knowledge. For the latter, there were 1,758,400 page views during 2008; 137,874 files were downloaded. These totals are higher than that recorded in 2007. The average user time per page view at a specific site was about 14 minutes.

Total Actual Amount of professional FTEs/SYs for this State

Year:2008	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	31.0	0.0
Actual	0.0	0.0	43.6	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. All scientific proposals submitted to USDA-CSREES or other federal agencies received merit and at least 3 external peer-reviews 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 2008, there were 10 Hatch and McIntire Stennis project outlines reviewed and submitted to USDA/CSREES to address state and national needs and to accomplish planned research goals in the following programs: Plant and Integrated Pest Management Systems (n = 8), Human/Animal Health (n = 1), and Soil and Water Quality (n = 1). The approved project outlines proposed work on plant genetics (n = 2), medically important arthropods, behavior of deer, wine grapes, greenhouse production systems, control of plant nematodes, chestnut trees, Neonectria canker infestations, and invasive plants. 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

Press releases were sent to the media to help promote 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. Attendance at the April event (128 persons in the main auditorium) and at the August Plant Science Day at Lockwood Farm (678 adults, 148 youths) was good. Press coverage of the talks and displays helped disseminate new scientific findings to persons not in attendance. Connecticut Network (CT-N), a public TV station, taped the main speaker's talk and 4 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 215 press contacts and 5,650 state residents on the Station's contact list to cover traditional stakeholder groups and individuals. Station displays of research, presented at 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, Farm/City Week is a statewide event, which provides children of urban families an opportunity to see farm research plots; 270 students (grades 3 to 7) saw Station displays. Hundreds of students and teachers, who attended the CPTV Science Expo, also had an opportunity to learn about Station research. 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. There were thousands of citizens, who saw Station exhibits on agricultural, forestry, and public health topics and had opportunities to bring insect, plant, and soil samples for diagnostic testing. Staff members at CAES continue to reach a broad base of traditional and non-traditional groups and individuals. To determine if state residents were pleased with workshops given on identification of invasive aquatic plants, forms were distributed at the end of the events to receive stakeholder input. All 62 residents who responded were pleased with the workshop programs. The stakeholders lived in 29 towns in Connecticut. Station scientists and administrators served on advisory boards and committees of at least 133 agricultural and environmental civic groups. Invasive aquatic plant problems were identified at meetings of traditional and non-traditional groups and individuals. Moreover, scientists and technicians made 488 visits to farms and other properties where pest problems occurred. In many cases, scientists worked with growers on their properties to find solutions for controlling insect pests and plant diseases. Finally, 7 state representatives, 3 state senators, staff in the Governor's Office of Policy and Management, state Office of Fiscal Analysis, and in one congressional office 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

There are several mechanisms in place to identify individuals and groups of stakeholders and to collect input from them. Active participation of Station scientists or technicians on 133 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. Current research on detecting pesticides 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. Greenhouse growers have 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. Special listening sessions held by CAES scientists during evenings for growers and survey results were especially useful in collecting public input. About 1,073 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. Research priorities on food safety, solving crop pest problems, providing new niche crops, biofuels, 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 has become very difficult. Further, frequent attendance at agricultural groups' meetings was very helpful in collecting stakeholder input. Pest problems, difficulties in receiving permits for plant shipments and pesticide treatment, and interpreting federal and state plant regulations were common concerns among meeting participants. Finally, the Science Citation Index was used to identify scientists in other institutions who were recognizing the Station's published works.

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

Most of the stakeholder input received during this reporting period was verbal. However, written correspondence and completed surveys, which were well designed to ask specific questions, were likewise effective processes in collecting public input on research programs. 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 Forest and Park Association, Federated Garden Clubs, Pest Control Association, CT Academy of Science and Engineering, Christmas Tree Growers, CT Greenhouse Grower Association, Northeast Organic Farmers Association, CT Beekeeper Association, Backyard Beekeeper Association, and the Experiment Station Associates, were effective in collecting direct stakeholder input. Four 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, verbal and written input was received from traditional and non-traditional stakeholders. Survey or evaluation forms were provided for more formal written comments. 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 input. Inviting high school students and teachers to see CAES laboratories and hear brief presentations on research resulted in collecting stakeholder input from selected individuals in the general population (mostly non-traditional individuals). The 17,377 diagnostic tests performed for traditional and non-traditional individuals also resulted in verbal or written 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.

3. A statement of how the input was 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 some cases, comments were passed on to the Department Heads and Director. All written comments received in letters or survey forms are reviewed by the Director and discussed with the appropriate Department Head in re-establishing research priorities or initiating new studies. At the requests of stakeholders, 5,399 diagnostic tests were performed 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 has relevance to other states in the northeast and elsewhere. For the second consecutive year, Chrysanthemum white rust was detected. Growers requested guidance in disposing 61 tons or regulated plant waste. More than 8,500 individual plants were incinerated or buried. Stakeholders want the high quality services continued at the present level. Growers and owners of biodiesel production facilities requested increased research on evaluating soybean and rapeseed cultivars for fuel production. Pest control operators notified CAES scientists that chemical control of bed bugs was not effective. Insecticide studies were started to address the problem. Beekeepers and fruit growers expressed concern about declining honey bee populations (colony collapse disorder) and requested that analysis be conducted for possible pesticide contamination. The research effort is underway. Hispanics and Asians requested assistance on introducing specialty crops. Experiments were conducted on 4 specialty crops. At the request of stakeholders, training was given to firefighters on how to de-populate a honey bee hive. In nurseries, mite and insect infestations of arborvitae and other economically important crops were having detrimental effects on plant vigor and quality. Field tests were conducted in response to stakeholder requests. In other cases, stakeholders identified the following emerging issues: melamine contamination of foods, pesticide presence in foods, possible health problems associated witih toxic fumes being released from "tire crumbs" used in artificial turf, and insect pests of regular grass turf. Surveys were requested to detect wood-boring beetles. Accordingly, research priorities were re-assessed to address these issues. All written comments received by the Director are summarized and discussed with appropriate Department Heads, and in some cases, specific objectives are included in the managers' annual performance goal programs. Responses are sent to those stakeholders who submitted letters to the Director or other Station staff members.

Brief Explanation of what you learned from your Stakeholders

Having good rapport with stakeholders encouraged input on emerging problems and offered opportunities for solutions to problems. Potential environmental, economic, or health impacts became apparent. Station scientists and administrators learned that bed bugs were not being controlled in hotels and apartments. Members of lake associations revealed invasive plant infestations and provided feedback on effectiveness of control methods. Nursery growers enlightened Station staff members about new mite and insect damage of crops and about the increasing problem of insect resistance to certain pesticides. The general public responded to news releases on melamine presence in candy and cookies and expressed their concerns over food safety. We learned that most people do not have confidence in the quality of imported foods and that stricter federal regulation on product labeling to disclose country of origin is needed. Increased surveillance for unwanted chemicals in foods was requested by the public, and the Station responded accordingly. Conversations with state officials revealed a serious problem with indoor mold in a state building. Physicians have alerted CAES scientists about the increase in numbers of ticks which transmit disease organisms that cause Lyme disease, granulocytic anaplasmosis, and human babesiosis. These people continue to describe the impact that these diseases have on their lives and the need to develop tick control programs for homeowner properties. We learned from foresters that the winter moth may become an important pest of hardwoods. Strawberry growers have reported damage caused by sap beetles. We learned from grape growers that bird damage to grapes was a problem. Fruit growers have informed CAES scientists that there are bacterial infections on peaches. Finally, CAES scientists learned that homeowners have become more interested in gardening because of higher food prices and concerns over food safety of imported fruits and vegetables. Similarly, positive stakeholder input was received from growers and ethnic groups (Hispanic, Brazilian, and Asian) praising the Station's efforts to provide information on cultivars of specialty crops, such as jilo, calabaza, edamame, garlic, leeks, and Chinese cabbage.

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	819129	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	0	0	904999	0
Actual Matching	0	0	4660425	0
Actual All Other	0	0	1469349	0
Total Actual Expended	0	0	7034773	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous years				
Carryover	0	0	475802	0

V. Planned Program Table of Content

S. NO.	PROGRAM NAME
1	Plant and Integrated Pest Management Systems
2	Food Safety and Biosecurity
3	Human and Animal Health
4	Soil and Water Quality

Program #1

V(A). Planned Program (Summary)

1. Name of the Planned Program

Plant and Integrated Pest Management Systems

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
205	Plant Management Systems			25%	
211	Insects, Mites, and Other Arthropods Affecting Plants			15%	
216	Integrated Pest Management Systems			60%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	19.0	0.0
Actual	0.0	0.0	12.2	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	546771	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1713072	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	57488	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

There are several expected outputs (i.e., activities, services, events, and new crops that reach people) designed to assist a broad, diverse group of stakeholders by transferring scientific information to stakeholders and solving problems. All activities of this planned research program will ensure that people have equality of service and access to CAES facilities to receive direct assistance from scientists. The following activities are planned: (1) CAES scientists will partner with stakeholders and participate in their organizations as members or officers, (2) CAES scientists will conduct workshops or meetings for stakeholders, (3) experiments will be performed on stakeholders' properties as well as on CAES research farms, (4) diagnostic services will be provided to stakeholders, (5) training on IPM practices and other methodologies will be provided to stakeholders, (6) staff members will disseminate written information on research findings by presenting scientific displays at agricultural fairs and giving talks and interviews to civic groups, and (7) staff members will work with the media and provide information on scientific discoveries. Public service is an important component for all output measures. For example, all state residents are allowed to enter CAES facilities and request direct assistance on diagnosing insect or plant disease problems. In this approach for delivering services, about 21,000 stakeholders are expected to benefit from these activities annually. CAES scientists are members or officers in at least 133 stakeholder groups. This provides opportunities for stakeholder input on the research program and facilitates reporting of research results. The non-traditional stakeholders are reached at agricultural fairs when they visit and inquire about CAES displays and via newspaper, radio, and TV reports. Two open houses are scheduled annually on CAES properties to allow the public to hear oral presentations on research results and to offer comments. Hundreds of talks and interviews are given to civic groups and the media to convey research results and to receive public input. Research experiments are important activities that lead to solutions to problems or information on new crops. Whenever possible, these experiments are conducted on farms or other private properties to encourage stakeholder engagement in the research. Results of these output activities lead to specific outcomes, such as reducing pesticide use, controlling insects or plant disease pathogens, the introduction of new specialty crops, and increased farm income. Scientific publications in peer-reviewed journals or articles written for the general public reach traditional and non-traditional groups of stakeholders.

2. Brief description of the target audience

A diverse group of targeted audiences, which include under-served and under-represented stakeholders, is needed to effectively serve 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 work with The University of Connecticut extension specialists in planning grower meetings. Progress has been made to enroll CAES into the national extension service (www.extension.org) to reach stakeholders nationally. This process has not been finished because a fee, based on extension funding, is required to be a member. The broad goals of the CAES research program also include work on forestry and environmental problems. Accordingly, target audiences include landscapers, conservation officers, foresters, arborists, beekeepers, maple syrup producers, seed companies, and persons in the wood products industry. Efforts are also made to reach 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.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	19500	15000	700	200
2008	37547	136386	4930	27262

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

Patent Applications Submitted

Year	Target
Plan:	0

2008 : 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	20	
2008	0	19	19

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Total research papers

Year	Target	Actual
2008	40	81

Output #2

Output Measure

- # of site visits to solve problems

Year	Target	Actual
2008	200	488

Output #3

Output Measure

- # of talks and interviews given to stakeholders

Year	Target	Actual
2008	400	715

Output #4

Output Measure

- # of responses to stakeholders' inquiries

Year	Target	Actual
2008	1700	17451

Output #5

Output Measure

- # of diagnostic tests performed

Year	Target	Actual
2008	1100	5125

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	# of homeowners gaining knowledge on insect pests and plant pathogens
2	# of homeowners learning practices to control plant and household pests
3	# of media reporters gaining knowledge on research results
4	# of students learning agricultural skills
5	# of growers adopting IPM practices

Outcome #1

1. Outcome Measures

# of homeowners 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	Quantitative Target	Actual
2008	1150	11645

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Homeowners, including farmers, rely on Station diagnostic services to solve plant pest problems. Crops and houseplants can suffer from a variety of infections, nematode damage, and the adverse effects of insects and mites. People do not want their plants to decline or die prematurely, and they seek remedies from staff members who are knowledgeable. Scientists are likewise interested in the reasons why plants decline because the cause(s) might reflect an emerging pathogen that could negatively impact an important crop system or forests.

What has been done

Diagnoses of insect and plant disease problems were performed on 9,499 samples submitted by stakeholders in person or by mail. Results and suggestions for control were forwarded back to the stakeholders along with written information on the pest. In about 49% of the inquiries, stakeholders visited the diagnostic laboratories to seek direct assistance from staff members.

Results

Diagnostic test results provided immediate new knowledge to stakeholders on what was causing the decline or premature death of plants. Pesticide treatments were remedies. During the past 2 years, Chrysanthemum white rust infestations occurred in Connecticut. Once the infestations were confirmed, more than 8,500 individual plants (61 tons) valued at about $200,000 were incinerated from one commercial property to prevent the spread of fungus infestations. Also, other nursery plant tissues were examined for Ramorum blight infestations. The immediate impact of diagnostic test results on federally regulated diseases was to prevent the spread of pathogens and widespread economic losses. Expected long-term benefits include healthy plants for wholesale and retail sale, increased profits for business, and an environment free of infected plants.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

# of homeowners 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	Quantitative Target	Actual
2008	1500	2138

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Homeowners (including farmers) want to know how to control plant and household pests. Problems that occur on private and commercial properties can sometimes be solved by using biological controls, insecticidal soap, horticultural oil, or cultural practices, such as crop rotation. People want healthy plants, a clean and comfortable indoor or outdoor environment free of pests and chemical pesticides, and high-yielding, quality crops.

What has been done

Fact sheets were relied on heavily to teach residents how to control pests. These materials were revised as needed and posted on the CAES website. At the Station's Plant Science Day (summer Open House), demonstrations on plant pest control were given. Also, in commercial operations, scientists visited stakeholders' properties and conducted experiments there. In the latter, there were 488 farm visits to help solve specific pest problems. In some cases, stakeholders participated by contributing to the experimental design and allowed use of their own equipment and materials in pesticide treatment trials.

Results

Annual bluegrass weevil is a major pest of homeowner lawns and intensively managed golf course turf. Pyrethrin insecticides have essentially become ineffective because of pest resistance. Homeowners and golf course managers had no way to assess degree of resistance. During the last reporting period, soil test kits were developed by research and extension entomologists at CAES, the Univ. of Connecticut, Univ. of Massachusetts, Univ. of Rhode Island, and Cornell. Information was transferred to some golf course managers on how to access the degree of pesticide resistance at selected sites. The pilot program was successful. These test kits are now being used by the US Golfing Association and golf course superintendents in 7 northeastern and mid-Atlantic states. There was a positive outcome because lawn care professionals adopted non-chemical, alternative control methods, such as the use of insect pathogenic nematodes, for managing weevils. There will be long-term impacts because a biological control agent can be used effectively in homeowner or golf course settings where pyrethrins were no longer effective. Other long-term benefits will include less human exposure to chemical pesticides and quality turf for homeowner lawns and recreation. This work was accomplished as part of multi-state NE-1025.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems
205	Plant 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	Quantitative Target	Actual
2008	10	45

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Growers and homeowners desire new knowledge on how to grow specialty crops with little or no pesticides. Farmers want to reduce pesticide costs and user exposure to these chemicals, but still have marketable crops that are in public demand. Media reporters recognize the public's interest in having a cleaner environment and likewise seek 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 and saw laboratories. There were at least 12 newspaper articles or other news releases on plants and IPM systems covering a wide range of topics, such as specialty crops, trees, gardening, and homeowner plantings. Station scientists gave 715 talks, some of which had reporters in attendance. Interviews also were relied on to release new findings. At the summer Plant Science Day event, public television (CTN) taped talks given by scientists on plant systems and telecasted the presentations to state residents.

Results

Reporters learned about breeding programs for chestnut trees, increased homeowner interest in gardening, crop resistance to pest problems, the use of mulching and other cultural practices that reduce reliance on the use of chemical pesticides, and about specialty crops. All reporters accurately transferred new findings in written form to stakeholders. For example, a newspaper reporter learned that different cultivars of Chinese cabbage were high yielding and could be grown in Connecticut with little or no pesticides. Yields averaged about 17.5 tons/acre. At a retail price of about $0.99 per pound, there is a potential crop value of about $38,400 per acre. These results had impact because the crop is in high demand by Asian residents and some growers are including this crop in their farm operations. The long-term benefits will include greater profits for growers, less pesticide use, farmland preservation, and a source of locally grown, nutritious food for consumers.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

# of students learning agricultural skills

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	500	418

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Efforts continue to reach youth, an under-served group. CAES scientists participated as judges in science fairs, showed exhibits and gave demonstrations at Farm/City Week and Plant Science Day events. Staff members organized tours of laboratories and experimental plots. Parents want their children to learn about science, including agricultural skills of growing crops. Science teachers request assistance in promoting interests in biology and chemistry.

What has been done

Scientists made contact with two high schools in New Haven to invite students to see CAES facilities, served as judges in science fairs, displayed exhibits at public events where youth of mixed racial and ethnic backgrounds attended, and gave presentations to elementary and high school students and teachers. Hundreds of students toured chemistry laboratories and saw demonstrations on the use of analytical equipment. Students in a New Haven school were allowed to grow vegetables for their own use at a CAES research farm and were taught good farming practices.

Results

Inner city minority students saw experimental field plots and learned how to grow vegetables and flowers, control plant pests by using mulching practices, and how to fertilize and rotate crops. Elementary and high school students learned about honey bees. High school students learned about the importance of honey bees for pollination. High school students also learned 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. In some cases, students learned about food banks and donated surplus produce. Based on verbal and written feedback from teachers, there was increased interest among students in science. New knowledge on gardening was incorporated in science programs in elementary schools. 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

# of growers adopting IPM practices

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	25	16

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

When pesticides are overused, they increase farm costs, can cause toxic effects on users and consumers, and can pollute soil and surface and ground water. Farmers want to reduce amounts of pesticides used and exposure to chemicals, whereas some people want no pesticides in foods or in the environment. The development of IPM programs benefits farmers, consumers, and the environment.

What has been done

At the request of the nursery industry, field tests were conducted in a prior reporting period to develop more accurate monitoring systems for rising scale and mite populations on arborvitae. Permethrin-based insecticides were evaluated for control. The objectives were to replicate field trials to determine the precise time for treatment and to protect an economically important crop that is exported from Connecticut by using minimal amounts of less toxic pesticides.

Results

Single or double applications of permethrin during the spring managed mites and scale insects. Monitoring programs were effective in identifying times of control. Managers in 3 large nurseries followed the IPM protocol; 350,000 treated (non-infested) arborvitae plants (valued at $12,250,000) were shipped and sold in the US and Canada. Long-term benefits, which will result in knowledge changes, include a cleaner environment because permethrin-based insecticides degrade rapidly outdoors. Less frequent applications of pesticide will decrease risk of pesticide resistance. Moreover, these insecticides are far less toxic to the users, compared with organophosphates. With this improved IPM approach, there will be continued profitability for nursery growers, greatly reduced state and regulatory problems because infested plants are not being shipped across state and national borders, less pesticide residues in nurseries, less risk of contaminating ground and surface waters, and less human exposure to pesticides, thereby reducing health risks.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
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 (Media influences)

Brief Explanation

The resignation of an IPM specialist in a prior reporting period adversely affected outcomes because the new knowledge could not be effectively transferred to more nursery managers. The vacant position has been filled and other scientists working on developing IPM programs continued the effort. The actual quantitative target outcome of 25 growers adopting IPM practices was partially met. There were no other external factors that impeded outcomes.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)

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 418 students, whereas "before and after" program on-site evaluations and observations indicated that there were positive outcomes in more effective control of pests on arborvitae.

Key Items of Evaluation

The Science Citation Index verified that 235 published articles on plant systems, written by 22 scientists over 30 years, were cited by scientists at other institutions (total cumulative citations = 4,880). Twelve accurately published news articles showed that knowledge changes had occurred in reporters. Likewise, verbal feedback from teachers verified knowledge changes in youth. On-site observations and evaluations verified success in improved IPM methods.

Program #2

V(A). Planned Program (Summary)

1. Name of the Planned Program

Food Safety and Biosecurity

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 professional FTE/SYs expended this Program

Year: 2008	**Extension**		**Research**	
	1862	**1890**	**1862**	**1890**
Plan	0.0	0.0	2.0	0.0
Actual	0.0	0.0	1.4	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	183072	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	250947	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The expected outputs (i.e., 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 and ease of access to scientific results. The state-generated outputs include numbers of food samples tested, scientific publications, and talks and interviews. The following activities are planned: (1) staff members will disseminate new information on analytical test results to visitors at open house events and in scientific displays at agricultural fairs and (2) oral presentations will be given to civic groups. 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 houses 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.

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.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

Year	Direct Contacts Adults Target	Indirect Contacts Adults Target	Direct Contacts Youth Target	Indirect Contacts Youth Target
Plan	1000	1000	1000	500
2008	2482	20200	233	4030

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	1	
2008	0	1	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Total research papers

Year	Target	Actual
2008	3	4

Output #2

Output Measure

- # of talks and interviews

Year	Target	Actual
2008	20	35

Output #3

Output Measure

- # of tests performed

Year	Target	Actual
2008	700	694

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 regulatory agencies applying decisions on testing 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	Quantitative Target	Actual
2008	1500	2400

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With increased commerce from foreign countries and more emphasis on large-scale food processing domestically, there have been instances when foods, beverages, and other products contained unwanted chemicals, such as pesticide residues. Consumers, food producers and importers, and public health officials are concerned about food safety and security.

What has been done

As a part of a statewide monitoring program, state officials in the Departments of Agriculture and Consumer Protection submitted samples to the CAES for chemical analyses.

Results

Pomegranate juice was found to contain 0.011 ppm - 0.052 ppm of Carbendazim (Benomyl). Since there is no tolerance for this pesticide in pomegranate juice, the product had to be recalled. There were 6,746 cases of products in commerce nationwide. The producer voluntarily recalled all of the pomegranate juice. These results had impact because stakeholders learned that a food security monitoring system was detecting contaminated products. The prompt recall of contaminated products prevented 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.

Outcome #2

1. Outcome Measures

state regulatory agencies applying decisions on testing results

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	3	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Foreign products, particularly from China, have been found contaminated with unwanted chemicals. Consumers, food producers and importers, and public health officials are concerned about food safety and security.

What has been done

As a part of a statewide monitoring program, state officials in the Departments of Agriculture and Consumer Protection submitted samples to the CAES for chemical analyses. Although some of this work is routine, there were special requests to test candy and other foods for melamine, an industrial chemical (found in some Chinese products) that can cause kidney disorders and death in domesticated animals and people (infants).

Results

Melamine was detected in candy and cookies, and products were removed from commerce. These results had impact and resulted in action because (1) the US Food and Drug Administration activated state and federal laboratories in the Food Emergency Response Network nationally to increase monitoring of melamine in foods and animal feeds and (2) the prompt recall of contaminated products prevented illness in humans and domestic animals.

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

- Appropriations changes
- Competing Programmatic Challenges

Brief Explanation

One scientist retired on August 1, 2008 and with the current hiring freeze in place, special approval to refill this vacancy was given by the Governor in October, but the position could not be filled because of declining state revenues and growing state deficits. However, outcomes were not affected. Analytical equipment operated normally. Planned program objectives were met.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- During (during program)

Evaluation Results

Information on research and service results was obtained "during the program" evaluations at public meetings (1 Open House and a special public meeting held on melamine in food), civic groups' meetings, and at Station exhibits received positive feedback from stakeholders. There was sufficient interest among media reporters, and at least 2 articles were written for the New Haven Register and Hartford Courant. Observations made during interviews with stakeholders revealed positive stakeholder sentiment about program effectiveness and value. Special permission was given by the Governor and the Office of Policy and Management to hire a chemist to fill a vacancy during a hiring freeze.

Key Items of Evaluation

The key items of evaluation and data collection were as follows: media reporters' responses upon learning about research and service findings and verbal responses received from stakeholders at public meetings. The Citation Index indicated that 22 articles, written by 5 scientists and covering 33 years of work, were recognized and cited by scientists in this field (total cumulative citations = 596).

Program #3

V(A). Planned Program (Summary)

1. Name of the Planned Program

Human and Animal Health

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			100%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	5.0	0.0
Actual	0.0	0.0	11.3	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	106789	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1437874	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	1124922	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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) disseminate information on research findings by giving talks and media interviews, (2) analyze ticks, (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 houses 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.

2. Brief description of the target audience

Research on human and animal health benefits a broad range of stakeholders. Research findings are directly transferred to scientists via peer-reviewed journals and conferences. The general public is reached by means of agricultural fairs, open houses, TV, radio, and newspaper articles. Media reporters frequently request information for stories. Oral presentations will be given to public health officials in meetings and, as requested, to civic groups. Also, state residents are allowed to submit ticks through local health departments for identification and analysis for the Lyme disease agent. Results are reported to public health officials when they inform the residents. General information on tick-related research is also provided. Fact sheets and other information posted on the CAES website are made available to everyone. Although these communication venues allow for extensive contacts with the public, special efforts are made to reach under-served and under-represented groups. Information on ticks and mosquitoes is printed in Spanish, and displays at agricultural fairs and open houses are designed to interest children as well as adults. Participation in agricultural fairs is particularly effective in reaching non-traditional stakeholder groups.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	3000	2000	200	100
2008	3332	113826	351	22750

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	2	
2008	0	10	20

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Total research papers

Year	Target	Actual
2008	3	25

Output #2

Output Measure

- # of talks and interviews

Year	Target	Actual
2008	125	204

Output #3

Output Measure

- # of responses to stakeholders' inquiries

Year	Target	Actual
2008	135	1930

Output #4

Output Measure

- # of ticks identified or tested

Year	Target	Actual
2008	3500	2602

Output #5

Output Measure

- # mosquitoes identified and/or tested

Year	Target	Actual
2008	165000	211657

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	# of residents gaining knowledge of ticks and mosquitoes
2	# of media reporters gaining knowledge of ticks and mosquitoes
3	Percentage of notified residents taking protective measures against mosquitoes or ticks

Outcome #1

1. Outcome Measures

# of residents gaining knowledge of ticks and mosquitoes

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	4550	5032

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Stakeholders are concerned about bacterial pathogens transmitted by ticks, such as the spirochetes that cause Lyme disease, and encephalitis viruses transmitted by mosquitoes. Like Lyme disease, infections of West Nile virus occur nationally and affect several thousand residents. The general public, health care providers, physicians, and veterinarians are interested in accurate diagnosis of illnesses and methods of effective vector control to reduce the risk of infections.

What has been done

In three Connecticut health districts, 1,944 (69.3%) stakeholders surveyed over three separate years indicated that they considered ticks and Lyme disease to be a serious or somewhat serious problem in their community. Consequently, field research was conducted on land management practices, the application of chemical pesticides, and on the use of a fungal biological agent to control ticks as a part of a community prevention program for Lyme disease.

Results

A single spray application of acaricide during the summer tick season was found to be effective. The transfer of this information to stakeholders in an educational outreach program had immediate impact because surveys revealed that limited, targeted seasonal spray applications of acaricides subsequently increased from 22% to 43% on homeowners' properties in one community. Compared to the more frequent spray applications used previously, the new approach for tick control should result in a decrease in amounts of acaricide used on properties, thereby decreasing the risk of human exposure to pesticides and minimizing the detrimental effects on non-target animal species.

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 and mosquitoes

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	10	39

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Reporters, frequently by request, seek information on mosquitoes, ticks, and associated diseases and are interested in new knowledge gained from research on the spread of disease organisms in nature and the status of tick and mosquito population densities. Lyme disease is prevalent in Connecticut. West Nile virus, an exotic pathogen, is now firmly established in North America. The detrimental effects of vector-borne pathogens on humans and horses illustrate the importance of monitoring for emerging pathogens and changes in the status of endemic disease organisms.

What has been done

There were at least 39 reporters who sought information on mosquitoes, encephalitis viruses, ticks, tick control, or tick-transmitted disease organisms. By interviewing scientists conducting field and laboratory investigations, the reporters gained new knowledge of mosquitoes and ticks and transferred this information to the general public. Tens of thousands of stakeholders were kept informed of recent research findings and the significance of scientific advances.

Results

There were 41 written news stories and 23 radio/TV news reports on mosquito and tick population numbers, prevalence of viral or bacterial infections in these arthropods, and methods of control. Articles written by 33 (85% of 39) reporters accurately transferred results to stakeholders. These actions had impact because upon learning about the presence of West Nile virus in the environment, municipalities responded by controlling larval mosquitoes in targeted areas. Also, more than 4,000 residents learned about the Station's diagnostic services available to test ticks for the Lyme disease agent and submitted 2,602 ticks for identification and analyses. Stakeholders learned whether or not ticks were infected and received a letter reporting results and a fact sheet describing how these arthropods transmit the Lyme disease organism. In many instances, ticks were not engorged with blood, and since no transmission of pathogens occurred, there was no need for unnecessary antibiotic treatment.

4. Associated Knowledge Areas

KA Code	Knowledge Area
722	Zoonotic Diseases and Parasites Affecting Humans

Outcome #3

1. Outcome Measures
Percentage of notified residents taking protective measures against mosquitoes or ticks

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	20	40

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Ticks transmit disease organisms that cause Lyme disease, human babesiosis, and human granulocytic anaplasmosis (formerly ehrlichosis). People who live in or enter tick infested areas are concerned about these diseases. Researchers and public health officials want to know if state residents follow precautions given to prevent tick bites.

What has been done

Attendees at meetings and conferences were asked if they follow steps to prevent tick bites and if they checked themselves and children for attached ticks.

Results

Of the 83 persons queried, 36 (43%) indicated that they closely followed precautionary steps, such as the use of repellents and daily tick checks. Another 14 (17%) persons indicated that they sometimes follow preventive measures to avoid tick bites. It was concluded that educational programs and literature on ticks and tick-borne infections were having a positive impact on public awareness of these arthropods and associated diseases.

4. Associated Knowledge Areas

KA Code	Knowledge Area
722	Zoonotic Diseases and Parasites Affecting Humans

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

Brief Explanation

There were no external factors which affected outcomes. Funding and staff numbers were stable. There were no changes in public policy, competing priorities, amounts of grant funding, or competing programmatic challenges.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Before-After (before and after program)
- During (during program)

Evaluation Results

"During program" and "after only" evaluations were conducted to assess program effectiveness. The treatment of mosquito larval habitats, following news releases of West Nile virus infections in mosquitoes, successfully reduced mosquito populations at selected, key sites. Surveys of stakeholders revealed positive responses for the practice of applying a single spray application fo acaricide for tick control during the summer season rather than multiple sprays. The practice of applying a single spray increased from 22 to 43% in one surveyed health district.

Key Items of Evaluation

Data were collected mainly by on-site verbal or written evaluations conducted following talks to civic groups. A survey was conducted to assess changes in behavior regarding tick control practices and there were face-to-face interactions with reporters and other stakeholders. Review of Science Citation Indexes revealed that 159 scientific articles, written by 8 scientists over 33 years on mosquitoes and ticks, were being recognized and cited by other scientists in the field (total cumulative citations – 5,419).

Program #4

V(A). Planned Program (Summary)

1. Name of the Planned Program

Soil and Water Quality

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
133	Pollution Prevention and Mitigation			100%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	5.0	0.0
Actual	0.0	0.0	5.2	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	68367	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1258532	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	286939	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

As in the previous report, the expected outputs are scientific publications, newsletters, and fact sheets; talks and interviews; and numbers of state residents served directly by analyzing soil samples or identifying invasive aquatic weeds. These activities, services, or events are designed to disseminate new information to stakeholders and to seek their input on the research program and findings. Interactions with members of lake associations in group discussion and workshops are particularly important because stakeholders in towns or communities must agree on how to remove aquatic weeds from lakes. Options are limited to 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. Information will also be made available to all stakeholders on the CAES website, in newsletters and fact sheets, and in displays at the open houses 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 pollution problems. 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 pollution.

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.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	**Target**	**Target**	**Target**	**Target**
Plan	1000	500	75	50
2008	2721	95322	275	19049

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	2	
2008	0	3	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Total research papers

Year	Target	Actual
2008	2	7

Output #2

Output Measure

- # of talks and interviews given to stakeholders

Year	Target	Actual
2008	30	119

Output #3

Output Measure

- # of diagnostic tests performed

Year	Target	Actual
2008	1000	5291

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 on 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	Quantitative Target	Actual
2008	75	1272

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Members of lake associations see extensive growths of aquatic weeds and are concerned about the loss of water quality. Homeowners also are concerned about the over use of herbicides for weed control in lakes and possible contamination of ground water.

What has been done

At the request of stakeholders, lakes were surveyed for invasive aquatic plants. In some cases, it was more practical to remove invasive plants by mechanical means (hydroraking).

Results

For small lakes and ponds, hydroraking methods were successful. The immediate impacts were improved water quality without the use of herbicides. Long-term impacts are a cleaner environment for fish and other wildlife, preservation of drinking water supplies, and recreational use of lakes and ponds.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation

Outcome #2

1. Outcome Measures

# of homeowners gaining knowledge on soil and water quality

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	1000	3809

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Fertilizers are used extensively by homeowners, landscapers, golf course managers, and farmers. In many cases, these chemicals are applied without knowledge of soil quality. This practice can lead to polluted surface and ground water, thereby encouraging rapid growth of algae and invasive aquatic plants. People who own or rent lake-front properties have expressed concern over reduced water quality.

What has been done

At the request of stakeholders, 2,284 soil tests were performed to determine nitrogen and phosphorous concentrations, acidity, and amounts of organic matter present. Specific results were provided on soil quality, and verbal or written suggestions were made concerning the addition of fertilizers and lime to improve soil quality or a statement was provided that no fertilizers were needed.

Results

Of the 2,284 soil samples tested, 69 (3%) were considered adequate for plant growth and did not require fertilizer applications. These stakeholders, mainly homeowners who submitted soil samples collected from their lawns, learned that they did not need to purchase fertilizers and, collectively, saved about $1,380. Another 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
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	Quantitative Target	Actual
2008	10	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Invasive aquatic plants reduce public access to water, restrict 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 milfoil and variable milfoil.

What has been done

Experiments were conducted with an herbicide (2, 4-D) to develop methods to clear variable water milfoil infestations from two lakes and a pond. Spring and late summer treatments were applied to an infested area of about 10 acres in one lake.

Results

Late summer applications of herbicides were as effective as traditional spring treatments, and control of aquatic plants was achieved without the spring treatment. There were immediate impacts because the reduction of herbicide use from 200 pounds per acre to 75-100 pounds per acre resulted in cost savings of about $4,000 and the lake is largely free of variable milfoil. Water quality has been restored in two lakes and one pond. Long-term benefits resulting from the reduction in herbicide use include decreased risk of contaminating wells, less stakeholder exposure to herbicides, and lower toxicity to native plant species.

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
- Other (Unexpected changes in workforce)

Brief Explanation

There were no external factors that affected outcomes.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)

Evaluation Results

quot;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. Of the 62 persons trained on identifying aquatic weeds in workshops, 100% replied in writing on evaluation forms that the new knowledge they gained was very useful.

Key Items of Evaluation

Written information on survey forms following workshops (on-site) and verbal feedback from interviews with volunteers and other stakeholders (unstructured) were important information collection methods for program assessments. The Science Citation Index verified that 74 published articles written by 4 scientists over 28 years on the general topic of soil and water quality, were being cited by scientists in other institutions (total cumulative citations = 2,827).