

2013 Clemson University and South Carolina State University Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

All five of the NIFA high priority issues are addressed in South Carolina's annual report. In addition, the state is reporting on seven other priority program areas: Sustainable Animal Production Systems, Sustainable Agriculture Production for (non-food) Horticultural Crops, Community Leadership and Economic Development, 4-H Youth Development and Families, Water Quality and Water Quantity, Sustainable Forest Management and Environmental Conservation for Wildlife. South Carolina's report reflects specific work done in Plant Disease and Pest Surveillance and Detection; Sustainable Production Systems for Agronomic Crops, Horticultural Crops and for Animals; Food Safety; Sustainable Forest Management; Natural Resource and Environmental Enhancement; Economic and Community Development, 4-H Youth Development; and advanced plant technology to improve the value of SC's agronomic crops.

Research and Extension delivery through outreach of research results to the clients promotes the economic growth and development of the agriculture and forestry sectors throughout the state. There were more than 115 active research projects in the reporting period. Researchers issued seven intellectual property disclosures and submitted three patent applications. Seven patents were awarded. Faculty also submitted 85 technical contributions for publication. The Clemson Extension Service delivered over 7,116 programs throughout the 46 counties of South Carolina, reaching some 219,407 people.

The emphasis on plant disease and pest surveillance and detection addresses concerns of emerging disease outbreaks, invasive plant species introduction, exotic plant pest and disease introduction, food safety, and other agroterrorism issues. There is continual emphasis on educating producers and first responders. Presentations including Equine Emergency Preparedness, Biosecurity, Foreign Animal Diseases, and Business Continuity sessions were taught to SC producers and emergency workers. The National Guard for Ag Development Training in Afghanistan included sessions by Extension on herd health, reproduction, and biosecurity. Row-crop entomologists in South Carolina have observed an average yield loss of about 20% due to the kudzu bug when untreated soybeans were exposed to naturally occurring high populations of the invasive species. Thresholds and spray techniques developed at Clemson are highly effective and can prevent over \$22 million in losses if utilized by growers. In addition, selecting the proper seed variety for the producer's environment will increase productivity and profitability.

The goal of the Sustainable Production Systems for Agronomic Crops, Horticultural Crops and for Animals is to improve profitability, increase efficiency, and reduce negative environmental impacts of such systems in South Carolina. Clemson University conducts Official Variety Trials of all major crops in multiple locations across the state. The information generated from these trials is then used by growers to select the varieties that perform best in their region of the state. In 2012 South Carolina growers produced a cotton crop valued at over \$211,000,000, a soybean crop valued at \$101,000,000, a corn crop valued at 145,000,000 and a wheat crop valued at 76,000,000. If yields were increased by 5% through proper variety selection this would result in an additional \$26,000,000 in revenue for South Carolina producers. Clemson Extension Specialists and County Ag Agents have carried out an aggressive training

program to teach growers how to identify the optimal time to dig peanuts. With an average of about 100,000 acres of peanut in South Carolina this means over \$7.5 million extra dollars for growers and the South Carolina economy. In addition, growers improved production efficiency of confined animal systems and adopted grazing management practices.

According to public health and food safety experts, 76 million illnesses in this country can be traced to food borne bacteria each year. Moreover, the Food and Drug Administration estimates that two to three percent of all food borne illnesses lead to secondary long-term illnesses. Food Marketing Institute research shows that consumers know that food safety is important and know that they personally should observe sound food-handling practices. However, it also shows either that they do not fully comprehend some of the most important messages or they fail to use food safety measures. In an effort to reduce food-borne illness, agents conducted food safety training for managers, supervisors, and other food handlers.

The prevalence of overweight and obesity has become one of the most critical health issues in both South Carolina and the United States. Overweightness and obesity cut across all ages, economic levels, and racial and ethnic groups. In South Carolina, over 60% percent of all adults are now either overweight or obese. Nutrition education and research will focus on the topic of preventing childhood obesity.

Extension provided education to horticulture professionals, master gardeners, master naturalists and consumers to help them improve their homes and communities through the use of environmentally sound horticultural practices. Extension provided education to horticulture professionals, master gardeners, master naturalists and consumers on environmentally sound horticultural practices. In turn, these volunteers answered consumer gardening questions, assisted with landscapes and gardening projects at schools and in their local communities, helped eradicate fire ants and other exotic invasive plants, renovated and maintained trails, restored habitats and cleaned up nesting boxes. Volunteers are involved in projects to educate and interpret nature to other audiences such as schools, assisting at parks and providing docent help for our many museums, nature centers and aquaria spread throughout the state. They also give back to our program by assisting Extension with the delivery of new courses and by taking or leading advanced training classes throughout the state.

The length of time between investments in timber production and revenue from timber sales is often long-term. Extension programs have focused on the use of alternative silvicultural systems from the traditional southern pine management and other programs to teach ways to diversify land use and management.

Economic and Community Development Programs help reduce the cost of service provision to communities and individuals and allow more communities to be better served. Specialists have determined the total combined economic impact for several local farmers markets. Graduates of Clemson Extension's senior and junior leadership programs were still involved in a responsible community project three years after graduation.

4-H programs seek to promote youth educational success and connection to the community through a learn-by-doing approach, inclusive learning environments, and the involvement of caring adults. Gains have been reported in knowledge of civic engagement, improvement in self-esteem, new skills demonstrated, and improved connections to the community.

Efforts continued to establish an advanced plant technology center at the Pee Dee Research and Education Center near Florence. This is a multi-year initiative with infrastructure improvements and new hires expected in the next program year. The research programs in forage fed beef received additional support as work in that area expanded, and the "Intelligent River" technologies developed in the last reporting period are being applied to a variety of areas involving agronomic crops with potential application in air quality and other research areas.

Research and Extension activities continued to identify strategies and cultural practices to deal with one of the most recent invasive species, the Kudzu bug, which has the potential to do serious damage to the soybean crop in South Carolina as well as a wide range of ornamentals.

Clemson researchers have identified rust-resistant soybean plants that can be used to develop resistant varieties with the potential to improve crop yields and nutritional value. These plants can also help reduce production costs by reducing the need for chemical pesticides. In 2011 South Carolina growers planted 370,000 acres of soybeans with a value of more than \$101 million.

Glyphosate-resistant Palmer amaranth, also known as pigweed, has emerged as one of the most severe threats to crop production in South Carolina. Research has shown that herbicide options will become more limited in cotton and soybeans. Clemson scientists are working with farmers to develop customized, aggressive soil herbicide programs that will cost growers about \$34/acre versus \$2,000/acre for hand-weeding, cultivation, and crop abandonment.

Peach rootstock trials have produced research-based information to guide South Carolina peach growers in selecting rootstock and cultivars for replanting old orchard sites to increase their productivity and profitability. Rootstocks that induce dwarfing are also being evaluated to determine which ones are best adapted for high-density orchard systems to facilitate mechanization and reduce labor costs. In 2011 South Carolina peaches generated more than \$75 million in cash receipts.

Researchers have developed environmental monitoring and data collection technologies that are providing real-time data on water quality and flow rate. Previous data were months or even years out of date and costly to collect from remote sites. The real-time data is critically needed to improve water resources management as demand increases for drinking water, hydroelectric power, recreation and industrial production. Coupled with GIS data layers, this technology also can be applied to management systems for agriculture, forestry and natural resources, potentially reducing costs and environmental impacts, and increasing profitability.

Anticipating grower demand for watermelon rootstocks that resist soil-borne diseases, Clemson researchers developed new methods for grafting watermelons. This reduced the per plant transplant grafting cost from more than \$1 to less than 80 cents, with potential for further savings. These cost reductions are critical to keep the state's producers competitive in U.S. and export markets. South Carolina watermelon production is valued at more than \$35 million per year.

Researchers have developed integrated gastrointestinal nematode control methods that decrease reliance on chemical dewormers. This has the potential to save South Carolina animal producers \$186,000 in deworming costs and gain \$465,000 in increased production for small ruminants. This industry contributes more than \$1.5 million per year to South Carolina's economy.

New test coatings have been developed that demonstrate the ability to protect marine ship hulls from fouling by oyster and barnacle larvae. The new coatings use a non-toxic, naturally occurring compound instead of the current chemicals that are highly toxic. This research has the potential to create a new technology industry in South Carolina and make a significant contribution to the environmental quality of the world's seaways.

South Carolina nursery and greenhouse growers are increasing their production capacity and profitability by using Clemson research-based guidelines for fertilizer concentration applied to stock plants. The new guidelines improve cutting production, quality, post-harvest performance, and rooting in plant propagation an industry that generates more than \$190 million in annual cash receipts for the state.

The quality of South Carolina's coastal environment is challenged by population growth and urbanization. Ongoing research on wetland forests provides long-term data on southeastern bald cypress-dominated swamps that will help land managers document existing forest conditions and monitor the effects of land-use change on coastal wetlands. Thoroughly understanding the extent to which natural coastal systems can respond to environmental and human changes and continue to provide essential services to society increases the likelihood that management efforts will be successful.

Palmer amaranth-pigweed- has become a super weed. In many areas it has developed a resistance to glyphosate, the key ingredient in Roundup and other herbicides that some bioengineered crop varieties can tolerate when sprayed. Clemson Experiment Station researchers are showing farmers alternatives to suppress pigweed. It can save growers millions of dollars. Scientists estimate that pigweed left uncontrolled would cause yield losses as much as \$1,000 per acre in cotton and \$350 an acre in soybeans. In total the impact would mean a \$427 million revenue loss for South Carolina. Cover crops such as cereal rye, purple-top turnips or crimson clover can knock out pigweed, depriving it of sunlight. Results showed cover crop mixtures reduced the incidence of Palmer amaranth up to 95 percent compared to standard practices. This strategy significantly reduced the amount of herbicide needed to control this weed and saved growers approximately \$75 per acre in herbicide costs and reduced environmental impacts from these chemicals.

Mosquitoes spread West Nile virus and equine encephalitis virus that can affect both livestock and humans. Research found that different mosquito species forage for hosts at different heights. This provides an important basis for monitoring and potentially preventing diseases spread by these pests. South Carolina animal agriculture generates more than \$1.5 billion a year in cash receipts.

The needle ant, *Pachyondyla chinensis*, is an invasive species whose venomous sting causes allergic reactions ranging from hives to anaphylactic shock. The species has invaded South Carolina and other southeastern states. Research discovered that the ants prefer protein as a food source, which will be useful to guide South Carolina citizens, agricultural producers and the \$500 million pest control industry in selecting bait products.

An environmentally sustainable water treatment system - called a constructed wetland - is providing an economically feasible alternative for the state's nursery and greenhouse industry to manage water quality. The new system developed by Clemson research produces measurably cleaner water with consistently lower levels of nitrogen, phosphorus, temperature and pathogens.

U.S. laboratory production of plant material - called micro-propagation - is under pressure from foreign competitors. Clemson researchers are developing a liquid-matrix system that protects the health of woody and herbaceous plants, and can provide nutrients that are critical to plant growth in nurseries and greenhouses. The new system will enhance global competitiveness for the micro-propagation industry in South Carolina.

The 1890 Research and Extension Program at South Carolina State University promotes an organized research and extension system that addresses quality of life opportunities for the citizens in South Carolina with a special emphasis on limited-resource communities. When referencing the term limited-resource, the 1890 Program focuses on minorities and social disadvantaged individuals who lack education, knowledge to resources, equipment or money to invest in various resources. The limited-resource farmer makes less than \$10,000 a year in farm income. Research and Extension provides effective stakeholder outreach programs and services in the area of extension, agriculture/ natural resources, family life, health and nutrition, youth development, community economic development, education and technology. 1890 Research and Extension values the integration of research, teaching and

public service. Although the mission of the 1890 Program has not changed over the last five years, the programmatic focus continues to evolve based on the needs identified by the citizens as the emerging issues impacting their communities.

Through the agricultural program, two statewide group meetings were held on land loss and land retention to include heir's property, probate court and estate planning. Training was held for small scale socially disadvantaged landowners and limited resource farmers on farm resource management and forest land management. Also, sessions were held on land ownership and responsibilities, land use options, public policy and legal issues as well as the restoration of longleaf pine forests.

In addition, farmers were taught direct marketing strategies for vegetable producers in the marketing environment. Vegetable producers and farmers market vendors engaged in hands-on activities to include proper display and presentation of vegetable crops and learned direct marketing risks and legal responsibilities. In vegetable gardening and production, new and updated techniques were taught and demonstrated in on-site plots.

Addressing the area of technology and the digital divide was the focus of the TechBridge Program. TechBridge is a unique technology based academic academy for selected rising seventh and eighth graders. Students spent five weeks building their skills in mathematics and reading comprehension through the use of technology. The participants were taught how to build a computer from the frame to a Computer Processing Unit (CPU). In addition, the students are required to load all of the academic software and were trained in CYBER-SAFETY and proper internet decorum. As a result of their participation, youth reported success in setting goals, appreciating cultural differences, gaining a better understanding of leadership, positive change in behavior, improved academic performance and an interest in STEM disciplines as a career. Young people became geospatial scientists for the day during the sixth annual 4-H National Youth Science Day (NYSD). The event, which took place in schools across the country and in 1890 Extension cluster area schools, served to also spark youth interest and leadership in STEM careers in an effort to keep America competitive in the fields. At the close of the academy, participants take their computer home.

Obesity is a serious health concern for both children and adults. Nutrition education programs, such as the Expanded Food and Nutrition Education Program (EFNEP), were implemented to help families understand the importance of consuming more fruits and vegetables, making healthy food choices and engaging in physical activity. Programs focused on helping individuals and families to understand that poor dietary choices and unhealthy life styles could lead to chronic diseases. Also, obesity contributes to an increase in health costs for the family and others, if they cannot afford healthcare. Participants in the various programs indicated that they were consuming more fruits and vegetables and preparing more healthy meals.

The Adult Leadership and Community Development Program provides communities with leadership training, financial management, business, job development, family and consumer education as well as a child development capacity to create opportunities for continuous and sustained growth. With a focus on resource building, education and training, leadership and organizational development, strategic and sustainability planning, The program assists socially disadvantaged and economically depressed communities build the potential to enhance their own resource development capacity from the inside out. Some of the activities offered were in technology education, which included Cyber Safety 101 and introduction to keyboarding ,community outreach, and homeownership, that incorporated a small business development workshop series and homeownership to include a rehabilitation and weatherization program.

The leadership of 1890 Research continues to promote the involvement of faculty in the Evans-Allen Projects. The funding of research grants to faculty members resulted in a cost savings to South Carolina

State University's educational and general budget of over \$200,000. Additionally, the involvement of faculty and students (graduate and undergraduate) increased the number of inter-disciplinary research projects and expanded internal and external collaborations and partnerships to build the land-grant capacity. Some areas of research addressed by faculty and students were campus/community health initiatives, community development and sustainable agriculture. Twenty-two undergraduate and graduate students presented their research projects at the National Professional Agriculture Workers Conference (PAWC) in Tuskegee, AL, of which seven won awards.

Within the past year, the 1890 Research and Extension Program and South Carolina State University experienced a change in leadership. The 1890 Research and Extension Program has a new acting vice-president and executive director of 1890 Programs, while the University gained its 11th President. The new leadership sought to increase rapport with South Carolinians by leveraging the relationships within the county cluster areas established with the communities they serve. The present administration wants the 1890 Program to continue to provide opportunities that prepare the state's youth as future leaders through 4-H and Youth Development Programs; make available educational workshops and programs that assist small farmers in increasing productivity and profit; teach families the importance of incorporating healthy lifestyle practices such as eating and preparing nutritious meals and engaging in physical activity; and help to ensure the economic vitality of South Carolina by working to improve the efficacy of new and existing small businesses.

Some highlights of the programmatic areas at South Carolina State University include the following: In the area of Adult Leadership and Community Development, small businesses and entrepreneurs were offered greater access to resources and funding opportunities by completing a small business workshop series and business plans about operating a successful small business. Twenty-five persons gained knowledge in development of better business matters and of that number, 15 of the business owners successfully completed the workshop series to receive small grants. A total of \$150,000 in grant funds were awarded to the 15 business owners in the amount of \$10,000 each. One owner was able to become a Limited Liability Corporation (LLC), increase staff, expand services as well as increase enrollment for afterschool and summer enrichment activities with the grant funds.

With the rehabilitation and weatherization project, low to moderate income Orangeburg County families were afforded safe, decent and sanitary housing. The focus of the project was to remove deficiencies or health and safety items, improve energy efficiency and extend the useful life of property. 1890 Research and Extension received grant funds from the U. S. Department of Housing and Urban Development to provide the activities. As a result, 8 of 16 homes were completed for the 2013 reporting period. A total of \$204,268 was awarded in grant funds to qualified low-to-moderate income owner-occupied homes with an average cost of \$30,000 per house. One grant recipient who lived in a house purchased in 1950, received a new heating and cooling system, metal roof, and insulated windows. Smoke detectors were installed and repairs to the exterior and interior were done.

At-risk-youth represent a high percentage of South Carolina's high school dropout rate and juvenile was violating behaviors. At-risk-youth lack basic life skills development opportunities that help enhance academic performance. Therefore, the SC State Extension Program coordinated a Citizenship Program, which focused on the development of citizenship, leadership skills, basic life skills, and character education. Twenty percent of the evaluated population indicated their intent to adopt citizenship and basic life skills principles as well as pursue post-secondary education and/or military or vocational training. One student stated that the program helped him become a leader by letting him know to always think about his actions and the consequences of what he does. He would remember to always do things to help others.

South Carolina has the 14th worst overweight or obesity rate in the nation. Three of every 5 South Carolina adults are either overweight or obese. Data indicates 25% of the population is physically inactive. Extension implemented an eight series program for youth and adults on eating healthy and being

active daily for 60 minutes. Eighty-five percent of the participants stated they learned a new health and wellness concept with 57% indicating they planned to use the information received. With follow visits, 40% of the participants polled stated they continued to use the information taught. There have been noticed changes in eating habits. More fruits and vegetables are being eaten. Youth are more active during recess and free periods.

Farmers in the South Carolina Low Country find vegetable production to be a profitable enterprise. Small, limited resource vegetable producers were organized in an Integrated Pest Management (IPM) Project. The project focused on small farm sustainability, updated production practices, soil fertility and pest management practices. Skilled trainings were provided. Fifty-nine small vegetable producers and gardeners received training, gained knowledge and increased skills in the application of sustainable agriculture practices. One hundred percent gained knowledge; 50% improved skills; 40% increased production and 25% reported increased income. As a result of the IPM Project, one farmer increased his vegetable operation as well as his customer base. Community residents now contract with the farmer to grow some specialty crops.

In research, the use of synthetic pheromones for mating disruption has proven to be effective for *L. serricornis* in stored-products' environments. Results showed significant reduction in the number of male beetles caught in traps. Commercializing mating disruption techniques would be ideal as the methods are environmentally benign, safer to non-target organisms and potentially a better alternative to fumigants that are harmful to humans and the environment. The outcome of the research will also help private industry to manufacture and market pest management techniques that could be adopted to control *L. serricornis* along the stored-products chain. Analysis of genetic variation and behavioral testing of specific fruit fly mutants indicate that over 200 genes may be involved in the control of female receptivity to mating. Additionally, one specific gene and one strong candidate genes were identified that affect the receptivity of female fruit flies to mating and may be involved in pheromone perception. Ultimately, the discovery of specific genes that control female receptivity opens the possibility of controlling pest populations through direct interference with mating behavior. Knowledge of the genes involved allows the structure of the protein to be predicted, and potentially the development of chemical inhibitors that would disrupt mating without the toxic effects of existing conventional pesticides.

A study of several South Carolina cities shows that community development has been disproportionate across the state, with little progress made in reducing disparities over a 30-year period. Municipal officials of the communities studied provided recommendations to enhance community development. For example, officials recommend that municipalities should work with the business community to improve education and the social capital of low income communities with the intent to attract new development. The data and analysis generated from the research have policy implications for state legislatures and can also assist 1890 Extension in its community development efforts.

Preliminary results of a study on Alzheimer's disease and other neurodegenerative disorders show promise in aiding the advancement of early detection methods and of decelerating progression of the diseases in the brain. The National Science Foundation and SC State's 1890 Research and Extension Program funded the three-year project, which focused on inhibiting protein aggregation in Alzheimer's and on developing sensors for the detection of unusual DNA structures associated with neurodegenerative diseases. The research outcomes have the potential to be among the arsenal of solutions used to fight Alzheimer's, the most common form of dementia.

A team of researchers conducted tests to evaluate radon levels in wells of families and businesses in the Midlands to Low Country regions. Testing specifically targeted communities along the Edisto River Basin, which span from the counties of Saluda to Charleston and Barnwell to Clarendon. The study found that groundwater in the Basin is generally low with respect to natural radioactivity. However, high radon concentrations were discovered in some areas including Pomaria, Lexington, Cordova, Branchville and an

isolated location in St. Matthews. Additionally, the researchers are the first to report higher radon concentrations in groundwater in Cordova than in surrounding areas. The service was funded through the 1890 Research Program as part of a study to investigate radioactivity levels of radioactive contaminants found in groundwater.

Research that examined South Carolina's Chapters 7 and 13 bankruptcy filings for low income persons before and after the passage of the 2005 Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA) recommends that the United States Congress should repeal or revise the law. According to the research, the law appears to be advantageous for financial corporations offering no respite for those who have a constitutional right to seek financial relief through the courts.

A research project is building infrastructure for a food safety laboratory designed to conduct investigations on the presence of food-born pathogens in poultry and meats and developing novel and cost-effective approaches to control bacterial contamination in poultry and meats, by using a number of antimicrobial treatments such as ozone, probiotics and their combinations.

Research investigating whether the type of resistance exercise a person uses to train will significantly attenuate complications with Type 2 diabetes. Through a systematic training protocol, it is expected that the subjects' overall health and wellbeing will improve. Successful results of the study could lead to reduced medical care costs and a decline in diabetes-related complication of patients. The study involves a novel approach to study strength curve and its relationship to parameters relating to range of motion and speed of contraction. By examining the slope of the fatigue curve rather than just the percentage decline, researchers hope to understand fatigue mechanisms with greater acuity and thus have the potential to develop better and more efficient muscular strength and endurance training systems.

The 1890 Extension Program made direct contact with approximately 17,975 people, during the reporting period, which was an increase of 1,060 persons from the previous year. Over 374 educational workshops were delivered throughout the state and approximately 1,387 youth were served on the Mobile Technology Center (MTC), before it was taken out of circulation for repairs.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	130.0	42.0	38.6	13.0
Actual	149.0	42.0	21.4	13.0

II. Merit Review Process

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

- Internal University Panel
- External Non-University Panel
- Expert Peer Review
- Other (Research Results Reviewed by selected growers and commodity groups and associations)

2. Brief Explanation

All Hatch and state funded research projects are reviewed by their respective department/school chairs and research faculty meeting with an internal review committee consisting of the Director of the Experiment Station, the Associate Dean for Research of the College of Agriculture, Forestry and Life Sciences and with research center directors, when appropriate, to review the proposed research. Emphasis is placed on collaboration with other faculty, on and off campus, the design of evaluation criteria and a clear definition of the outputs and outcomes anticipated for the research. Once projects are approved by the internal review committee, Hatch funded projects are sent out for peer review at other institutions.

To receive Evans-Allen funds, a faculty member interested in submitting a research proposal for an 1890 Research Grant must first prepare and submit a completed abstract/pre-proposal to the Office of 1890 Research by the established deadline during the fall semester of a given academic year. Each abstract/pre-proposal is reviewed by staff, to determine if the project falls with the scope and objectives of the 1890 Research Program. Abstract/pre-proposal are also peer reviewed by a select panel of South Carolina State University faculty and staff, including: a minimum of two reviewers from University faculty, two 1890 Research staff members, one 1890 Extension staff member and one Sponsored Programs staff member. The reviewers are selected from different disciplines in response to the nature of the proposals and the disciplines involved. Evaluation criteria for proposal abstracts are provided to the reviewers. Samples of the forms to be completed by each reviewer are also provided. Researchers whose abstracts/pre-proposals are approved via the initial peer review process are required to conduct a 15 minute presentation of their proposed research to the panel of reviewers. Upon completion of this step in the grant proposal development process, each researcher is contacted by 1890 Research staff with information concerning whether his/her abstract/pre-proposal has been approved for full proposal development.

A written proposal is needed to address all criteria as stipulated in the Grant Application Guidelines required for 1890 Research funded projects. A detailed listing of the required sections, as well as information pertaining to what needs to be addressed in each section is identified.

After submitting a completed proposal to the Office of 1890 Research for submission to USDA/NIFA, the proposal must be reviewed using the following procedure:

1. The proposal must be evaluated by a peer review panel consisting of University faculty as well as staff from both the Office of Sponsored Programs and the Office of 1890 Research.
2. Each reviewer must provide written appraisal and comments, which may be used in revising and improving the proposal. A copy of the forms to be completed by each reviewer is provided.
3. The principal investigator must respond to all substantive review comments and provide to the Research Administrator copies of the reviews and responses to all substantive recommendations for

revision. The principal investigator is responsible for incorporating suggestions made by all reviewers into the proposal, but must give reasons for any substantive suggestions not included or addressed. All final revisions to proposals must be submitted to the review panel for final recommendations for funds approval.

4. On a case-by-case basis, proposals may be evaluated by off-campus reviewers (i.e., land grant institutions 1890 or 1862), who will determine if an additional review and/or substantive revision is necessary.

5. The Research Administrator is responsible for reviewing any revisions of the proposal and for approving its transmission to USDA/NIFA.

Stakeholder input remains a key to successful Extension programs. Clemson and South Carolina State have a long history and tradition of seeking stakeholder input into the Plan of Work process. The process of seeking stakeholder input includes identifying stakeholders that should have input in the POW process and determining the process used in seeking stakeholder input. Meetings with commodity groups are particularly helpful in determining research priorities and needs for on-farm Extension support. Input from participants and graduates from programs available statewide, such as the Master Gardener Program is used to upgrade and enhance the quality of the program and identify new participants. The most recent process used in seeking stakeholder input included meetings that were held in all counties in the state to identify issues and set priorities for agricultural Research and Extension. Stakeholders were identified and invited to attend a meeting. Stakeholders included those internal to the Cooperative Extension System--administrators, extension agents, agent associations, specialists, faculty, department chairs, associate deans and faculty, as well as, those external to the system. External stakeholders are Extension advisory boards members, commodity group representatives, community leaders, human service providers, business/industry representatives and collaborators (Farm Bureau, Chamber of Commerce, Farm Service Agencies, etc).

In addition, the Research and Program Development Committee of the South Carolina State Extension Advisory Council reviews and comments on new programs initiated by Clemson University. The seven-member Research and Program Development Committee is one of the Council's three committees that review the list of programs and descriptions. The committee serves as the external non-university panel for program review. The committee members are knowledgeable of South Carolina's social and economic demographics and are sensitive to the needs of underserved and underrepresented populations. The entire Council gave input about programs. There are Extension volunteers, producers, a community center program coordinator, a public school educator and business owners. Programs are also reviewed by state Extension Program Team Leaders based on organizational capacity, relevance, and impact.

III. Stakeholder Input

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

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey specifically with non-traditional groups

Brief explanation.

Commodity groups, the SC Farm Bureau, the Department of Natural Resources and the State Department of Agriculture as well as individual growers and producers are in on-going dialogues to identify issues and make decisions on the use of available research resources.

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

1. Method to identify individuals and groups

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

Brief explanation.

Individuals who are involved in the Research and Extension Programs and/or receive services as well as persons who may have an interest or concern are identified and contacted.

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)
- Meeting specifically with non-traditional groups
- Survey specifically with non-traditional groups
- Meeting with invited selected individuals from the general public

Brief explanation.

County data is compiled from stakeholder meetings and the information is used to make recommendations and adjustments in program design and implementation. Evaluations, surveys and focus groups are used to collect input from stakeholders. The advisory meetings are attended by county advisory committee members and other key stakeholders. A Nominal Group Technique (NGT) was used to garner stakeholder input for the Plan of Work process. NGT is a process that allows a group of individuals to generate a large number of ideas in a relatively short period of time. NGT is helpful in identifying problems, exploring solutions and establishing priorities.

3. A statement of how the input will be considered

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

Brief explanation.

Specific requests for information on production practices to include pest management, variety selections and fertilizer selections and applications were incorporated, when possible, into ongoing research activities. In other cases, stakeholders were referred to faculty with specific expertise at other land grants, primarily in the South East.

State Program Leaders identify the major programs for the new federal Plan of Work using the identified list of issues. The programs are defined using the logic model. The State Plan of Work, which includes specific initiatives and projects, is developed based on the identified programs. The process is used to identify emerging issues and to redirect Extension programs. Programs are developed, expanded or eliminated based on their quality and/or effectiveness. In addition, the priorities identified are considered when hiring staff and when establishing action plans. Through these and other efforts, the Clemson Extension Service and the 1890 system are kept current on stakeholder programs and services that have the potential to affect public policy, social, economic value and efficiency, environmental quality and individual well-being.

Brief Explanation of what you learned from your Stakeholders

A summary of meetings with stakeholders revealed that they want more programming in the areas of crop, livestock and forestry management. Strong emphasis was placed on the use of precision agriculture applications in row crops and equal discussion and recommendations on locally grown vegetable production within South Carolina. Challenges of certification programs were discussed as related to vegetable production (GAP certification). Many of the groups also expressed a strong commitment to seeing the 4-H programs in South Carolina rebuilt after such catastrophic budget cuts over the past several years. Stakeholders commented that they very much appreciated

Clemson University listening to their concerns.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
5316334	1675740	3893967	2074306

2. Totalled Actual dollars from Planned Programs Inputs				
Extension			Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	5350511	1675740	2686311	2074306
Actual Matching	5350511	1386385	5260824	1627495
Actual All Other	0	0	0	0
Total Actual Expended	10701022	3062125	7947135	3701801

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	0	0	1207656	0

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Sustainable Animal Production Systems
2	Sustainable Agriculture Production for (non-food) Horticultural Crops
3	Water Quality and Water Quantity
4	Food Safety and Nutrition
5	Community, Leadership, and Economic Development
6	4-H Youth Development and Families
7	Environmental Conservation for Wildlife
8	Sustainable Forest Management
9	Childhood Obesity
10	Climate Change
11	Sustainable Energy
12	Global Food Security and Hunger

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Sustainable Animal Production Systems

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	10%	20%	15%	15%
302	Nutrient Utilization in Animals	10%	20%	0%	15%
303	Genetic Improvement of Animals	0%	10%	25%	10%
307	Animal Management Systems	35%	25%	25%	20%
308	Improved Animal Products (Before Harvest)	0%	10%	30%	15%
311	Animal Diseases	25%	0%	0%	10%
315	Animal Welfare/Well-Being and Protection	15%	15%	5%	10%
601	Economics of Agricultural Production and Farm Management	5%	0%	0%	5%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	7.5	3.7	1.0
Actual Paid Professional	11.0	8.0	2.8	1.0
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
530304	301275	176242	254394
1862 Matching	1890 Matching	1862 Matching	1890 Matching
530304	249254	942947	199594
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

Research was conducted in a wide range of areas related to animal health to include insects of veterinary importance, causes of neonatal death in cattle, and animal genomic topics. There was a range of research on enhancing the competitiveness and value of US beef and the number of potential forages available received increased attention and were assessed as to their impact of producing a healthy and profitable product. Research was also underway on the thermal destruction of pathogenic bacteria in rendered animal products.

Extension planned, coordinated, and implemented animal production systems programs, seminars and trainings. The Master Cattleman educational series continues. In this fee-based program multiple topics are covered over a five-week period for area producers. Beef Quality Assurance certification is offered as an optional program at this Master Cattleman series. The Grass Masters program is a multi-night fee-based seminar series covering the basics of forage selection, establishment, and management. Small ruminant workshops were conducted, including Goat Management. Specialists taught National Guardsmen training on Small Ruminants health and bio-security - SC National Guard members were prepared to work with sheep and goats and other agricultural commodities for one year in Afghanistan, including proper bio-security when returning to the United States.

Extension specialists continue to work with producers in developing cost management strategies for rations, budgets and other input costs. Multiple on farm demonstrations are in place to demonstrate controlled grazing, improved forage varieties, novel legumes, etc. Livestock agents and specialists also assist with youth programs by teaching livestock management and managing youth livestock activities when needed. Veterinarians and livestock producers became aware of the new Federal Traceability Rule in SC and its impact on official identification and interstate movement of livestock and poultry.

Confined Animal Manure Management trainings/re-certifications were conducted across the state. Producers attended the re-certification trainings, each obtaining 2 hours of credit for this year. Sessions on Bio-security and Vaccines were conducted to promote awareness to the local equine industry on current and emerging disease issues that have a direct impact on the management of their horses' health.

The Clemson Bull test was conducted. The Clemson test received funding for a new Grow Safe feed monitoring system which allows the measurement of feed efficiency in the testing program. The Clemson test will remain a conventional grain/byproduct based feedlot test in coming years. Extension conducted Feeder Cattle Sale. Producers gained knowledge of beef cattle good management practices which improved production efficiency with higher weaning rate and weights.

Emergency Managers meetings for Animal Emergencies were conducted to instruct a group of veterinary professionals about how they could join groups of pre-designated responders who could assist South Carolina citizens in emergency situation to help lessen the negative effects of disasters in our state.

Extension planned, coordinated, and implemented additional seminars and trainings on Small Farms Workshop, Equine Management, Grazing Management, Alternative Forages Program, Mastitis Management, and Beekeeping.

One 1890 research project's goal was to design and implement a computer-based epidemiological simulation model that combines the traditional herd-based epidemiological methods with the role of a multi-agent framework. The proposed simulation model is capable of representing the behavior of individual animals, in addition to the benefits of stochastic herd-based simulation. It provides accurate and flexible simulation results to assist those who must provide early responses for emergency outbreaks. Designed and implemented the Bridge Module, including extension of the stochastic model, Graphical User Interface (GUI) Module for simulation and a part of the Multi-agent framework using MASON and message-exchange module in Java computer language were used. Deployed a map agent with the study of the "World Wind" package for the system to be capable of displaying the status of agents, as well as results of simulations on a map graphically. As an extension of the research, a grant application was submitted to the National Science Foundation.

2. Brief description of the target audience

Producers, Spanish-speaking employees, Limited-Resource Farmers and agency personnel, etc.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	10937	3414	8	13

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	2	15	17

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Disclosures

Year	Actual
2013	0

Output #2

Output Measure

- Licenses

Year	Actual
2013	0

Output #3

Output Measure

- Number of people completing educational workshops.

Year	Actual
2013	5932

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of publications authored or co-authored (fact sheets, papers presented at Extension meetings, etc.)
2	Number of persons gaining knowledge as a result of the USDA Animal Disease Traceability Program (ADTP).
3	Number of people reporting increased knowledge and indicating adoption of animal production practices.
4	Increased income due to producers and growers improved production efficiency of confined animal systems.

Outcome #1

1. Outcome Measures

Number of publications authored or co-authored (fact sheets, papers presented at Extension meetings, etc.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	14

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Sustainable Animal Production Systems program aims to improve the production efficiency, environmental sensitivity, and profitability of animal production systems and reduce the environmental impact of animal waste in South Carolina.

What has been done

One 307 page manuscript was submitted to USDANRCS for publication as part of their Environmental Engineering Series. Articles were submitted for publication in the Applied Engineering in Agriculture. Eleven papers were presented during sessions at the National Extension Conference Waste to Worth Spreading Science & Solutions. Publications were made available on-line.

Results

Paper presentations expand the knowledge base in animal production efficiency and environmental sensitivity. Papers presented covered topics such as Solid Liquid Separation Alternatives for Manure Handling and Treatment, Using Broiler Litter as an Energy Source Energy Content and Ash Composition, Feasibility Analysis of Using Anaerobic Digestion to Replace Fuel Used in Fleet Truck, Combustion of Poultry Litter A Comparison of Using Litter for On-Farm Space Heating Versus Generation of Electricity, Benefits of Using Liquid Solid Separation with Manure Treatment Lagoons, Production of Fuel Crops to Make Biodiesel Using Animal Manure, Overview of SolidLiquid Separation Alternatives for Manure Handling and Treatment, Efficient Utilization of Equine Manure, South Carolinas Confined Animal Manure Manager Program, Combustion of Poultry Litter A Comparison of Using Litter for OnFarm Space Heating Versus Generation of Electricity, Benefits of Using LiquidSolid Separation with Manure Treatment Lagoons,Production of Fuel Crops to Make Biodiesel Using Animal Manure,Overview of SolidLiquid Separation Alternatives for Manure Handling and Treatment, Efficient Utilization of Equine Manure.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
307	Animal Management Systems

Outcome #2

1. Outcome Measures

Number of persons gaining knowledge as a result of the USDA Animal Disease Traceability Program (ADTP).

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	30

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Small scale livestock producers in the Greenwood Cluster were interested in the rules and guidelines of the USDA Animal Disease Traceability Program (ADTP) to improve the traceability of diseases throughout the livestock industry. Livestock producers must be made aware of the guidelines, rules and recordkeeping requirements of the program, in order to remain in compliance with the law when marketing their animals.

What has been done

A workshop was held to make livestock producers aware of the benefits of the Animal Disease Traceability Program (ADTP), classes of livestock affected, guidelines and recordkeeping requirements. A chart was provided to assist livestock producers in complying with the rules process.

Results

As a result of attending the workshop, producers who had premises ID for their operation were eligible to obtain free brite tags from the USDA Animal and Plant Health Inspection Service (APHIS) to identify their animals. The brite tags satisfied the requirements of the Animal Disease Traceability Program's identification requirements. One hundred percent (100%) of the producers who did not have premises ID were issued an application to obtain one, so they would be eligible to receive free brite tags.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

Outcome #3

1. Outcome Measures

Number of people reporting increased knowledge and indicating adoption of animal production practices.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1211

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Labor management and worker training have been identified as areas of concern among many dairymen and represent an opportunity for improved performance, workforce stability and retention. Language barriers and inconsistent levels of experience make continuous training essentials; however communicating with Spanish speaking employees can be a challenge for English speaking dairymen. With this in mind, Clemson Extension developed programs that would increase the efficiency of the dairy labor force through bilingual training.

What has been done

Ten herds with 35 total employees participated in the on-farm training sessions.

Results

Six of the farms have reported a decrease in somatic cell counts with four farms now receiving quality milk premiums resulting in an increase of over \$90,000 per year on those farms. Overall, of those participating in Extension animal educational programs, 91% reported knowledge gain and 22% reported adopting a practice.

4. Associated Knowledge Areas

KA Code **Knowledge Area**
307 Animal Management Systems

Outcome #4

1. Outcome Measures

Increased income due to producers and growers improved production efficiency of confined animal systems.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	50285

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Extension program aims to improve the production efficiency, environmental sensitivity, and profitability of animal production systems and reduce the environmental impact of animal waste in South Carolina. Cattle producers in South Carolina are frequently seeking methods to enhance profitability of their cattle operations. One method is to market cattle in uniform truckload lots of properly vaccinated, preconditioned cattle. Calves marketed using this method sell at higher prices compared to calves sold through traditional marketing venues.

What has been done

The area Extension livestock agent coordinated an area feeder calf sale of preconditioned truckload lots. Thirteen producers marketed 776 calves in truckload lots. Of the 776 calves sold, 540 were sold directly off farm and 236 were sold in commingled truckloads comprised of cattle from small farmers. Cattlemen selling on the commingled loads averaged 21 head per farmer, allowing small producers the opportunity to maximize profitability by selling in truckload lots.

Results

This year source and age verified truckload lots sold for \$0.09 per pound more than traditional weekly livestock auctions resulting in \$50,285 in additional income for area cattle farms (\$3,868 per farm).

4. Associated Knowledge Areas

KA Code **Knowledge Area**
302 Nutrient Utilization in Animals

307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

For Extension, language barriers and inconsistent levels of experience resulted in the realization that continuous training was needed.

All livestock producers had to implement the APHIS ID tag, in order to sell their livestock. It was an agriculture policy change initiated by USDA. The 30 livestock producers represented one cooperative, which was the first group to participate in the program. Eventually, other cooperatives of small livestock producers will be educated and included in the program.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Producers and growers improved production efficiency of confined animal systems and adopted animal management practices.

The evaluation results were that livestock producers were able to receive their USDA Animal and Plant Health Inspection Service (APHIS) tags for their animals.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Sustainable Agriculture Production for (non-food) Horticultural Crops

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
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	15%	0%
202	Plant Genetic Resources	0%	0%	10%	0%
204	Plant Product Quality and Utility (Preharvest)	20%	0%	5%	0%
205	Plant Management Systems	20%	0%	10%	0%
211	Insects, Mites, and Other Arthropods Affecting Plants	15%	0%	20%	0%
212	Pathogens and Nematodes Affecting Plants	10%	0%	10%	0%
215	Biological Control of Pests Affecting Plants	15%	0%	5%	0%
216	Integrated Pest Management Systems	20%	0%	15%	0%
601	Economics of Agricultural Production and Farm Management	0%	0%	10%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	20.0	0.0	5.0	0.0
Actual Paid Professional	17.0	0.0	4.8	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
572948	0	942934	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
572948	0	1698556	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

Some 184 new Master Gardeners were trained by Extension agents. These Master Gardeners provided 34,998 hours of volunteer horticulture services to communities, which represents a \$601,965 value of program support. Agents taught Environmental Horticulture Education for Horticulture Professionals and Consumer Education in Environmental Horticulture. Field trials were conducted and demonstrated.

Evaluation reports were provided to growers with comprehensive and updated information on performance so that they can make informed decisions. Activities that foster sustainable agriculture practices and policies were promoted and encouraged.

Research experiments were conducted in the use of sensor technology to manage pests and fertilize and water a variety of non-food field crops.

There was extensive research on turf grass related issues, to include work on the ecology and integrated management of arthropod pests, some of which was applicable to ornamental crops. Work continued to identify novel microRNAs and their target genes involved in plant response to abiotic stress in turfgrass.

Since the putting green is such a critical element of profitable golf courses, research into improved disease management specifically for greens was useful for course operators in the Southeast.

Production practices of producers of all sizes benefited from research results passed along by the Cooperative Extension Service.

Clemson's arthropod collection was expanded and continues to serve as a public reference source for South Carolina and world wide scientific research.

South Carolina's nursery industry benefited by new processes which optimize water use during propagation of unrooted cuttings. And work continued on the remediation of phytopathogens from irrigatio water.

Research continued in the etiology and managemen of phytophthera diseases on ornamental plants and trees in the Southeast.

Cotton farmers in the state benefited from research into agronomic practices and management

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 systems for optimum productivity and profitability.

The research support for non food agricultural crops was provided by 4.8 faculty FTE's.

2. Brief description of the target audience

The audience will include producers, small farmers and Extension personnel, horticulture professionals, residents in counties with Master Gardener programs, Master Gardeners, and consumers.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	24078	1161122	0	0

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

Patent Applications Submitted

Year: 2013
 Actual: 1

Patents listed

An integrated dual site specific recombination system for use in developing environmentally safe and clean transgenic turfgrass

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	2	35	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Disclosures

Year	Actual
2013	1

Output #2

Output Measure

- Licenses

Year	Actual
2013	0

Output #3

Output Measure

- Number of people completing horticultural educational workshops

Year	Actual
2013	10384

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of Master Gardeners reporting activities and programs
2	Number of participants gaining knowledge
3	Number of people gaining knowledge in environmental horticulture education.

Outcome #1

1. Outcome Measures

Number of Master Gardeners reporting activities and programs

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	184

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Horticultural Program at Clemson University seeks to inform horticulture professionals, master gardeners, and consumers on environmentally sound horticultural practices that will improve communities.

What has been done

Master Gardeners (MG) received certification and contributed service in their communities. MGs sponsored a Listen and Learn series at a local farmers market, conducted a weekly plant clinic, implemented a gardening series at a local library, conducted growing tomatoes classes, and conducted a plant and animal survey of a Beaufort County property and identified over 80 genera of plants and animals. We continue the Rent-A-Master Gardener program. Master gardeners serve on public, civic, and non-profit boards and committees for community beautification for tree protection and historical preservation.

Results

Master Gardeners reported adopting sound horticultural practices and they are improving their communities through beautification projects and community service. Some 34,998 hours of volunteer service was contributed, which represents a value of \$601,965 in program support.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Number of participants gaining knowledge

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of people gaining knowledge in environmental horticulture education.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	9755

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Horticultural Program at Clemson University seeks to inform horticulture professionals, master gardeners, and consumers on environmentally sound horticultural practices that will improve communities.

What has been done

Extension conducted 423 workshops reaching 10,384 persons. In addition to the Master Gardener programs delivered, agents taught Environmental Horticulture Education for Horticulture Professionals and Consumer Education in Environmental Horticulture. Agents taught Carolina Yards and Neighborhoods classes on composting, recycling, protecting the waterfront, and attracting wildlife and pest management. Other programs covered topics such as native plants for the landscape, weed control in the landscape, seed germination, seedling growth and care, building soils, nutrient recycling and immobilization, rain garden plants for the Hallogreening, planting spring bulbs, insects, and wildlife concerns. They presented programs for joint meetings of various representatives from county churches on trees and their importance in human life and the environment. Agents delivered programs on vegetable gardening for emergency preparedness fair, conducted the ornamental plant school and the Professional Turf School. Presentations pertaining to the IPM book and smartphone apps for the green industry were

conducted.

Agents taught students and faculty at technology centers on gardening for wildlife and after-school programs on soil, how it is formed, what it is comprised of and how to take soil samples. Third grade students were taught how to take a soil sample. Then all helped take soil samples for each of the raised beds in their school garden.

They assisted landscapers, commercial and municipal landscapers with recommendations for citrus leaf miner, tree borers, turf and horticultural problems, carbaryl toxicity on St. Augustine, soil pH, and water sample results.

A Website (<http://wiki.bugwood.org/SNIPM>) was updated to incorporate PDF copies of 13 chapters in the book IPM for Select Deciduous Trees in Southeastern US Nursery Production. Some 496 media activities were conducted.

Results

Some 94% of the people participating in programs reported that they gained knowledge. Over 38% reported using practices learned. Registration fees were charged for the Turf School to cover costs and three SC pesticide recertification credits were offered.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Participants in Extension (non-food) Horticultural Crop programs are applying knowledge gained to protect waterfronts, attract wildlife and for pest management to improve their communities. Master gardeners are applying knowledge gained from Extension programs to help beautify the communities of South Carolina.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Water Quality and Water Quantity

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
111	Conservation and Efficient Use of Water	30%	0%	10%	30%
112	Watershed Protection and Management	30%	0%	50%	20%
131	Alternative Uses of Land	5%	0%	0%	20%
133	Pollution Prevention and Mitigation	30%	0%	40%	20%
134	Outdoor Recreation	5%	0%	0%	10%
	Total	100%	0%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	8.0	1.0	4.4	1.0
Actual Paid Professional	9.0	0.0	3.2	1.0
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
312362	0	295146	187344
1862 Matching	1890 Matching	1862 Matching	1890 Matching
312362	0	334039	146990
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

Over 435 water quality and quantity and water resource educational programs were conducted by Extension reaching over 9,035 people such as students, from elementary to college, USDA Forest Service staff, governing boards for local municipalities and community organizations. Faculty collected water samples from burned sites for analysis for the USDA Forest Service Forested Wetland Center and discussed the impacts of forest fire on water quality. They conducted a study for the National Park Service about the impacts of microplastics on the health of wildlife and environmental qualities. A design was produced for a rock weir in a drainage ditch for the Horry County Storm water Management Program. Fifteen water quality and/or quantity best management practices were installed as demonstrations and over 2,300 pounds of trash were removed from regional waterways. In an effort to help better protect South Carolina's natural resources, Clemson University's Home and Garden Information Center has launched a fact sheet series called H2Ownership that provides solutions to today's water resource challenges. The series is available as a free download from the website. Agents educated the public on how their land-use practices impact the quality and quantity of water in streams. Agents and specialists developed and delivered educational programming on stream restoration and water quality protection; trained county volunteers to deliver water quality programming; designed, demonstrated and promoted the installation of riparian buffers and other environmentally appropriate plantings to protect water quality; and promoted environmentally sound natural resource recreation and tourism opportunities in South Carolina.

Field research focused on toxicity of metals and pesticides and on TMDL watershed modeling. Researchers establish an environmental radiochemistry lab, conducted a literature investigation on groundwater radionuclides in the Edisto River Basin, collected about 60 groundwater samples and conducted analyses.

We continue to conduct research and expand applications for the Intelligent River remote sensing technology in the Savannah river and in adjoining watersheds. Mercury in water was studied, bacterial and sediment impacts were evaluated associated with recreational trails on water quality of stream ecosystems, and the impact of urbanization on flow and sediment regimes in coastal watersheds.

An 1890 research project has characterized, remediated, managed and monitored the Edisto River mercury contaminated water and sediments in place and assessed the processes that govern ecological and human health risks. We established an Environmental Research and Teaching Lab in the Science and Engineering Complex. Researchers continued to review literature and collect existing field measurement data and site characterization information. Researchers searched and tested existing numerical modeling codes with different computer language for future modification and development.

2. Brief description of the target audience

The target audience includes landowners, Extension agents, and administrators, natural resource professionals, land management agency personnel and user groups, nature-based tourism operators/industry, South Carolina citizens, tourists, children in school, after-school, summer and 4-H programs, agents and volunteers, urban, suburban and rural residents, farmers, ranchers, poultry and swine producers, foresters urban agents, agency personnel, urban planners and land owners/managers, municipal officials, and local community groups statewide, managers, government officials and recreation and tourism operators.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	12435	752755	0	0

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

Patent Applications Submitted

Year: 2013
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	22	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Disclosures

Year	Actual
2013	0

Output #2

Output Measure

- Licenses

Year	Actual
2013	0

Output #3

Output Measure

- Number of people completing educational workshops

Year	Actual
2013	9039

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of people gaining knowledge.
2	Number of people using practices learned.
3	Number of people gaining knowledge and using practices to improve water quality and quantity.

Outcome #1

1. Outcome Measures

Number of people gaining knowledge.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of people using practices learned.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of people gaining knowledge and using practices to improve water quality and quantity.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	9039

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Water resources are vital to communities in South Carolina, especially in tourist regions. While water resources seem to be abundant in these regions of the state, many of the rivers and beaches are suffering from impaired water quality largely from non-point pollution from urban runoff. This program will promote the use of Best Management Practices for water quality and quantity.

What has been done

Some 435 programs were conducted reaching 9,035 people. Water quality and/or quantity best management practices (including rain gardens, rain barrels, storm drain marking) were taught

and/or installed as demonstrations. Certified Erosion Prevention and Sediment Control Inspector courses were conducted to educate field personnel on the proper installation, maintenance, and inspection of erosion prevention and sediment control measures at construction sites. These courses generated over \$40,765 in externally derived revenue, which was used to pay graduate student stipends, travel, equipment, and supplies. Over 5,000 people have successfully completed the certification examination.

The South Carolina Water Resources Conference, which is coordinated by the Clemson University Center for Watershed Excellence (www.clemson.edu/watershedcenter) in conjunction with a statewide planning committee, included state level stakeholders and legislators. The conference provided an integrated forum for discussion of water policies, research projects and water management in order to prepare for and meet the growing challenge of providing water resources to sustain and grow South Carolinas economy, while preserving our natural resources. Waste Water Treatment (Septic) System Training was conducted to reduce the incidence of septic system failure by increasing homeowner knowledge about how to properly use and maintain their onsite wastewater treatment system.

The Clemson University Home and Garden Information Center has launched a fact sheet series called H2Ownership that provides solutions to water resource challenges. The series is available as a free download from the website: <http://www.clemson.edu/public/carolinaclear/>

Results

Of those persons completing programs, 8,766 (97%) gained knowledge. The municipal attendees indicated that the information they acquired will be used in amendments to regulations, practices, and zoning ordinances. Over 2,300 pounds of trash were removed from regional waterways.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
134	Outdoor Recreation

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Federal permit regulations administered by the state, require that all inspectors

participate in a recertification course before their initial certification expires. CEPSCI recertification required the development of a new curriculum, which took into account changes to the regulations, along with updates to structural best management practices, strategies for effectively completing inspection forms, and understanding emerging topics that will potentially affect permit compliance in the future.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Course evaluations have indicated an overwhelmingly positive response to curriculum modifications.

Evaluation results of the Onsite Waste Water Treatment (Septic) System Training, photos and full agenda can be supplied upon request: <httpwww.clemson.eduwateshedcenterseptictraining.html>.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Food Safety and Nutrition

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
503	Quality Maintenance in Storing and Marketing Food Products	5%	20%	0%	5%
703	Nutrition Education and Behavior	30%	30%	0%	35%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	30%	20%	70%	20%
723	Hazards to Human Health and Safety	30%	10%	30%	20%
724	Healthy Lifestyle	5%	20%	0%	20%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	8.0	3.0	2.7	2.0
Actual Paid Professional	27.0	3.5	1.2	2.0
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
734655	156314	164449	345805
1862 Matching	1890 Matching	1862 Matching	1890 Matching
734655	129323	315064	271318
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

Safe handling of food was taught to handlers in the food service industry and the general public. Commercial food processors were targeted in an effort to improve commercial food processing efficiencies and effectiveness/develop new markets/improve commercial handling, processing, preservation and packaging to provide safe and high quality foods. Attention was given to providing consumers with scientifically based, reasonable nutrition and food safety information via the media. Food-borne illnesses were defined and conditions discussed that encourage bacteria growth. Agents and specialists covered topics such as common food-borne pathogens, additives, preservatives and basic kitchen safety techniques were taught.

Participants increased knowledge and skills in safe handling of food. Managers and supervisors were certified to train food handlers in safe food handling techniques. Food handlers practiced safe food handling techniques. Specialists assisted in the development of new food businesses. Regulatory compliance was promoted.

A Perinatal Awareness for Successful Outcomes (PASOs) Program was conducted and covered the topics of eating smart being healthy during pregnancy, feeding your new baby, and feeding your baby solid foods. Community-based research continues to reach Hispanic audiences. Specialist continue to improve educational materials, "Celebrando la Salud," for Hispanic populations in the Upstate region of South Carolina. Research was conducted on nanotechnology applications for food safety and quality. There were special efforts to develop strategies and processes that can reduce the presence and risk of pathogenic bacteria on foods. Food safety though enhanced packaging technologies was another research focus. Research is proceeding on the DNA of a bacterium widely used as starters in yogurt and cheese. By understanding its genetic characteristics of this bacterium, scientists can improve the commercial usefulness, such as fermentation rate, flavor and sweetness.

1890 Research is continuing to investigate the effects of ozone and probiotics on inhibiting food-borne pathogens associated with poultry and meats. Poultry and beef samples were purchased bi-weekly for experimentation. Experiments were performed testing the effects of lactic acid (a byproduct of probiotics) on the growth of *E. coli*. Competitive growth experiments were performed using *E. coli* and *Streptococcus thermophilis*. The media provided would not support the growth of *S. thermophilis*. A new media was ordered, which will support the growth of both organisms. Results indicated that lactic acid exhibited bacteriocidal properties at 16% concentration on *E. coli*. Therefore, studies are planned to use lactic acid on *E. coli* found in beef and salmonella/campylobacter found in poultry to see if similar results will be generated. The Food Safety Laboratory was established. Students were trained on how to successfully use equipment and supplies.

Also, research is conducted to investigate the effects of two different resistance exercise regimens on the diabetic profile of a Type 2 diabetes mellitus patient. The research used innovative signal processing techniques to study kinetic patterns of muscular fatigue. The training portion of the research was successful. A preliminary analysis of data was completed. Subjects in the band exercise group reported, after a couple of months of training, one person improved his strength, balance and stability so much he packed away his walking cane. Another subject reported her leg cramps disappeared after a few weeks of training. A subject in the isokinetic training group reported improved strength and flexibility that allowed her to perform simple tasks such as tying shoelaces and using a dust pan, while sweeping floors for the first time in years. Other subjects in the isokinetic group also reported improved functioning and balance in everyday tasks.

2. Brief description of the target audience

The target audience includes community leaders, agencies, policy makers, general public, EFNEP - limited resource families, food service managers, supervisors, food handlers, producers, commercial food handlers, processing and packaging industry, entrepreneurs seeking to start food businesses or improve existing food business, media and other marketing contacts, and publication outlets - doctors' offices and grocers.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	13765	100	716	500

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

Patent Applications Submitted

Year: 2013

Actual: 1

Patents listed

Oxygen scavengers comprising a free radical and a transition metal.
Carolina Canning

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	1	8	9

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Licenses

Year Actual

2013 0

Output #2

Output Measure

- Disclosures

Year	Actual
2013	0

Output #3

Output Measure

- Number of people completing educational workshops.

Year	Actual
2013	10490

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of participants reporting increased knowledge in safe food handling and nutrition.
2	Number of managers/supervisors/food handlers completing educational program and receiving a course certificate
3	Number of participants reached with food safety information by volunteers who participated in an Extension training program
4	Number of new or improved food products entering the market as a result of adopting recommended practices
5	Number of people reached through media outlets that utilize Extension food safety, food biotechnology and nutrition resources

Outcome #1

1. Outcome Measures

Number of participants reporting increased knowledge in safe food handling and nutrition.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1398

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The program promotes healthy lifestyles and improves the quality and safety of food for the citizens of South Carolina.

What has been done

Food Safety agents conducted educational programs for the general public reaching 1,420 adults. Carolina Canning is an example of an educational program that equips consumers with science-based knowledge to produce safe, high quality canned, dried, or frozen foods. Extension staff members have recruited experienced home canners as volunteer Canning Coaches and have developed training materials to update their knowledge so they can provide or assist with home food preservation programs. Volunteers from over 23 counties have been trained as Canning Coaches. A 4-lesson canning curriculum is tailored to South Carolinas specialty crops (but broadly applicable to other foods) has been produced. Workshops have been marketed by multiple means including a new Facebook page. Food Safety & Nutrition agents have delivered hands-on canning workshops to audiences that included members of the general public, youth and limited resource individuals.

Agents conducted 251 food safety programs for the general audience. Over 40 canning coaches and other volunteers were trained and delivered programs or information. Over 271 media programs were delivered covering topics of Food Safety, Nutrition, and Health. Agents distributed information via newspaper articles, websites, other external publications, and on Facebook, radio and television. In addition, specialists are collaborating with NC State University to prepare a food safety manual in Spanish to target Spanish-speaking food processors.

Results

Of the adults participating in the educational programs, 98% reported a gain in knowledge. Over

77% reported using practices learned. Food Safety and Carolina Canning web activity:
<http://www.facebook.com/carolinacanning>
<http://www.facebook.com/#!/pages/Food-Safety-Nutrition-and-Health->
http://www.clemson.edu/extension/food_nutrition/canning/index.html

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
723	Hazards to Human Health and Safety
724	Healthy Lifestyle

Outcome #2

1. Outcome Measures

Number of managers/supervisors/food handlers completing educational program and receiving a course certificate

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	125

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Centers for Disease Control reports that there are five situations which cause most of the outbreaks of foodborne illness. Those situations are poor personal hygiene, improper holding temperatures, purchasing food from unsafe sources, failing to cook food adequately, and using contaminated equipment. In South Carolina, foodborne illness outbreaks from restaurant facilities numbered approximately 100 in both 2009 and 2010, according to data collected by the South Carolina Department of Health and Environmental Control. The CDC estimates for the whole nation that 5200 deaths from foodborne illness occur annually.

What has been done

In an effort to reduce food-borne illness, agents conducted ServSafe® food safety training for managers, supervisors, and other food handlers.

Results

A total of 125 food service employees received a course completion certificate, representing 110 food establishments. These food handlers can potentially affect thousands of people. The National Restaurant Association has estimated that the average cost of a food-borne illness outbreak to an establishment is about \$75,000. The approximate economic value of the training sessions could be as high as \$8,250,000 by preventing outbreaks.

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
703	Nutrition Education and Behavior
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
723	Hazards to Human Health and Safety

Outcome #3

1. Outcome Measures

Number of participants reached with food safety information by volunteers who participated in an Extension training program

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Number of new or improved food products entering the market as a result of adopting recommended practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	43

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Food entrepreneurs need knowledge on marketing and selling safe, high quality food. Their product must be in compliance with all local, state, and federal regulations. The Food Safety program promotes healthy lifestyles and improves the quality and safety of food for the citizens of South Carolina.

What has been done

Over 68 contacts were made with food entrepreneurs, representing 13 food companies. Quality testing was conducted for 14 products. Specialists have assisted food processors regarding food laws, delivered a national commercial food canning workshop for Abbott pharmaceutical in Arizona, a Food Plant Sanitation workshop in Spanish in Mexico, a HACCP program for a local company, a commercial food canning workshop, and a probiotics session for health care professionals. A food safety workshop was delivered in Spanish targeting Hispanic businesses. One specialist is collaborating with NC State University preparing a manual in Spanish targeting Spanish speaking food processors.

Results

Some 43 new or improved food products entered the market as a result of adopting Extension recommendations.

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
723	Hazards to Human Health and Safety
724	Healthy Lifestyle

Outcome #5

1. Outcome Measures

Number of people reached through media outlets that utilize Extension food safety, food biotechnology and nutrition resources

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Based on questionnaires and evaluations, participants' preservation of local fruits and vegetables have increased and they now have the knowledge to preserve South Carolina food products safely. Food handlers and managers have made changes in their practices when serving the public.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Community, Leadership, and Economic Development

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
608	Community Resource Planning and Development	15%	25%	40%	20%
609	Economic Theory and Methods	10%	10%	0%	10%
610	Domestic Policy Analysis	15%	10%	0%	20%
801	Individual and Family Resource Management	15%	20%	0%	10%
802	Human Development and Family Well-Being	15%	10%	0%	15%
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	15%	15%	60%	20%
806	Youth Development	15%	10%	0%	5%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	11.0	5.0	3.0	2.0
Actual Paid Professional	12.0	7.0	2.5	3.0
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
409183	339841	173565	337307
1862 Matching	1890 Matching	1862 Matching	1890 Matching
409183	281158	164013	264651
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

Extension's Institute for Economic and Community Development staff supported the state and local agribusiness community. Strategic planning workshops were conducted for local municipalities. Economic impact reports for agriculture and rural development and economic scorecards were presented. Needs assessments for Kitchen and Business Incubator for local foods were conducted for two counties. Specialists conducted an Itology program for non-profit collaboration of businesses, academic institutions and organizations dedicated to growing the IT talent pipeline, fostering economic development. New and beginning farmers feasibility studies presentations were conducted. An agribusiness Cluster Study report was presented. Leadership programs were conducted and board trainings were offered to community organizations. Joint activities with Extension were implemented, publications were written and partnerships were established.

In research, a comprehensive database was set-up addressing issues of U.S. competitiveness in international agricultural markets and development of generalized gravity models for world trade in individual vegetables.

A depository vegetable trade data matrix with impacts of free trade agreement and periodical updates was created.

Research continued into the economic and cultural impact of agribusiness in the state.

The economics of the use of black soldier fly larve to manage organic waste streams and to develop biodiesel, protein feed sources and other marketable products continued as a research activity.

Work continued in assessing the consumer behavior, market coordination and performance of the consumer-oriented fruit and vegetable sector, since this is a significant economic activity in the state.

Also, interview questions were developed and administered to municipal officials. In addition, secondary data searches were conducted. A comprehensive listing of all export promotion programs was compiled.

With the expectation of developing a new technology which could potentially have the potential for increasing economic activity in the state, work continued on oyster biology and real time microscopy for marine biofouling management.

With aggressive termite activity, especially in the coasta region of the state, research continued on

Between the two institutions, there was a total of 5.5 faculty FTE's directed towards research efforts in the community, leadership and economic development area.

2. Brief description of the target audience

The target audience includes students, child care providers, limited-resource persons, community leaders, board/council members, nonprofit organization boards and groups, adults, youth, business and workforce preparation agencies and disadvantaged citizens and communities, state, federal, and local agency personnel, association members, citizens faced with public issues and citizens engaged in economic and tourism development.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	6344	164612	1652	0

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

Patent Applications Submitted

Year: 2013
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	14	14

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Publications, business plans and housing grants.

Year	Actual
2013	15

Output #2

Output Measure

- Total number of people completing educational workshops.

Year	Actual
2013	5042

Output #3

Output Measure

- Number of board members trained.

Year	Actual
2013	79

Output #4

Output Measure

- Number of educational workshops conducted.

Year	Actual
2013	325

Output #5

Output Measure

- Number of homes rehabilitated.

Year	Actual
2013	8

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Total number of people reporting increased knowledge as a result of participation in CLED activities
2	Number of facilitated public meetings addressing public issues
3	Number of printed materials used to promote understanding of public issues
4	Number of participants engaged in community promotion projects
5	Number of business owners who completed the small business workshop series.
6	Number of homeowners reporting successful completion of rehabilitation/weatherization of homes.

Outcome #1

1. Outcome Measures

Total number of people reporting increased knowledge as a result of participation in CLED activities

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1729

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Internet has become a part of the lives and of adults and youth. It requires instruction for safe use for all persons of any household. The SC Department of Education Standards-based Internet safety instruction benefits K5 - 12th grade students and adults of computer literacy through the use of technology, instructional aides and evaluations.

What has been done

An internet safety project (Cyber Safety 101) based on the NetSmartz program, a nationally recognized curriculum, was taught on the Mobile Technology Center (MTC). Age-appropriate sessions on internet etiquette, sharing personal information, scams, recognizing predatory behavior and identity theft were taught. Educational videos were shown and an evaluation completed. A pre- and post-test were given.

Results

After the post-test, 90.3% of the 1729 youth recognized inappropriate internet behavior that may result in criminal charges. Eighty-seven percent realized they should never post or give out any personal information on the Internet. One hundred percent realized that they should not put mean things on the computer about someone.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and

806 Communities
Youth Development

Outcome #2

1. Outcome Measures

Number of facilitated public meetings addressing public issues

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of printed materials used to promote understanding of public issues

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Number of participants engaged in community promotion projects

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	893

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Community, Leadership and Economic Development (CLED) Program will promote engagement and community enhancement and improvement that are linked to community image, sustainable economic development and improved quality of life for the citizens of South Carolina.

What has been done

Economic impact reports for agriculture and rural development and economic scorecards were presented. Needs assessments for kitchen and business incubators for local foods were conducted for two counties. Specialists conducted an Itology program for non-profit collaboration of businesses, academic institutions and organizations dedicated to growing the IT talent pipeline, fostering economic development. New and beginning farmers feasibility studies were conducted. An agribusiness Cluster Study report was presented. CLED regional agents worked closely with state Extension specialists, practitioners, and researchers to provide expertise in topics ranging from agribusiness and other leadership development, strategic planning, local economic and community development planning and support, industry cluster development, and economic impact analysis. Palmetto Leadership, Senior Leadership and Junior Leadership programs were conducted. Palmetto leadership programs were conducted at the county level in cooperation with local county governments. Economic impact reports for agriculture and rural development and economic scorecards were presented. Needs assessments for kitchen and business incubators for local foods were conducted for two counties. Specialists conducted an Itology program for non-profit collaboration of businesses, academic institutions and organizations dedicated to growing the IT talent pipeline, fostering economic development. New and beginning farmers feasibility studies were conducted. An agribusiness Cluster Study report was presented. CLED regional agents worked closely with state Extension specialists, practitioners, and researchers to provide expertise in topics ranging from agribusiness and other leadership development, strategic planning, local economic and community development planning and support, industry cluster development, and economic impact analysis. Palmetto Leadership, Senior Leadership and Junior Leadership programs were conducted. Palmetto leadership programs were conducted at the county level in cooperation with local county governments.

Results

Participants strengthened their community awareness and ability to access community resources, built partnerships, and strengthened their capacity to respond to future issues and opportunities. Participants have a greater knowledge about the county in which they live and/or work including education, economic development, healthcare and social issues. Approximately 70% of the graduates were still involved in a responsible community project three years after graduation. Graduates of the leadership class have been elected or appointed to serve in leadership such as county council seats, municipal officers, board directors, community action groups, judges, and task forces to help the community. Many have also been inspired to write books detailing local history, assist in local schools as tutors, direct operations for Habitat for Humanity, and assist with affordable housing, and town fundraisers.

Several communities throughout the state have expressed the need for greater local foods system development and planning. Through the alignment of market operations, Extension was able to leverage public resources for advertising, management, marketing, programming and training related to farmers markets. Project partners were able to ensure consistency of regulations and applicable guidelines, thereby streamlining the participatory process for market producers and vendors. As a result, a much broader pool of producers and vendors have been engaged to participate in each market increasing the impact of each market.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #5

1. Outcome Measures

Number of business owners who completed the small business workshop series.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	25

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The minority business owners, residents and communities, in close proximity to SC State, are a reflection of the overall economic condition of the county. The private sector, including the business community and charitable community, should be better integrated into local change and development activities. Small businesses and entrepreneurs should have greater access to resources and funding opportunities.

What has been done

The 1890 Research and Extension Program received grant funding from the U. S. Department of Housing and Urban Development to provided training, technical assistance and grants to Small Minority Businesses. Business owners attended a workshop series. Upon satisfactory completion of the classes, participants could apply for a small grant by writing a proposal. They prepared and completed business plans for their businesses.

Results

As a result, 25 individuals and business owners gained knowledge in the development of better business practices, financing, human resources, customer service, branding and marketing. But, only 15 who successfully completed the small business workshop series classes were selected to receive small grants. A total of \$150,000 in grant funds were awarded to 15 business owners in the amount of \$10,000 each for expansion of sales and services, creation of jobs, economic impact and increased productivity. One owner, who provides afterschool and summer enrichment activities to students was able to become a Limited Liability Corporation (LLC). More equipment was purchased, hired more staff and increased student enrollment. The owner enhanced the needs of the program and assisted with increasing the revenue of the business.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

Outcome #6

1. Outcome Measures

Number of homeowners reporting successful completion of rehabilitation/weatherization of homes.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	16

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Renovating and rehabilitating time-worn and inefficient homes for qualified low-to-moderate income owner-occupied homes in close proximity to SC State has an economic impact on the community and surrounding areas as well as makes the community more attractive. The weatherization of homes assists in improving the health, safety and energy efficiency of homes, while helping to save money for homeowners.

What has been done

The 1890 Research and Extension Program received grant funding for rehabilitation and weatherization of owner-occupied single family houses for low-income families. Contractors were selected through a bidding process. The rehab and weatherization Project activities were implemented by the 1890 Extension Northeastern Corridor of Orangeburg Community Development Corporation (NCOCDC), which made repairs.

Results

As a result, 8 of 16 homes have been completed. Grant funds of \$204,268 have been awarded to qualified low-to-moderate income owner-occupied homes with an average cost of \$30,000 per

house. Removed deficiencies or health and safety items, improved energy efficiency and extended the useful life of properties. Installed metal roofs, heating and cooling systems, windows, handicap accessible showers, replaced doors and updated plumbing and electricity, etc. One grant recipient who lived in her home for 63 years, purchased in 1950, received a new heating and cooling system, metal roof, insulated windows and smoke detectors. Repairs were done to the exterior and interior of the home as well. The recipient was unable to afford the renovations. She was proud and pleased of the work done to her home and thanked everyone who worked and helped her.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Individuals not completing the paperwork to participate in the small business workshop series and/or presenting their business plan. Weather tended to delay project completion by the established deadline. Receiving grant approval to conduct rehab/weatherization work.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The evaluation results were followed according to the guidelines stipulated by the U. S. Department of Housing and Urban Development. Twenty-five business owners were selected for the small business owners workshop series, which resulted in 15 business completing the series and obtaining a \$10,000 grant. Also, 8 of 16 homes were completed, for the reporting period, in the Rehabilitation and Weatherization Project. An average cost of \$30,000 per house was provided to qualified low-to-moderate income owner-occupied homes, which total \$204,268 in grant funds.

The total combined economic impact for the farmers markets in South Carolina was about \$10 million.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

4-H Youth Development and Families

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
801	Individual and Family Resource Management	5%	25%	0%	0%
802	Human Development and Family Well-Being	15%	10%	0%	0%
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	30%	20%	0%	0%
806	Youth Development	50%	45%	0%	0%
	Total	100%	100%	0%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	24.0	15.0	0.0	1.0
Actual Paid Professional	19.0	11.5	0.0	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
722840	481645	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
722840	398477	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Clemson Extension 4-H conducted 3,326 programs that reached over 69,171 youth and families. In addition, 4,508 adult volunteers were trained, who then trained youth in leadership development; hunting safety; plant and animal projects; science, technology and engineering projects; day and overnight camping; and nutrition, health and fitness. 4-H adults and teens contributed 27,048 hours of volunteer service, which represents a \$465,225 value of program support.

4-H partnered with local schools to implement the National Youth Science Day project, "EcoBots." Students worked in pairs to design a robot to clean-up a fictitious toxic spill. Teams of youth demonstrated the use of critical thinking and problem solving in this three-part experiment. This project met SC science education standards. In 4-H, youth used math skills, critical thinking, and creativity, which are valuable life skills. South Carolina 4-H participants coordinated and participated in community service projects as they donated no-sew blankets to Project Linus, an organization that hand makes blankets for critically ill children, raised funds for 4-H families in Oklahoma affected by the tornados, helped assemble hero packs for SC Operation: Military Kids, conducted food drives, and visited nursing homes throughout the year.

Youth and family development programs continued to provide skills needed to become well-rounded citizens of South Carolina. Lessons covered leadership, conflict resolution, stress, financial management, social skills and diversity. Computer skills and nutrition information were provided.

2. Brief description of the target audience

- All youth between the ages of nine and nineteen
- All youth between the ages of five and eight
- Parents and other adults interested in the development of South Carolina youth.
- 30-44 parent and young adult
- 45-64 Mature volunteer
- 65+ Grandparent and Senior Volunteer.
- Adult learners (college students)
- Teachers

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4861	715140	55709	11462

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

Year: 2013
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	1	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of people participating in educational workshops conducted

Year	Actual
2013	53588

Output #2

Output Measure

- Total number of adult volunteers (including non-Extension staff) trained in club, school enrichment, and special interest program delivery and management in all 4-H project areas.

Year	Actual
2013	90

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of trained adult volunteers and staff, (including non-Extension staff) who teach subject matter and life skills to youth
2	Number of youth who gain knowledge in leadership and citizenship project areas
3	Number of youth participating in service learning projects for the community and to improve themselves, and help others.
4	Number of youth who gain knowledge and skills about plants, livestock and/or pets.
5	Number of youth who develop knowledge and skills in science, engineering, and technology (including electricity, computers, pontoon classroom, etc.).
6	Number of youth gain knowledge in nutrition and fitness
7	Number of youth who gain knowledge in natural resources and shooting sports
8	Number of youth who develop and improve communication skills through speaking and debating

Outcome #1

1. Outcome Measures

Number of trained adult volunteers and staff, (including non-Extension staff) who teach subject matter and life skills to youth

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	580

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There is a need for an effective system to develop volunteer trainers in 4-H Youth Development.

What has been done

This year, almost 600 volunteers were trained. These along with over 4,508 other adult volunteers previously trained taught others using approved curriculum material. These volunteers then trained youth in leadership development; hunting safety; plant and animal projects; science, technology and engineering projects; day and overnight camping; and nutrition, health and fitness. Agents and volunteers used facebook, web pages, Skype, exhibits, and traditional media to promote youth development programs.

Results

Volunteers were equipped for leadership roles and have made positive impacts and contributions in their communities and trained youth with new knowledge and skills. Adults contributed 27,048 hours of volunteer service, which represents a \$465,225 value of program support. Volunteers reported seeing significant improvement in the children's overall problem-solving skills and math skills as well as the children's willingness to work together as a team to solve problems and make decisions. In addition, there were reports that youth used creativity and displayed increased self-confidence and self-pride as they accomplished projects.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being

803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

Outcome #2

1. Outcome Measures

Number of youth who gain knowledge in leadership and citizenship project areas

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	12958

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Youth have basic needs that include developing a sense that they are valuable contributing members of their family and community. At-risk-youth represent a high percentage of South Carolina's high school dropout rate and juvenile law violating behaviors. The Juvenile Offenders and Victims Report indicates the top characteristics of juvenile law offenders are living in poverty, limited connectedness to school or work and limited basic life skills. The characteristics are evident in 80% of the state's juvenile offenders. When external factors challenge academic performance, youth lack the labor skills, basic skills and educational level required to seek sustainable employment. When youth are not aware of the roles, responsibilities and benefits of effective citizenship, they are more likely to become dependent upon their government when they reach adulthood.

What has been done

The SC State Extension Program coordinated a Citizenship Program, which focused on the development of Citizenship, Leadership skills, Basic Life Skills and Character Education.

Clemson's 4-Hers participated in State Congress and statewide Ambassador Training, Senior Leadership Training, and Senior and Junior Teen Weekend to help them serve more effectively in their leadership roles at the club, county, regional, or state levels. Youth were empowered to actively engage in their communities and the world through a series of workshops on leadership, self-esteem, 4-H and conflict resolution. Over 11,219 youth were served in a combination of 397 workshops and activities.

Results

As a result of evaluations conducted at the end of the Citizenship Program, 81% of the program participants indicated knowledge gained. Twenty percent (20%) of the evaluated population indicated their intent to adopt Citizenship and Basic Life Skills Principles as well as pursue post-secondary education and/or military or vocational training. Of the 20% evaluated population, 15% stated they have adopted the principles they learned. With one student stating that the Citizenship Program helped him become a leader by letting him know to always think about his actions and the consequences. He also stated that it will also help him to remember to always do things that will help others. The individuals are more likely to become productive taxpaying citizens. Some 38 Clemson 4-H youth were trained to be 4-H Ambassadors. Ambassadors represent 4-H to the public and are involved in writing and speaking to the media.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

Outcome #3

1. Outcome Measures

Number of youth participating in service learning projects for the community and to improve themselves, and help others.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Studies show that youth develop in areas of civic engagement, respect, and social responsibility through participating in service-learning projects. Service learning can also have a positive effect on students' ability to relate to culturally diverse groups (Fox, 2010). Recent findings from the 4-H Study of Positive Youth Development indicate that young people in 4-H are three times more likely to contribute to their communities than youth not participating in 4-H.

What has been done

Over 50 youth provided leadership in service learning community projects.

Results

Youth in Clemson's 4-H programs donated no-sew blankets to Project Linus, an organization that hand makes blankets for critically ill children, raised funds for 4-H families in Oklahoma affected by the tornadoes, helped pack hero packs for SC Operation Military Kids, made animal treats for animal shelters, collected needed items for animal shelters, conducted food drives, and visited nursing homes throughout the year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

Outcome #4

1. Outcome Measures

Number of youth who gain knowledge and skills about plants, livestock and/or pets.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1224

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Research reveals that when children have hands-on experiences with nature, the results can lead to fewer incidents of anxiety and depression, improved self-esteem, enhanced brain development, and a sense of connectedness to the community and the environment. They have opportunities for such development by participating in the 4-H Plants and Animals project.

What has been done

Over 694 Plants and Animals programs were conducted reaching 2,305 youth. Youth in Clemson Extension 4-H programs are involved in hands on nature based programs such as Jr. Master Gardener, 4-H20, Dairy Heifer, Livestock, Barrow, Swine, Sheep, Beef, Poultry, Gardening, Goat, Horse, Rabbit and other plant and animal projects.

The South Carolina 4-H Small Garden Project involved youth from seven counties in the state. Participants were required to plant a minimum 100 square foot garden with a minimum of three crops and to keep a record book to account for costs and labor. Participants in the program were taught the proper use of fertilizers and pesticides and how that related to water quality. Participants in another Summer Gardening Program made nutritious recipes with various fruits and vegetables from their gardens.

Participants in the SC 4-H Forestry Clinic learned how to measure trees (diameter and height) and learned how to use various measuring devices. County 4-H units partnered with school district to establish and maintain Habitat (Butterfly) Gardens. The sites incorporated rainwater harvesting (rain barrels) for the purpose of irrigating.

Results

The youth were able to experience gardening, from soil and seed and from the market to the table. They learned about their community and were contributing members of it.

By competing in the shows and raising show animals, the youth learned valuable animal husbandry lessons in nutrition, genetics, reproduction, animal health, and handling techniques. Youth also were able to increase their ability to select good livestock and learned the responsibility needed to raise and manage these animals. Showing livestock also helps build confidence in the youth and teaches them responsibility.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

Outcome #5

1. Outcome Measures

Number of youth who develop knowledge and skills in science, engineering, and technology (including electricity, computers, pontoon classroom, etc.).

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	7983

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Science and technology skills are needed if youth are to keep up with the rapidly changing knowledge-based and knowledge-transfer society. According to the Department of Labor's Employment and Training Administration, the majority of careers beginning in 2012 will require some knowledge of geospatial technology and systems. The 4-H program in South Carolina offers youth the opportunity to develop knowledge and skills in science, engineering, and technology.

What has been done

During one opportunity, 4-H partnered with local schools to implement the National Youth Science Day project, EcoBots in five schools with 95 elementary and middle school students. These students joined thousands of young people across South Carolina and the United States to become scientists for the day. Students worked in pairs to design a robot to clean up a fictitious toxic spill. No solutions were given to students to help them solve the contamination problem. Students were encouraged to use the scientific process, test hypotheses and theories, explore all ideas and possibilities with their respective partners, and discuss concepts such as costs of malfunctions and why robots are used instead of humans.

Agents worked with youth in science and robotics clubs and assisted youth in preparation for statewide engineering competitions. Extension specialists, developed and published an iphone App named Firefly Flash Counter. It will be used as an educational and outreach tool of the Clemson Vanishing Firefly Project.

Results

Teams of youth demonstrated the use of critical thinking and problem solving in this three-part experiment. This project met SC science education standards. In 4-H, youth used math skills, critical thinking, and creativity, which are valuable life skills.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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- 801 Individual and Family Resource Management
- 802 Human Development and Family Well-Being
- 803 Sociological and Technological Change Affecting Individuals, Families, and Communities
- 806 Youth Development

Outcome #6

1. Outcome Measures

Number of youth gain knowledge in nutrition and fitness

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Number of youth who gain knowledge in natural resources and shooting sports

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	4327

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Many youth either participate in hunting or have family members who hunt and, therefore, have access to guns. Many youth do not have any formal training in the safe use and handling of firearms. Although rare, accidents with firearms do occur, and often are the result of improper handling of firearms. Exposing youth to firearms and teaching both adults and youth the proper way to safely handle firearms can reduce the risk of accidents.

What has been done

Some 148 programs were conducted reaching over 4,435 persons. Youth participated in hunting safety programs, natural resource clubs, shotgun and rifle clubs, 4-H Archery Clubs, and Food and Cover Establishment for wildlife programs. Youth learned components of wildlife habitat, water quality, and environmental stewardship. In addition, a SC 4-H Forestry Team participated in the National 4-H Forestry Invitational.

Results

Ninety-eight percent of the youth participating in natural resource and shooting sports programs gained knowledge. Youth demonstrated wise decision-making skills and self-confidence. They demonstrated caring of their environment and established food plots to benefit small game and other wildlife species. They demonstrated proper shotgun handling.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

Outcome #8

1. Outcome Measures

Number of youth who develop and improve communication skills through speaking and debating

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	552

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Youth need opportunities to develop assets such as good communication skills, organizational abilities, reasoning skills, and self-confidence. They have opportunities for such development through participating in the Communication and Expressive Arts projects.

What has been done

Twenty programs were conducted reaching 552 youth. Youth gave presentations and demonstrations during club and county level contests and gave speeches at community organizations promoting 4-H. A sign language workshop was conducted.

Results

Youth successfully prepared and gave presentations. They demonstrated good communication skills, organizational abilities, reasoning skills, and self-confidence. Youth researched various topics and presented information.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Observation and pre-post tests were conducted. 4-H youth used math skills, critical thinking, and creativity to address issues and solve problems which are valuable life skills. They contributed to their communities, learned how to work in teams, and demonstrated leadership.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Environmental Conservation for Wildlife

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
135	Aquatic and Terrestrial Wildlife	100%	0%	0%	0%
	Total	100%	0%	0%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	0.0	0.0	0.0
Actual Paid Professional	3.0	0.0	0.0	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
115308	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
115308	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Master Wildlifer and Master Naturalists training were conducted. Agents educated clientele on cogon grass, feral hog management, and wildlife habitat improvement and management, aquatic weed control, pond management, wildlife nuisance control, aquatic invertebrate taxonomy for impoundment assessment,

developing wildlife friendly pine plantations and native warm-season grasses for enhancement of wildlife habitat. An Imported Fire Ant Management Demonstration was established and YouTube videos were produced to teach fire ant management. Agents used various media formats to teach nuisance wildlife management.

2. Brief description of the target audience

The target audience includes state, local government and civic leaders, business owners, developers, home and garden clubs, area homeowners, wildlife specialists, state and federal biologists and administrators, potential volunteers, farm and forest owners, landowners/homeowners, Nuisance Wildlife Control Operators, natural resource professionals, Aquatic Pesticide Applicators, general public, farmers, foresters, urban, suburban and rural residents, urban planners and managers, concerned citizens, land owners/managers, agency personnel, citizens of South Carolina, Extension agents, youth, municipal officials, and local community groups statewide.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3867	102292	0	0

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

Patent Applications Submitted

Year: 2013
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of people completing educational workshops

Year	Actual
2013	1416

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of people reporting knowledge gained
2	Number of people reporting knowledge gained in wildlife management.

Outcome #1

1. Outcome Measures

Number of people reporting knowledge gained

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of people reporting knowledge gained in wildlife management.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1392

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

This program promoted the use of Best Management Practices of natural resources to improve natural resource conservation. As landscapes become more urban it is important to educate citizens of the natural world, so that they are more inclined to protect the special places that are important to the state and its tourism industry. As state resources become more limited, it is also important to look to other sources of labor to help maintain the natural spaces and help conduct environmental education programs. The South Carolina Master Naturalist and Master Wildlifer Programs aim to address both of these issues. The formation of a statewide corps of volunteers providing education, outreach and service dedicated to the beneficial management of natural resources and natural areas within communities is one aim of the program.

What has been done

Training was conducted for volunteers to become Master Naturalists. SC Master Naturalists have participated in nationwide citizen science projects such as monarch watch, the backyard bird count, monitoring loggerhead sea turtle nest, eradicating fire ants; renovating and maintaining trails; restoring habitats and cleaning up nesting boxes. They give back to the program by assisting in the delivery of new courses and by taking or leading advanced training classes throughout the state. Agents educated clientele on cogongrass, feral hog management, wildlife

habitat improvement and management, aquatic weed control, pond management, wildlife nuisance control, aquatic invertebrate taxonomy for impoundment assessment, and developed wildlife friendly pine plantations and native warm-season grasses for enhancement of wildlife habitat. An Imported Fire Ant Management Demonstration was established and Youtube videos were produced to teach fire ant management. Agents published news articles pertaining to nuisance wildlife.

A Master Wildlifer online series was developed for landowners, land managers and wildlife enthusiasts to teach how to manage wildlife on their land. The award-winning Master Wildlifer Program brought together a panel of renowned wildlife biologists, conservation experts and habitat managers for educational sessions on wildlife ecology and management, and included sessions on white-tailed deer, coyote, wild hog, non-game wildlife conservation and wild turkey. A registration fee was charged which gave participants access to all five live sessions, recordings of each session, and program materials.

Results

This program provided volunteers and landowners with tools, information and economic incentives to maintain and enhance lands for wildlife and to provide services and solutions to mediate and resolve human-wildlife conflicts. Master Naturalist and Wildlifer volunteers provided over 5,922 hours of service, which equates to a value of \$101,858 in program support.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Of the 1,416 persons attending workshops, 98% indicated knowledge gained. Landowners and volunteers applied knowledge and skills learned in Extension programs and provided over 5,922 hours of service, which equates to a value of \$101,858 in program support.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Sustainable Forest 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
122	Management and Control of Forest and Range Fires	30%	0%	0%	0%
123	Management and Sustainability of Forest Resources	50%	0%	80%	0%
124	Urban Forestry	20%	0%	20%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	0.4	0.0
Actual Paid Professional	3.0	0.0	0.4	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
90926	0	32297	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
90926	0	253845	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

Educational programs were conducted to teach sustainable forestry principles. Agents produced news articles and radio programs to inform landowners of the economic and environmental benefits of using Best Management Practices in all forest management operations.

2. Brief description of the target audience

The target audience will include private landowners, loggers, professional resource managers, foresters and other natural resource professionals, students, family forest landowners, consulting foresters that assist private landowners, and the general public.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1267	10000	0	0

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	8	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of people completing educational workshops

Year	Actual
2013	396

Output #2

Output Measure

- Disclosures

Year	Actual
2013	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of people reporting increased knowledge
2	Number of people reporting knowledge gained in sustainable forest land management and diversification.

Outcome #1

1. Outcome Measures

Number of people reporting increased knowledge

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of people reporting knowledge gained in sustainable forest land management and diversification.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	391

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

This program promotes the use of Best Management Practices for forest systems and other natural resources to improve South Carolina's forest productivity and promote natural resource conservation. Farm and forest landowners in South Carolina are seeking alternate land uses, management and diversification strategies to generate additional income to mitigate the effects of declines in commodity sales and markets, as well as the maturity time required for timber investments.

What has been done

Extension agents and specialists developed and provided educational programs on sustainable forest management programs, reaching 396 persons. Topics included longleaf pine history and management and prescribed burning. A survey of three longleaf pine forests was conducted to collect native plant seed for ecosystem restoration.

Specialists taught a Master Tree Farmer online program. Specialists conducted a webinar in conjunction with the US Forest Service titled, The Forest Service Toolbox. A specialist worked with the IRS to review and revise the Hardwood Timber Audit Technique Guide to benefit tax preparers and forest landowners.

Results

Landowners participating in Extension programs managed over 572,600 acres of forestland. In one county, landowners indicated that the Extension programs would help them save \$147,000 and earn \$229,000 in the future when managing longleaf pine on their land. Extension programs increased the number of acres of forests in South Carolina using sustainable forestry practices, increased biodiversity in the state, restored longleaf pine ecosystems, and facilitated the conservation of ecosystems.

4. Associated Knowledge Areas

KA Code	Knowledge Area
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Of the 396 persons attending programs, 99% reported that they gained knowledge. Landowners participating in Extension programs managed over 572,600 acres of forestland. In one county, landowners indicated that the Extension programs would help them save \$147,000 and earn \$229,000 in the future when managing longleaf pine on their land. Extension programs increased the number of acres of forests in South Carolina using sustainable forestry practices, increased biodiversity in the state, restored longleaf pine ecosystems, and facilitated the conservation of ecosystems.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Childhood Obesity

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
701	Nutrient Composition of Food	0%	0%	0%	10%
702	Requirements and Function of Nutrients and Other Food Components	0%	0%	0%	10%
703	Nutrition Education and Behavior	50%	45%	0%	40%
723	Hazards to Human Health and Safety	5%	25%	0%	10%
724	Healthy Lifestyle	45%	30%	0%	30%
Total		100%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	7.0	3.0	0.2	2.5
Actual Paid Professional	9.0	4.0	0.0	3.0
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
288962	95390	0	452213
1862 Matching	1890 Matching	1862 Matching	1890 Matching
288962	78919	0	354806
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

Clemson University Cooperative Extension as well as 1890 Research and Extension focused on nutrition and wellness programs for youth directed towards the prevention of childhood obesity, increasing physical activity and the development of food preparation skills that fit current nutritional needs and lifestyles.

Over 1,518 educational programs were conducted reaching approximately 20,459 children. Agents reached youth and adults in schools, summer camps, community centers, alternative school, Head Start, churches, and libraries. Some of the topics taught by agents included basic nutrition, how to make healthy food choices, reading food labels, the importance of eating a balanced breakfast and food safety in preparation and storage. Youth participated in hands-on activities using recipes using fresh fruits and vegetables, whole grains, planted gardens, and learned the importance of physical fitness.

2. Brief description of the target audience

The target audience includes youth, adults, families, and agencies that serve all income levels, including limited resource families and youth.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	21758	5000	2438	1210

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	4	1	5

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of children and youth reached in healthy eating programs.

Year	Actual
2013	21883

Output #2

Output Measure

- Number of families with children reached in preserving healthy foods.

Year	Actual
2013	831

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of people gaining knowledge as a result of participating in educational workshops
2	Number of children and youth gaining knowledge in eating healthy foods.
3	Number of families with children that gained knowledge of how to preserve healthy foods.

Outcome #1

1. Outcome Measures

Number of people gaining knowledge as a result of participating in educational workshops

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	2438

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

An estimated 25% of children in South Carolina are obese. An increasing number of the children are being treated for obesity related conditions such as Type 2 diabetes and hypertension. The cause is due to several factors, which include limited access to healthy foods, lack of knowledge of simple ways to create healthy dishes and not being introduced to different types of food at an early age.

What has been done

1890 Extension agents and local community members developed a healthy lifestyles program, which taught youth the importance of eating healthy foods and being active daily. The workshops discussed different fruits and vegetables and their importance to the development of organs. Discussion included different activities participants can do, which could help maintain healthy body weights. Follow-up visits were conducted.

Clemson Extension programs reached youth and adults in schools, summer camps, community centers, alternative school, Head Start, churches, and libraries. Some of the topics taught by agents included basic nutrition, how to make healthy food choices, reading food labels, the importance of eating a balanced breakfast and food safety in preparation and storage. Youth participated in hands-on activities using recipes using fresh fruits and vegetables, whole grains, planted gardens, and learned the importance of physical fitness.

Agents organized and taught Veg-Olympics, Step Up to MyPlate, Cooking Schools, Healthy Lifestyles Clubs, Kids in the Kitchen Club, 4-H Cooking Clubs, Health Fairs, 4-H Health Rocks and a 4-H Health Summit at Cafe Cultura. Lessons in nutrition and physical activity were taught to the children whose mothers are participating in the nutrition education program in Spanish Celebrating Health. Topics covered with the older children were portion distortion, mindless

eating, dairy products, the importance of eating breakfast, selecting healthier fast foods, and making healthy snacks. Youth participated in a Hispanic Health Fair. An Hispanic Afterschool Program was implemented. Youth and adults participated in the Annual Family Fun Day and Cafe Cultura. In addition, youth participated in the 4-H Healthy Lifestyle Contest and 4-H Expanded Food and Nutrition Education Programs. Through a series of lessons, 4-H EFNEP participants learn basic nutrition, the importance of daily physical activity, how to make healthy food choices and food safety in preparation and storage.

Results

As a result, 77% of youth have shown an increase in knowledge on living a healthier lifestyle with 33% stating they plan to implement the information taught in the program to their daily lives. Staff noticed a change in the eating habits of the students. They were more willing to try to eat more fruits and vegetables, often referring to key phrases used during classes that helped reinforce learning. The youth were also noticed being more active during recess and free periods.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #2

1. Outcome Measures

Number of children and youth gaining knowledge in eating healthy foods.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	20459

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The prevalence of overweight and obesity has become one of the most critical health issues in both South Carolina and the United States. Overweightness and obesity cut across all ages, economic levels, and racial and ethnic groups. In South Carolina, over sixty percent of all adults

are now either overweight or obese. South Carolina is the 8th fattest state in the nation and is one of the least healthy. Children learn eating behaviors from adults and peers.

What has been done

EFNEP through Clemson University was conducted for 542 limited resource adults to improve nutrition practices and food resource management practices such as planning meals, comparing prices, and using grocery lists. Over 2,828 volunteer hours were contributed for adult and youth EFNEP programs.

Results

Some 69% improved in one or more nutrition practices; 75% improved in one or more food resource management practices; 37% of participants increased the amount of physical activity; 99% of participants improved their diet; 68% increased fruit consumption; 67% increased vegetable consumption; and 54% increased consumption of calcium-rich foods.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #3

1. Outcome Measures

Number of families with children that gained knowledge of how to preserve healthy foods.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	507

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Food preservation can help families save money, reduce waste, and eat healthy. Families that preserve food can have the availability of out-of-season food throughout the year.

What has been done

Agents and specialists taught food preservation classes, including pressure canning, waterbath canning, pickling, drying, making jams and jellies, and preserving locally grown specialty crops. Volunteers were also trained as canning coaches, who in turn, taught food preservation methods to others.

Results

Over 88% of the participants in food preservation workshops indicated that they gained knowledge. Some 54% indicated that they used food preservation skills learned.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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
- Public Policy changes
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Of the 2438 youth, 77% showed an increase in knowledge of living a healthier lifestyle. The youth eat more fruits and vegetables and became more physically active.

Expanded Food and Nutrition Education Programs were conducted for 542 limited resource adults to improve nutrition practices, food safety, and food resource management practices such as planning meals, comparing prices, and using grocery lists. More than 65% improved in one or more food safety practices; 69% improved in one or more nutrition practices; 75% improved in one or more food resource management practices; 37% of participants increased the amount of physical activity; 99% of participants improved their diet; 68% increased fruit consumption; 67% increased vegetable consumption; and 54% increased consumption of calcium-rich foods. Evaluation data shows the following: 56% of the youth reported eating a variety of foods; 28% increased their ability to select low-cost, nutritious foods; and 24% improved practices in food preparation and safety.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

Climate Change

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
111	Conservation and Efficient Use of Water	0%	0%	40%	0%
132	Weather and Climate	0%	0%	0%	30%
205	Plant Management Systems	0%	0%	60%	0%
503	Quality Maintenance in Storing and Marketing Food Products	0%	0%	0%	30%
604	Marketing and Distribution Practices	0%	0%	0%	20%
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%	0%	0%	20%
	Total	0%	0%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	0.6	0.0
Actual Paid Professional	0.0	0.0	0.5	1.0
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	26044	86548
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	195117	67905
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

Research was conducted on a variety of crops which might be impacted by climate change and on the insects which are problematic for plants and animals in the state.

Work was also conducted on the impact of increased salinity in the water table along the coast associated with a changing climate

Research continued to characterize changes in natural organic matter influenced by climate change and coastal development.

Development continued on a web-based GIS flood warning system.

The was one half of one faculty FTE primarily focused on this program area.

2. Brief description of the target audience

The target audience will include regulatory agencies, resource managers, local county and municipal officials and public works staff.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Year: 2013
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	14	14

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Disclosures

Year	Actual
2013	0

Output #2

Output Measure

- Licenses

Year	Actual
2013	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Provide knowledge to policy makers to assist in coping with the effects of climate change, particularly in the coastal region.
2	To measure the impact of the demand uncertainty and supply disruption by performing a sensitive analysis.

Outcome #1

1. Outcome Measures

Provide knowledge to policy makers to assist in coping with the effects of climate change, particularly in the coastal region.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

To measure the impact of the demand uncertainty and supply disruption by performing a sensitive analysis.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The disaster relief supply chain project is in its final year and reporting will be done in the next cycle.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 11

1. Name of the Planned Program

Sustainable Energy

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
123	Management and Sustainability of Forest Resources	100%	0%	0%	0%
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	30%	0%
402	Engineering Systems and Equipment	0%	0%	30%	0%
403	Waste Disposal, Recycling, and Reuse	0%	0%	0%	100%
511	New and Improved Non-Food Products and Processes	0%	0%	40%	0%
	Total	100%	0%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	2.3	0.0
Actual Paid Professional	4.0	0.0	2.4	1.0
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
144829	0	194206	147600
1862 Matching	1890 Matching	1862 Matching	1890 Matching
144829	0	520727	115807
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

Extension agents are monitoring a switch grass project to be used as a possible demonstration of how it can be used for bio-fuel at a county's raceway site. Workshops and programs were developed addressing forestry ethics, forest herbicides, forest taxation, and timber harvesting.

Research is being conducted on reducing the amount of plastic waste material in landfills. Two kinds of plastics, polystyrene-based materials (dining plates and shipping protection boxes) and polyethylene based wastes (plastic bags) were thermally converted to liquids. The fine chemical constituents of the liquids were identified by gas chromatography mass spectrometry.

Articles, paper presentations and publications were developed and submitted to conferences, journals, etc.

2. Brief description of the target audience

All consumers in the state will benefit from research and education programs related to lower cost energy options.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4332	36305	0	0

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	10	10

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Disclosures

Year	Actual
2013	2

Output #2

Output Measure

- License agreements

Year	Actual
2013	0

Output #3

Output Measure

- Number of people completing educational workshops

Year	Actual
2013	2667

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of people gaining knowledge as a result of participating in educational workshops
2	Number of people reporting knowledge gained in sustainable energy, land management and diversification strategies.

Outcome #1

1. Outcome Measures

Number of people gaining knowledge as a result of participating in educational workshops

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of people reporting knowledge gained in sustainable energy, land management and diversification strategies.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	2628

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

This program will promote the use of Best Management Practices for forest systems and other natural resources to improve South Carolina's forest productivity and promote environmental sustainability and sustainable energy. In addition, farm and forest landowners in South Carolina are seeking management and diversification strategies to generate additional income and profitability.

What has been done

A demonstration was established at the Darlington Raceway to be used as a possible strategy to educate the public about the use of switchgrass for biofuel. Agents documented its planting and growth. A forestry ethics webcast was developed for the US Forest Service webinar series. Workshops were developed on the topics of prescribed fire, timber harvesting, forest herbicides, forest taxation, timber income tax and estate planning. Articles were published to promote the stewardship of South Carolina's urban and community forests. Students participated in an Environthon that promoted environmental sustainability.

Results

Of the 2,667 persons attending programs, 99% reported that they gained knowledge. Some 30%

of the participants in educational programs reported that they implemented a skill learned through Extension.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
511	New and Improved Non-Food Products and Processes

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Of the 2,667 persons attending programs, 99% reported that they gained knowledge. Some 30% of the participants in educational programs reported that they implemented a skill learned through Extension.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 12

1. Name of the Planned Program

Global Food Security and Hunger

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
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	10%	5%	0%	20%
204	Plant Product Quality and Utility (Preharvest)	10%	15%	20%	10%
205	Plant Management Systems	15%	20%	10%	10%
212	Pathogens and Nematodes Affecting Plants	25%	10%	10%	10%
213	Weeds Affecting Plants	10%	15%	20%	0%
216	Integrated Pest Management Systems	20%	10%	0%	10%
301	Reproductive Performance of Animals	0%	0%	0%	10%
302	Nutrient Utilization in Animals	0%	0%	0%	5%
303	Genetic Improvement of Animals	0%	0%	0%	5%
304	Animal Genome	0%	0%	10%	0%
307	Animal Management Systems	0%	5%	0%	5%
311	Animal Diseases	0%	0%	10%	0%
315	Animal Welfare/Well-Being and Protection	0%	10%	0%	0%
601	Economics of Agricultural Production and Farm Management	5%	10%	0%	10%
701	Nutrient Composition of Food	5%	0%	20%	5%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	45.0	3.0	16.3	2.0
Actual Paid Professional	35.0	8.0	4.8	2.0
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
1428194	301275	681428	263095
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1428194	249254	836516	206424
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

Research was conducted on micropropagation mediums, parasitic plant nematodes, new forage crops for the state, new peach variety development, management strategies for insect pests of cotton and soybeans, precision agriculture, grafting methods and disease management for watermelons.

In addition, scientists worked on agronomic practices for cotton production, the use of sensors for site specific applications of pesticides, fertilizers and water, weed management practices in corn, soybeans and cotton, and dealt with minimizing losses caused by nematodes in a variety of crops.

Research was implemented on the automatic identification technology usage for farm produce traceability. The traceability equipment was implemented into the supply chain for the selected businesses. Training was provided for proper use of the equipment. Data collection was conducted on seasonal crops. Data was collected from small scale farms of summer crops. The process was conducted for determining the necessary requirements and feasibility for integrating the RFID (Radio Frequency identification) system used in the project with the inventory systems used by selected Orangeburg County medium scale farm participation distribution centers.

In focusing on research dealing with the impact of the Panama Canal expansion on corn exports, the research developed the basic OLS (Ordinary Least Square) and time series models to predict regional corn exports. Relevant data from various resources to run the regression models were collected and comparisons were made. A transportation model to forecast corn exports by several major ports was built.

Paper presentations and articles were written and presented at conferences, symposiums, etc. Publications were submitted to peer reviewed journals.

Educational programs and activities were conducted that focused on integrated crop management, integrated pest management, water resources, risk management, and marketing. Field trials were conducted and demonstrated.

2. Brief description of the target audience

Research in this program has the potential to benefit growers, state, federal and international agencies dealing with food production and distribution and with end users in countries around the world.

The target audience includes producers, limited-resource farmers and Extension personnel, agency

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	28485	15226	259	242

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

Patent Applications Submitted

Year: 2013
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	28	28

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Disclosures

Year	Actual
2013	2

Output #2

Output Measure

- Licenses

Year	Actual
2013	0

Output #3

Output Measure

- Number of people completing educational workshops

Year	Actual
2013	12221

Output #4

Output Measure

- New Variety Releases

Year	Actual
2013	0

Output #5

Output Measure

- Number of youth participating in 4-H food systems programs

Year	Actual
2013	932

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of people reporting increased knowledge
2	Number of acres affected by Integrated Crop Management or Integrated Pest Management programs.
3	Number of youth gaining knowledge of food systems
4	Number of producers indicating adoption of recommended agronomic crop production practices
5	Number of producers indicating adoption of recommended animal production practices
6	Number of acres affected by Integrated Crop Management.

Outcome #1

1. Outcome Measures

Number of people reporting increased knowledge

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1661

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

South Carolina Low Country counties find vegetable production to be a profitable enterprise. The long planting season allows for spring and fall crops, which is more appealing. Increasingly higher production cost has caused problems for limited resource producers. Sustainable agriculture practices and skills learned in their application have shown a reduction in production costs for some producers. Vegetable producers and gardeners are interested in up-to-date production practices and techniques, specifically sustainable practices to sustain their operations. There are higher production costs, especially costs of chemical applications. In order to maintain their operations, they must increase their skills in sustainable agriculture practices.

What has been done

Small, limited resource vegetable producers were organized in an Integrated Pest Management (IPM) Project. The project focused on small farm sustainability, updated production practices, soil fertility and pest management practices. Skills training were provided in sustainable agriculture practices through production meetings, field demonstrations and tours, training sessions and workshops.

Results

Fifty nine (59) small vegetable producers and gardeners received training, gained knowledge and increased skills in the application of sustainable agriculture practices. The updated production practices were adopted by eighty five percent(85%) of project participants. One hundred percent (100%) of participants gained knowledge of the practices, fifty percent (50%) demonstrated improved skills, forty percent (40%) increased production and twenty five percent (25%) reported increased income. As a result of assistance from 1890 Extension, one producer began with the IPM Collard Project four years ago. He has now expanded his crops to included 10 other vegetables and dramatically increased his customer base.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
311	Animal Diseases
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

Number of acres affected by Integrated Crop Management or Integrated Pest Management programs.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	2047

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Local vegetable producers were interested in producing a high quality product with the least amount of off farm inputs and higher rates of profit. Producers were interested in using fewer chemicals and fertilizers. They wanted to eat healthier as well as purchase locally grown food.

What has been done

Workshops were held emphasizing soil fertility, marketing strategies, healthy eating as well as promoting more chemical free foods. Cultivating soil and weed management were also addressed for higher yields and pest management.

Results

One hundred percent of the IPM participants took soil samples and begun to implement soil fertility management concepts. As a result of the IPM Training Project, farmers have adopted

IPM, soil testing, crop rotation for disease control, reduced herbicide rates for crop rotation and selection of crops best adapted to soil growing conditions. Excessive rains destroyed over 95% of the IPM Project farmers' crops, but they replanted their crops and implemented the IPM recommended practices. Soil testing and crop rotation for disease control saved financial resources by using less herbicides and fertilizers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
601	Economics of Agricultural Production and Farm Management

Outcome #3

1. Outcome Measures

Number of youth gaining knowledge of food systems

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food

Outcome #4

1. Outcome Measures

Number of producers indicating adoption of recommended agronomic crop production practices

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Number of producers indicating adoption of recommended animal production practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

Outcome #6

1. Outcome Measures

Number of acres affected by Integrated Crop Management.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	518041

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sustainable agronomic crop production programs will develop and implement agricultural production systems in South Carolina that are economically sustainable, safe and environmentally sound.

What has been done

Clemson Extension conducts Official Variety Trials of all major crops in multiple locations across the state. The information generated from these trials is then used by growers to select the varieties that perform best in their region of the state. Extension conducted 394 programs reaching 12,221 persons; 94% of the participants indicated that they gained knowledge and 57% reported using practices learned. Educational programs included such topics as farm accounting and financial analysis; pesticide applicator training; soybean, tobacco, corn and cotton production meetings; fruit and vegetable meetings; beekeepers meetings; irrigation modeling for orchard crops; organic vegetable disease control.

<http://www.clemson.edu/extension/aes/budgets/index.html>

Results

Extension ICM activities affected 800,000 agronomic crops and 100,000 horticultural crops. Horticultural crop estimates include 35,000 acres of vegetable crops, 25,000 acres of fruit crops, 40,000 acres of sod, with the remainder of nursery/field grown floriculture. Improved strawberry production practices added \$10,725,000 to the South Carolina economy. Labor costs associated with peach thinning were reduced from \$165 to \$93 per acre. A collard crop improvement project reduced the number of insecticide and nitrogen applications for a savings of \$193/acre and of \$114/acre, respectively. South Carolina growers produced a cotton crop valued at \$211,848,000, a soybean crop valued at \$101,700,000, a corn crop valued at \$145,860,000, and a wheat crop valued at \$76,140,000. Peanut production was valued at \$7.5 million for growers and the South

Carolina economy. If yields were increased by 5% through proper variety selection this would result in an additional \$26,777,400 in revenue for South Carolina producers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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Key Items of Evaluation