

# 2010 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

This year's report again includes three of the NIFA high priority issues. Activity previously reported under Sustainable Agronomic Crop Systems, Integrated Pest Management and Sustainable Agriculture Production for Horticultural Crops are now combined and reported under the heading of Global Food Security and Hunger. The remaining horticultural activity includes Environmental Horticulture Education (i.e. Master Gardener, Consumer Horticulture, ornamental crops, etc.). Research scientists worked to improve the quality of life for people in South Carolina, the nation and the world by providing science-based information on major issues facing decision makers. Research was conducted in laboratories, farms, and forests across the state at sites that are strategically located in the state's distinct soil and climate regions. Areas of study include: animal production, horticultural crops, agronomic crops, biotechnology, food safety and nutrition, community and economic development, water quality and quantity, and forest and natural resources. Research and Extension delivery through outreach of research results to our clients continues to be key in promoting economic development and job creation throughout the state.

South Carolina State University has a total of 55 FTEs. Of that total, 13 FTEs belong to Research and 42 slots are obligated to 1890 Extension. During FY 2010, there was no increase in FTEs as previously anticipated and indicated in the FY 2012-2016 Updated Plan. It is anticipated the FTEs will remain the same for the coming year, if not decrease.

1890 Research continues to conduct studies in the areas of Sustainable Agriculture Production for Horticultural Crops, which is now transferred under Global Food Security and Hunger; Food Safety and Nutrition; Community, Leadership and Economic Development; 4-H Youth Development and Families; Childhood Obesity and Climate Change.

1890 Extension continues to provide and encourage the application of research-based knowledge and leadership techniques to individuals, families and youth who reside in the targeted service areas. Staff is committed to providing conferences, workshops, activities and programs to help assist limited resource clients in urban and rural areas to improve their overall quality of life. 1890 Extension provides programs and activities in the areas of Global Food Security and Hunger ; Food Safety and Nutrition; Community, Leadership and Economic Development; 4-H Youth Development and Families; Childhood Obesity.

#### Powerful Impacts and Return on Investment

There is a \$182 million in return on agricultural research - based on 12 to 1 rate of return on investment in agricultural research (Huffman and Evanson, 1993); SC ranks 4th in the nation on converting agricultural research dollars into revenue for the state.

There is a \$5.8 billion in return on investment in agriculture - based on \$10 billion direct output of agriculture in South Carolina (Miley, Gallo & Associates, 2008) and 58% internal rate of return of through cooperative extension programs (Gardner and Rausser, 2001)

The Clemson Extension Service delivered over 12,000 programs throughout the 46 counties of South Carolina, reaching some 247,000 people. Through global food security and hunger, the savings to soybean growers due to the soybean rust monitoring program was over \$2 million. The approximate economic value of the food handlers trainings was more than \$14 million due to the prevention of food borne illness outbreaks. In nutrition and childhood obesity, 88% of the participants showed improvement in one more nutrition practices. In environmental horticulture, over 336 Master Gardeners contributed over 54,368 hours of service, which is an estimated program value of \$978,624. In animal production, producers were certified by the national Beef Quality Assurance Producers program and improved breeding, reproduction health and grazing management systems. Economic and community development programs supported the state and local agribusiness communities, serving local farmers markets with an economic impact of over \$300,000.

In 4-H Youth Development, adults contributed \$93,150 worth of time to support programs. Coordinators and volunteers of afterschool 4-H programs have reported that youth are learning organizational and time management skills that will be useful as they enter college. Volunteers reported seeing significant improvement in the children's overall reading, writing, 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 the children's self-confidence and self-pride increased. Over 680,000 acres of forest land have been affected by information gained through Extension educational programs. These 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.

Water quality education programming helped raise awareness among local county officials who passed development ordinances requiring buffers and stormwater management plans for new construction and extended ecosystem services information regarding irrigation and water management for SC National Guardsmen to be deployed to Afghanistan. Through the delivery of Master Naturalist and Master Wildlifer programs, adults were trained to provide education, outreach and service for the beneficial management of natural resources and natural areas within their communities.

Extension agents and specialists have presented information through traditional media- newsletters, radio, and TV, as well as through social media -Facebook, Youtube, Twitter, websites, iTunesU, etc.

\$10 million potentially saved by SC soybean growers if PSA scientists' reduced seeding rates are implemented

2.2 million pounds of pesticide containers have been recycled since 1993, helping to protect the environment from potential pesticide contamination.

The 1890 Extension Program provides awareness of health challenges facing youth, such as obesity and diabetes. Research has revealed, from 1990 to 2000, obesity among children has tripled and continues to increase at alarming rates. As a result of the 1890 Extension Healthy Lifestyles Program, 95% of the participants decreased their risk of diabetes and obesity, while 100% of the participants increased their knowledge and physical activity.

1890 Extension utilizes the Color Me Healthy curriculum for children ages four and five. Children are engaged in fun, innovative and interactive learning opportunities about physical activity and healthy eating exploring the five senses (touch, taste, smell, sight and sound). Ninety-eight percent of the participants communicated they increased their knowledge base about the importance of eating healthy and staying active. Approximately 75% of the participants agreed to try new healthier foods. Parents have stated they will implement more fruits and vegetables in the meal and snacks provided to their children. Also, youth garden projects have been implemented.

In order to accomplish many of the tasks associated with 1890 youth development, partnerships and collaborations are formed across the state. The 1890 Extension Program collaborated with area schools and other community programs to conduct 153 leadership and basic life skills workshops to 3155 youth participants.

South Carolina State University's 1890 Program continues to close the technological gap known as the "Digital Divide", which refers to the technology gap between those who have access to digital technology and those who do not. To close the gap, rising seventh and eighth grade students participate in a five-week program, in which they receive personalized assistance in improving their proficiency in mathematics, reading, science, learning job-related skills as well as life long learning skills. The participants built their own computer. As a result of the technology program, post-test scores in mathematics and reading increased by an average of ten points as compared to the pre-test scores. At the end of the training, participants carry the computers home. Program participants are teaching family members the technology skills they have acquired from the training and the entire household is becoming computer literate.

Farmers and consumers are interested in sound animal production that is socially acceptable and produces a profit. 1890 agents and specialists have provided basic animal management skills for participants through trainings, workshops and conferences. On-site demonstrations were also held on farm visits. Sixty-five percent of the producers reported they learned new herd health management techniques. As a result of their training, five volunteers were extended an opportunity to further their skills by participating in a National Meat Goat Conference. As a result, a minority farmer registered his operation with USDA at the FSA Office.

The 1890 small commercial vegetable producers and home gardeners are interested in the most up-to-date production practices and techniques to improve the quality of their produce. Seventy-four percent of the participants adopted updated production practices. One hundred percent gained knowledge and increased skills, while 65% increased production and 25% increased income.

**Total Actual Amount of professional FTEs/SYs for this State**

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	149.0	43.0	43.0	13.0
Actual	165.0	42.0	44.8	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

## **2. Brief Explanation**

The Research and Program Development Committee of the South Carolina State Extension Advisory Council is responsible for reviewing and commenting on new programs initiated by Clemson University and South Carolina State University. The seven-member Research and Program Development Committee is one of the council's three committees that reviewed the list of programs and descriptions that were conducted. 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 total Council had the opportunity to give input about programs. There are Extension volunteers, producers, a community center program coordinator, a public school educator, and business owners.

There are internal university review panels. All proposed research projects are reviewed and critiqued by a research panel. Clemson Extension programs are reviewed by state Extension Program Team Leaders and administration. Both panels review projects and programs based on organizational capacity, relevance, and impact. In addition, all research projects go through a review process as outlined under Hatch regulations. This serves as the Expert Peer Review process.

The Internal University Panel periodically reviews South Carolina's plan of work. The Research and Program Development Committee is kept abreast of new national priority areas and of the realignments of research and Extension activities to focus on the NIFA priority areas. The program review activities of the committee will complement the scientific peer review process established at both institutions.

## **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.**

The most recent process used in seeking stakeholder input included meetings that were held in all counties in the state to assess programs and identify issues for agricultural Research and Extension. Stakeholders were identified and invited to attend meetings. Stakeholders included those internal to the Cooperative Extension and 1890 System--administrators, extension agents, agent associations, specialists, faculty, department chairs, and faculty, as well as, those external to the system. External stakeholders are Extension advisory board members, commodity group representatives, community leaders, human service providers, business/industry representatives, and collaborators (Farm Bureau, Chamber of Commerce, Farm Service Agencies, etc).

**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.**

People who are already involved in Research and Extension programs or receive services as well as people who may not be involved, but may have similar interests or are addressing similar concerns 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.**

A survey instrument is being designed to collect stakeholder input and issue identification for research and Extension. Participants are asked to evaluate the effectiveness of Extension programs, major concerns in the county and recommend topics they feel Extension can adequately address. They also give program ideas. Each county compiles data from the stakeholder meetings and makes adjustments in program design and implementation.

**3. A statement of how the input will be considered**

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

**Brief explanation.**

Program issues are identified and programs are developed, expanded, or eliminated based on their quality and/or effectiveness.

**Brief Explanation of what you learned from your Stakeholders**

The stakeholders felt that more clarity is needed in terms of the kinds of water activities that would fit under the category of Sustainable Energy. Methodology in the area of agriculture resiliency and climate change needs to be strengthened.

#### IV. Expenditure Summary

<b>1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)</b>			
<b>Extension</b>		<b>Research</b>	
<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
5692652	1818698	3834363	2137063

<b>2. Totaled Actual dollars from Planned Programs Inputs</b>				
<b>Extension</b>			<b>Research</b>	
	<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
<b>Actual Formula</b>	5482470	1818698	3346495	2137063
<b>Actual Matching</b>	5482470	952867	7090947	1118583
<b>Actual All Other</b>	3098075	0	0	0
<b>Total Actual Expended</b>	14063015	2771565	10437442	3255646

<b>3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous</b>				
<b>Carryover</b>	2078969	0	681513	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	Sustainable Agronomic Crop Systems
4	Water Quality and Water Quantity
5	Biotechnology
6	Food Safety and Nutrition
7	Community, Leadership, and Economic Development
8	4-H Youth Development and Families
9	Environmental Conservation for Wildlife
10	Sustainable Forest Management
11	Global Food Security and Hunger
12	Sustainable Energy
13	Childhood Obesity
14	Climate Change

**V(A). Planned Program (Summary)**

**Program # 1**

**1. Name of the Planned Program**

Sustainable Animal Production Systems

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	20%	20%	20%	0%
302	Nutrient Utilization in Animals	20%	20%	20%	0%
303	Genetic Improvement of Animals	15%	10%	15%	0%
307	Animal Management Systems	20%	25%	20%	0%
308	Improved Animal Products (Before Harvest)	15%	10%	15%	0%
315	Animal Welfare/Well-Being and Protection	10%	15%	10%	0%
	<b>Total</b>	100%	100%	100%	0%

**V(C). Planned Program (Inputs)**

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	9.0	6.0	5.1	0.0
Actual	12.0	7.5	3.3	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
519783	294635	368581	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
519783	154367	883358	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
114120	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

As a result of the Extension Animal Production programs, 9286 persons completed programs, such as Master Cattleman, the Grass Masters program, Cattleman's Day and Bull Sale, the Artificial Insemination School, backyard poultry clinic, goat and sheep seminars, and the USDA small farm workshops. Since last Fall, 211 producers were certified as national Beef Quality Assurance Producers. They reported that they improved breeding, reproduction health and grazing management systems. Some 1,065 producers improved forage cultivars. In addition, educational programs were conducted to certify newly permitted confined-livestock and poultry producers to provide annual re-certification training for all permit holders, as required by state law. Over 1285 livestock producers attended Extension recertification trainings to maintain their permits and 68 producers earned first-time certification.

Extension Specialists designed a course titled, Ethanol, Biodiesel, and Biomass: Opportunities for Animal Producers. A project proposal entitled: Integration of Broiler Production with the Production and Use of Biomass Fuel Pellets was developed and submitted.

The 1890 Extension Small Farm Assistance and Outreach Program is active in 32 rural counties of the state. The program provides education and outreach strategies which support limited resource family farms in molding farming communities to become more involved and livable. Assistance is rendered in development of opportunities as a collective strategy to create economics of self-sufficiency. The program conducts activities that increase farm management skills in the areas of production, marketing and sustainability.

The small farm program team challenges its target audience to make sound risk management decisions during the nation's economic downturn with a drastic economic impact on all sectors of the agriculture. The challenging effort has shown a significant increase in farmers' and landowners' skills in the areas such as farm enterprise management, production and marketing. As a result, some farming enterprises have realized an increase in their farm income through innovative marketing strategies.

1890 Extension agents provided livestock management training to limited resource producers and encouraged them to increase their production of high quality marketable animals. The producers have an average cattle herd size of 20 animals and an average meat goat herd size of 12 animals. The agents were able to reach over 514 persons. However, indirect adult contacts more than tripled with approximately 13,184 contacts.

**2. Brief description of the target audience**

Producers, Limited-Resource Farmers and Extension personnel, agency personnel.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	14500	5100	0	0
<b>Actual</b>	41592	306095	120	111

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

**Patent Applications Submitted**

Year: 2010  
 Plan: 1  
 Actual: 2

**Patents listed**

Feed Supplement Delivery System  
 Bioactive Recombinant Follicle Stimulating Hormone Utility

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
Plan	0	8	
Actual	2	16	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Disclosures

Year	Target	Actual
2010	1	0

**Output #2**

**Output Measure**

- Licenses

Year	Target	Actual
2010	1	1

**Output #3**

**Output Measure**

- Number of people completing educational workshops

Year	Target	Actual
2010	8700	20191

**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	Increased percentage of forage fed beef production in the state and the region.
3	Number of people reporting increased knowledge

## **Outcome #1**

### **1. Outcome Measures**

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

### **2. Associated Institution Types**

- 1890 Extension
- 1862 Research
- 1890 Research

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	6	20

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

The program aims to improve 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**

An Extension specialist designed an energy efficient ventilation system for a poultry producer in Anderson County. He provided calculations and several reports on improving energy efficiency of lighting systems in broiler buildings, provided analysis on energy savings due to adding attic insulation and an insulated tunnel door to a brooding area, and for improving the energy efficiency of a lighting, ventilation, and heating system.

Articles were written for national journals and the Southeastern livestock newsletters.

#### **Results**

Producers learned that tunnel velocity will be increased by 36%, system efficiency by 16%, and the new lighting system will provide 32% energy savings. Additional analysis and assistance were provided to poultry producers and compiled to assist a producer with a USDA-RD Energy Efficiency Improvement Grant.

Agents and specialists made presentations at the SC Ag Council and the World Aquaculture Society Conferences; and the SC Sheep Industries organization.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
301	Reproductive Performance of Animals
307	Animal Management Systems

### **Outcome #2**

#### **1. Outcome Measures**

Increased percentage of forage fed beef production in the state and the region.

Not Reporting on this Outcome Measure

### **Outcome #3**

#### **1. Outcome Measures**

Number of people reporting increased knowledge

#### **2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

#### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	3900	18999

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

The program aims to improve 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**

As a result of the Extension Animal Production programs, 8,772 persons completed programs, such as Master Cattleman, the Grass Masters program, Cattleman's Day and Bull Sale, the Artificial Insemination School, backyard poultry clinic, goat and sheep seminars, and the USDA small farm workshops. Over 1285 livestock producers attended Extension recertification trainings to maintain their permits.

The Extension Specialists trained National Guard members leaving for Afghanistan on small

ruminant diseases, and zoonotic diseases. Specialists taught the SC Large Animal Medicine Shortcourse to veterinarians.

### Results

Some 1,065 producers improved forage cultivars. Over 1285 livestock producers attended Extension recertification trainings, including the Confined Animal Manure Management (CAMM) for all permit holders, as required by state law to maintain their permits. Some 211 producers were certified in the national Beef Quality Assurance program and 68 producers earned first-time certification.

## 4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

## 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

Educational programs were conducted to certify newly permitted confined-livestock and poultry producers to provide annual re-certification training for all permit holders, as required by state law. In addition, USDA small farm workshops were conducted.

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

### 1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- During (during program)
- Case Study
- Comparison between locales where the program operates and sites without program intervention

## Evaluation Results

An evaluation of over 515 Sustainable Agricultural Production Systems for Animals programs involving 20191 people revealed that over 95% reported knowledge gained.

**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

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

**V(C). Planned Program (Inputs)**

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	27.0	6.0	10.1	3.0
Actual	22.0	0.0	7.1	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
735208	0	697656	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
735208	0	1455397	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
161438	0	0	0

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

Extension Environmental Horticulture included lawn and garden, turfgrass and nursery certification programs. A total 84 horticulture crops programs were conducted, reaching over 14,506 people. Clemson Extension food-based horticultural crop activities have been moved to Global Food Security and Hunger.

Clemson researchers identified the cause of large, leopard-print shaped patches which had begun to appear on the greens at a Myrtle Beach golf course. They recognized that the turf was hydrophobic, which means the soil was repelling water. The condition creates green and brown areas of the turf - green where water gets in, brown where it doesn't. Affected areas can be separated by only a few inches, which create the leopard pattern. A series of chemical treatments were prescribed that returned the turf to full health.

Clemson turfgrass specialists are suggesting painting for golf courses to keep the green in a bermudagrass putting surface over the winter. Special paints - which are dyes, not oil-based - are already used on some courses in South Carolina. Over-seeding continues to be the dominant winter practice for areas like Myrtle Beach, since real grass is more attractive to people from northern states coming south for winter golf. Winter painting avoids the added cost of over-seeding, which can weaken the underlying bermudagrass during the spring transition. In addition, research shows that plots painted in December and in February greened up in spring before unpainted dormant greens due to higher solar heat absorption.

Golf is a very big business in South Carolina and it takes scientists to ensure it stays that way. Golf generates more income than any other entertainment or recreation activity in the state. In 2007, the game accounted for more than \$2.7 billion in sales, more 33,000 jobs and \$834 million in personal income. Keeping the more than 350 golf courses around the state in top-notch condition involves more than mowers. Research on turfgrass pathology done at the Clemson Pee Dee Research and Education Center helps keep the state's more than 350 courses green and healthy. The Pee Dee REC research team has been a Southeast leader in establishing disease and environmental controls to treat blight and deadspots.

Researchers examined environmental resource management practices which can potentially reduce the quantity of nutrients in horticultural runoff. An assessment was also made of the potential of wetland systems to assimilate horticultural chemicals prior to entry into water bodies. Clay substrates were considered as a treatment option for phosphorus remediation and the potential for reuse as a potting substrate amendment. As a result of this research, nursery operators have access to a step-by-step guide detailing how to design a constructed wetland for remediating nutrient rich effluent, and a rating system detailing nutrient uptake potential of various aquatic plants is also available. Nurseries can devote half the land mass previously recommended for a constructed wetland because it was found that a single, deep-cell constructed wetland

was as effective at removing nitrogen as a two stage deep cell to shallow cell constructed wetland. Phosphorus can be removed on a consistent basis using a clay lined subsurface flow wetland, and when saturated, the substrate can be recycled in potting substrate within the nursery. A hybrid surface to subsurface flow constructed wetland may prove to be the most effective tool for removing both nitrogen and phosphorus from nursery effluent.

Clemson turfgrass specialists are suggesting painting golf course putting greens to keep the green in bermudagrass over the winter. Special paints - which are dyes, not oil-based - are already used on some courses in South Carolina. Over-seeding continues to be the dominant winter practice for areas like Myrtle Beach, since real grass is more attractive to people from northern states coming south for winter golf. Winter painting avoids the added cost of over-seeding, which can weaken the underlying bermudagrass during the spring transition. In addition, research shows that plots painted in December and February greened up in spring before unpainted dormant plots due to higher solar heat absorption.

**2. Brief description of the target audience**

Producers, Extension personnel, horticulture professionals, residents in counties with Master Gardener programs, Master Gardeners, consumers

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	19000	5700	0	0
<b>Actual</b>	44343	0	0	0

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

**Patent Applications Submitted**

Year: 2010  
 Plan: 0  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
<b>Plan</b>	60	8	
<b>Actual</b>	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Disclosures

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	2	0

**Output #2**

**Output Measure**

- Licenses

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	0	0

**Output #3**

**Output Measure**

- Number of people completing horticultural educational workshops

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	5400	14506

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of participants reporting profitability gain
2	Number of Master Gardeners reporting activities and programs
3	Number of people receiving information from Master Gardeners
4	Percent increase in profitability in the peach and melon industries
5	Number of participants gaining knowledge
6	Number of acres affected by ICM

**Outcome #1**

**1. Outcome Measures**

Number of participants reporting profitability gain

Not Reporting on this Outcome Measure

**Outcome #2**

**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	Quantitative Target	Actual
2010	1300	4501

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

This program seeks to inform horticulture professionals, master gardeners, and consumers on environmentally sound horticultural practices that will improve communities.

**What has been done**

Over 330 Master Gardener and 129 Jr. Master Gardener trainings were conducted.

**Results**

Over 336 new Master Gardeners were certified. Over 4,500 Master Gardeners contributed over 54,368 hours of service conducting programs and activities such as oral presentations, newsletters, radio programs, and TV appearances, a value of \$978,624 program support. An estimated 700,000 people were reached through information provided by Master Gardeners via clinics, fact sheets, school projects, newsletter articles, radio and TV appearances.

**4. Associated Knowledge Areas**

**KA Code    Knowledge Area**

205 Plant Management Systems  
216 Integrated Pest Management Systems

**Outcome #3**

**1. Outcome Measures**

Number of people receiving information from Master Gardeners

Not Reporting on this Outcome Measure

**Outcome #4**

**1. Outcome Measures**

Percent increase in profitability in the peach and melon industries

Not Reporting on this Outcome Measure

**Outcome #5**

**1. Outcome Measures**

Number of participants gaining knowledge

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	5750	12884

**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**

Some 684 horticultural programs were conducted reaching 14,506 persons. Activities this year included site visits to commercial nurseries to address plant and pest problems, meetings with horticultural professionals to diagnose turf problems, conducting plant identification classes, sustainable landscapes, and trainings for Master Gardeners and community organizations. A total of 22,457 consumers received information through HGIC Information Center. There were 2.2 million visits to university horticulture websites. Agents conducted media programs such as appearances on Making it Grow radio and TV shows, wrote newspaper articles, developed fact sheets and published websites.

**Results**

Of the 14,506 persons participating in horticultural programs, 89% reported a gain in knowledge.

**4. Associated Knowledge Areas**

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

**Outcome #6**

**1. Outcome Measures**

Number of acres affected by ICM

Not Reporting on this Outcome Measure

**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**

{No Data Entered}

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

**1. Evaluation Studies Planned**

- After Only (post program)

- Before-After (before and after program)
- During (during program)
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**V(A). Planned Program (Summary)**

**Program # 3**

**1. Name of the Planned Program**

Sustainable Agronomic Crop Systems

**V(B). Program Knowledge Area(s)**

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
204	Plant Product Quality and Utility (Preharvest)	0%	0%	10%	0%
205	Plant Management Systems	0%	0%	10%	0%
211	Insects, Mites, and Other Arthropods Affecting Plants	0%	0%	10%	0%
212	Pathogens and Nematodes Affecting Plants	0%	0%	15%	0%
213	Weeds Affecting Plants	0%	0%	10%	0%
215	Biological Control of Pests Affecting Plants	0%	0%	10%	0%
216	Integrated Pest Management Systems	0%	0%	15%	0%
601	Economics of Agricultural Production and Farm Management	0%	0%	10%	0%
604	Marketing and Distribution Practices	0%	0%	10%	0%
	<b>Total</b>	0%	0%	100%	0%

**V(C). Planned Program (Inputs)**

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	0.0	7.4	0.0
Actual	0.0	0.0	6.4	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	638621	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1881875	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**

Research activities centered on ways to increase disease and insect resistance levels, assess transgenic varieties, and improve management systems.

Clemson Extension agronomic crops programs are reported under Global Food Security and Hunger.

**2. Brief description of the target audience**

Producers, Extension and other agency personnel

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	11500	2000	0	0
<b>Actual</b>	0	0	0	0

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

**Patent Applications Submitted**

Year: 2010  
 Plan: 0  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
Plan	0	10	
Actual	0	21	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Disclosures

Year	Target	Actual
2010	1	3

**Output #2**

**Output Measure**

- Licenses

Year	Target	Actual
2010	0	0

**Output #3**

**Output Measure**

- Number of people completing educational workshops  
Not reporting on this Output for this Annual Report

**Output #4**

**Output Measure**

- New Variety Releases

Year	Target	Actual
2010	2	0

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of acres affected by ICM programs
2	Number of people reporting increased knowledge
3	Number of new high yielding soybean cultivars with resistance to nematodes which will improve profitability for growers

### **Outcome #1**

#### **1. Outcome Measures**

Number of acres affected by ICM programs

Not Reporting on this Outcome Measure

### **Outcome #2**

#### **1. Outcome Measures**

Number of people reporting increased knowledge

Not Reporting on this Outcome Measure

### **Outcome #3**

#### **1. Outcome Measures**

Number of new high yielding soybean cultivars with resistance to nematodes which will improve profitability for growers

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
- Government Regulations
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

#### **Brief Explanation**

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

#### **1. Evaluation Studies Planned**

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

- During (during program)
- Time series (multiple points before and after program)
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

## **Evaluation Results**

### **Key Items of Evaluation**

**V(A). Planned Program (Summary)**

**Program # 4**

**1. Name of the Planned Program**

Water Quality and Water Quantity

**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%	30%	50%
112	Watershed Protection and Management	20%	0%	20%	0%
131	Alternative Uses of Land	20%	0%	20%	25%
133	Pollution Prevention and Mitigation	20%	0%	20%	25%
134	Outdoor Recreation	10%	0%	10%	0%
	<b>Total</b>	100%	0%	100%	100%

**V(C). Planned Program (Inputs)**

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	4.5	0.0	4.8	0.0
Actual	10.0	0.0	4.4	1.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
431600	0	319476	198147
1862 Matching	1890 Matching	1862 Matching	1890 Matching
431600	0	571207	103717
1862 All Other	1890 All Other	1862 All Other	1890 All Other
94636	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

Presentations were given for using rain garden technology for managing storm water quantity and quality, safety standard procedure for dioxin analysis, long-term databases for an estuary, ecosystem services information regarding irrigation and water management in Afghanistan for SC National Guardsmen to be deployed to Afghanistan to help set up an Extension program, Nonpoint Education for Municipal Officials short course, and the Stormwater Compliance Support Workshop. Agents are working with Ft. Jackson Army Training Center to develop a watershed management plan for entire base. Agents are working with recreational trail builders to protect stream crossings from bacterial contamination. They developed and offered a four credit CCA course, Utility of Geophysical Methods in Agriculture and Turf, and are collecting samples in conjunction with the National Aeronautical and Atmospheric Administration during phytoplankton monitoring workshops.

The Carolina Clear Extension Agent helped raise local decision makers' awareness of the Carolina Clear program and gained their support for water quality education. Richland County Council passed the development ordinances, which included requirements for buffers and stormwater management plans for new construction, a floodplain overlay district and stronger regulations on control of sediment from construction sites. Other activities included, the Tyger River Sweep, in which volunteers collected over 80 bags of garbage and 20 tires from the banks of the river.

1890 Research is conducting research on the Groundwater Radionuclides in the Edisto River Basin in South Carolina. The researcher is using a RaDeCC system for the measurement of Ra-223 and Ra-224. The preparation method of MnO<sub>2</sub>-fiber column and the calibration procedure of Ra-224 measurement have posted quality checking and are producing measurement data. Staff was hired. A modified procedure for the analysis of radon gas in groundwater was tested and adopted. A special box for the glass funnels used in the procedure was built. A contractual service with USC Department of Chemistry for the ICP-MS analysis of uranium isotopes in the groundwater samples was set-up. Several field trips to collect groundwater samples were made.

## 2. Brief description of the target audience

Farm and forest 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, tourism operators, contractors, subcontractors, registered landscape architects, professional engineers, land surveyors the stormwater advisory board, the zoning board of appeals, the parks and open space board in addition to staff from stormwater, planning, and parks and recreation departments.

### V(E). Planned Program (Outputs)

#### 1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	7500	3000	0	0
<b>Actual</b>	18059	445212	0	0

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

**Patent Applications Submitted**

Year: 2010  
 Plan: 3  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
Plan	0	12	
Actual	1	13	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Disclosures

Year	Target	Actual
2010	3	1

**Output #2**

**Output Measure**

- Licenses

Year	Target	Actual
2010	1	0

**Output #3**

**Output Measure**

- Number of people completing educational workshops

Year	Target	Actual
2010	4400	10229

**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	Policies for economically viable land use preserving water quality
4	Strategies for TMDL development and implementation at the watershed level

**Outcome #1**

**1. Outcome Measures**

Number of people gaining knowledge

**2. Associated Institution Types**

- 1862 Extension
- 1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	3400	10008

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Forty-percent of the monitored waterways of South Carolina are impaired, meaning they are not meeting their water quality standard for at least one monitoring parameter. Stormwater pollution is people pollution, everything that is left out on the landscape and picked up by rain. It is not treated and washes off into the nearest receiving waterway. Education and public involvement are critical to solving this broad issue. This program will promote the use of Best Management Practices for water quality and quantity.

**What has been done**

Some 240 educational programs were conducted, reaching 10229 persons.

Clemson partners with nearly three dozen permitted communities to provide education and public involvement opportunities that meet the requirements of the US EPA mandate. More than 1,600 telephone surveys were completed for the Carolina Clear program to assess constituent behaviors that affect water quality. Full reports and summaries of the data collection effort are available at:

<http://www.clemson.edu/public/carolinaclear>

Other programming included showing students and volunteers how to instrument a stream with a continuously logging stage recorder. Over 5,000 people have participated in the Certified Erosion Prevention and Sediment Control Inspector program with over 4,200 completing certification.

Agents have produced media programs including newsletters, and newspaper articles.

**Results**

Survey responses are being used to prioritize education messages to target specific behaviors that could be leading to water quality impairments, identify what messages will be successful in increasing awareness and encouraging behavior change, clarify educational messages, and to

evaluate and compare the awareness, education and behaviors across different regions of the state.

#### 4. Associated Knowledge Areas

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

#### Outcome #2

##### 1. Outcome Measures

Number of people using practices learned

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Condition Outcome Measure

##### 3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	2000	3894

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

An Aerial Infrared Thermographic Survey was performed as part of the Horse Creek 319 Water Quality grant. During analysis of the survey, it was discovered that there was an illicit discharge into a pond that emptied into Horse Creek. This pond then discharged water into Langley Pond, a recreational facility used by swimmers. Upon further investigation, it was determined that there were five houses in the neighborhood that had septic systems that were located in a flood plain which had the potential of failing.

###### **What has been done**

Valley Public Service Authority was awarded the subcontract to put in the sewer line which amounted to \$30,000. The Authority also contributed cost share in the amount of \$1,400. The tap-on fee was waived for these homeowners. Aiken County also made contributions to the Langley Project. Aiken Public Service Authority did the preliminary drawings, site visits, and surveys which amounted to a cost share of \$1,656. Aiken County Stormwater Division coordinated the efforts in inspecting the hotspots from the infrared survey and discovered the illicit discharge. Aiken County

Department of Engineering paid the cost of the engineering firm to draw the design. The Clemson staff coordinated the efforts and wrote the request for an extension of the grant.

**Results**

This grant was used to repair failed septic systems in the Horse Creek Watershed for people in need. The five houses are now on a sewer line because of the supportive efforts of this group. A six-month extension was given on the Horse Creek 319 grant so the sewer line could be constructed. DHEC awarded \$48,000 to the grant which included \$29,000 in septic system repairs making it possible to repair 35 more septic systems. Another aspect of this grant was that it helped people in need. The illicit discharges have been eliminated and the stream has been made safer for recreational purposes.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
112	Watershed Protection and Management
131	Alternative Uses of Land
133	Pollution Prevention and Mitigation
134	Outdoor Recreation

**Outcome #3**

**1. Outcome Measures**

Policies for economically viable land use preserving water quality

Not Reporting on this Outcome Measure

**Outcome #4**

**1. Outcome Measures**

Strategies for TMDL development and implementation at the watershed level

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

### **Brief Explanation**

CEPSCI (Recertification) - 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 and Data Collection)**

### **1. Evaluation Studies Planned**

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

### **Evaluation Results**

Some 240 Water Quality and Quantity programs were conducted, reaching 10,229 persons. Of those participating, 98% reported gaining knowledge.

### **Key Items of Evaluation**

**V(A). Planned Program (Summary)**

**Program # 5**

**1. Name of the Planned Program**

Biotechnology

**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%	25%	0%
202	Plant Genetic Resources	0%	0%	25%	0%
303	Genetic Improvement of Animals	0%	0%	20%	0%
304	Animal Genome	0%	0%	20%	0%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%	0%	10%	0%
	<b>Total</b>	0%	0%	100%	0%

**V(C). Planned Program (Inputs)**

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	8.1	0.0
Actual	0.0	0.0	7.9	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	522422	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	800472	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**

Research in mammary development to increase profitability in dairy, beef, swine and lamb operations. Research on legumes, especially with regard to genes involved in nodulation, and research on resistance to soybean pests in primitive germplasm for application in modern varieties.

**2. Brief description of the target audience**

Agricultural biotechnology research has a grower and industry focus. New approaches to improving crop and animal lines are one result of biotechnology research and the ability to better deal with a variety of pests which negatively impact productivity is another.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	0	0	0	0
Actual	0	0	0	0

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

**Patent Applications Submitted**

Year: 2010  
 Plan: 4  
 Actual: 2

**Patents listed**

Genetic Engineering of Crop Species with Two Novel Antimicrobial Peptides for Plant Disease Resistance  
 Genetic Engineering of Crop Species with a Rice SUMO E3 Ligase Gene for Enhanced Abiotic Stress Tolerance and Biomass Production

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
Plan	0	25	
Actual	0	23	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Disclosures

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	6	3

**Output #2**

**Output Measure**

- Licenses

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	1	0

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Development of expanded applications of legumes in nitrogen poor environments
2	Improved profitability for beef and dairy producers

### **Outcome #1**

#### **1. Outcome Measures**

Development of expanded applications of legumes in nitrogen poor environments

Not Reporting on this Outcome Measure

### **Outcome #2**

#### **1. Outcome Measures**

Improved profitability for beef and dairy producers

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
- Government Regulations

#### **Brief Explanation**

{No Data Entered}

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

#### **1. Evaluation Studies Planned**

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

#### **Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**V(A). Planned Program (Summary)**

**Program # 6**

**1. Name of the Planned Program**

Food Safety and Nutrition

**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%	5%	5%	5%
703	Nutrition Education and Behavior	30%	40%	30%	35%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	30%	10%	30%	20%
723	Hazards to Human Health and Safety	30%	30%	30%	20%
724	Healthy Lifestyle	5%	15%	5%	20%
	<b>Total</b>	100%	100%	100%	100%

**V(C). Planned Program (Inputs)**

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	14.0	2.1	4.0
Actual	18.0	3.0	1.8	2.5

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
151545	169796	234127	427481
1862 Matching	1890 Matching	1862 Matching	1890 Matching
151545	88965	192994	223752
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1030307	0	0	0

**V(D). Planned Program (Activity)**

## 1. Brief description of the Activity

The goals of Food Safety and Nutrition are to provide self-responsibility for health, empower South Carolinians to manage their health and health care services, strengthen individuals and families through education, and provide knowledge of safe food handling practices to help families stay healthy.

A series of Expanded Food and Nutrition Education Programs were conducted for 1617 families and 13,142 children and youth limited resource adults to improve nutrition, food safety, food resource management, food security, and physical activity practices. More than 7,280 volunteer hours were contributed for the project.

Agents conducted food safety and nutrition programs for the general public, reaching 10,939 adults with nutrition, physical activity and health. Media programs were delivered covering topics of Food Safety, Nutrition, and Health. Media represents articles published in newspapers, other external publications, and information delivered through radio and television.

A grant of \$273,000 was received to conduct a pilot study to determine the effect of a nutrition/food safety intervention targeting older adults participating in the South Carolina congregate Nutrition Program (Cooking Healthy Eating Smart). It aims to sustain or improve the health of older South Carolinians so they can live independently longer. Another proposal (\$14,000) was submitted to conduct a feasibility study for a Specialty Crop Food Business Incubator. The study would assess support for locating a community kitchen/food business incubator at the new State Farmer's Market in Columbia, SC.

A four-week, Children and Community Gardening Course for MUSC Dietician Internship Program, included 1.5 hour classroom based discussions.

The 1890 Extension Program at SC State University provides nutrition and food safety education to help food stamp recipients, low-income individuals, youth, and the general public prepare meals that are consistent with their cultural traditions and resources. The program is also addressing the needs of the "new poor"; people long accustomed to the comforts of middle-class life who are now relying on public assistance for the first time in their lives.

The 1890 Extension EFNEP Program provided educational workshops at Head Start centers and elementary schools located in the Midlands and Low Country with the Rock 'n Read outreach program. Over 900 children were educated with the Rock 'n Read Program, an outreach program that incorporates literacy education and the attention-getting curriculum of the OrganWise Guys. OrganWise Guys promotes the benefits of good nutrition and preventive health care practices to people of all ages, but focuses primarily on preschoolers and students in elementary school. Each student received a book to read with their parents and information about how families can incorporate exercise into their daily lives.

1890 Extension held healthy eating workshops and training sessions about the importance of healthy eating and daily healthy food choices. Participants learn about MyPyramid, label reading, comparison shopping, portion control, water intake, and exercise.

The 1890 Extension Program presented Camp SNAPS (Sound Nutrition and Practical Science) to participants in Orangeburg, Bamberg, Calhoun, and Dorchester counties. The goals of the camp were to provide a quality summer camp that offered youth a variety of programs including academic, artistic, athletic, and/or more traditional camp curricula; to promote diversity by encouraging interaction among youth and staff from different cultural and economic backgrounds and neighborhoods; to provide youth

with opportunities for skill development, personal growth and new experiences; and to support programming that encouraged inclusion for children with physical and/or mental disabilities. Campers were evaluated on the various topics using pre- and posttest.

The campers transitioned through the Power of Science - an interactive session with age-appropriate science projects; Eat Well, Live Well - a dynamic session that included food demonstrations and activities about healthy food selection, food safety, and smart food purchasing techniques; and More Money - a hands-on workshop with information about the financial planning process, constructing personal budgets and navigating the stock market. Participants also engaged in physical activity such as the limbo, tug-of-war, kickball, and flag football. The participants also played board games and Wii fitness activities. The audience included over 1000 participants ages 5 - 18.

Another 1890 Research project is studying Quantum Dot Sensors for Detection of Unusual DNA Structures Associated with Human Diseases. Many, if not most of diseases have their roots in human genes. More than 4,000 diseases are thought to stem from mutated genes inherited from one's mother and/or father. Human neurodegenerative diseases such as Alzheimer disease, Fragile X syndrome, Huntington's disease, Myotonic Dystrophy to name a few, have been traced to genetic mutations. Novel methods for the detection of DNA are highly desirable for genetic defect detection. This project aims to develop nanomaterial-based sensors of unusual DNA structures that are implicated in human neurodegenerative diseases. To date, staff has been trained to operate specialized equipment and utilize methodologies.

Research is being conducted as An Innovative and Flexible Approach for Agriculture Transit System Design to Improve Rural Life and Opportunities. The research focuses on improving rural agriculture transit network designs and system operations. Specifically, the results will be critical for addressing the following key areas of the 1890 program which is committed to rural life and rural opportunities, as well as environmental, health and human nutrition.

1890 Research is studying Patterns in the Implementation of US Nutrition Policies in South Carolina. The research addresses the difficulties encountered in transmitting federal nutrition guidelines to South Carolinians, since the 1890s. Patterns are being reviewed analyzing diaries, commentaries, letters and cookbooks authored by or written for South Carolinians from the 19th century and on. A final bulletin is being prepared for publication.

## **2. Brief description of the target audience**

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.

### **V(E). Planned Program (Outputs)**

#### **1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	30300	2000	10000	0
<b>Actual</b>	20690	2707606	14309	0

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

**Patent Applications Submitted**

Year: 2010  
 Plan: 0  
 Actual: 5

**Patents listed**

Thermally Enhanced Oxygen Scavengers Including a Transition Metal and a Free Radical Scavenger.  
 Nanoencapsulation Techniques and Systems for Oxygen Scavenging.  
 Cyclodextrin Inclusion Complex as an Oxygen Scavenger  
 Packaging Materials Derived from Renewable Resources and Including a Cyclodextrin Inclusion Complex.  
 Films from Renewable Resources.  
 Packaging Materials Derived from Renewable Resources and including a Cyclodextrin Inclusion

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
<b>Plan</b>	0	6	
<b>Actual</b>	0	4	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Licenses

Year	Target	Actual
2010	0	0

**Output #2**

**Output Measure**

- Disclosures

Year	Target	Actual
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2010

1

2

**Output #3**

**Output Measure**

- Number of press kits distributed  
Not reporting on this Output for this Annual Report

**Output #4**

**Output Measure**

- Number of people completing educational workshops

**Year**

**Target**

**Actual**

2010

22500

16059

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of participants reporting increase 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 coalitions formed (partners, public/private, academic)
4	Number of participants reached with food safety information by volunteers who participated in an Extension training program
5	Number of new or improved food products entering the market as a result of adopting recommended practices
6	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 increase knowledge in safe food handling and nutrition

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension
- 1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	13000	18897

**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**

Over 2,549 programs were conducted, during the reporting period. Food safety and nutrition programs were delivered to children in schools and communities, adults and other food handlers. EFNEP developed more than 15 nutrition, diet and health fact sheets and 12 other articles for use in the Home and Garden Information Center([www.clemson.edu/ HGIC](http://www.clemson.edu/HGIC)) and the Nutrition Information and Resource Center([www.clemson.edu/NIRC](http://www.clemson.edu/NIRC)). Also, educational workshops were provided to Head Start centers and elementary schools in the Midlands and Low Country with Rock 'n Read using the OrganWise Guys.

**Results**

Ninety-five percent of the participants indicated that they gained knowledge. Ninety percent of participants showed improvement in one or more nutrition practices; 92% showed improvement in one or more food resource management practices (i.e., planning meals, comparing prices, using grocery lists, or not running out of food); 72% percent showed improvement in one or more food safety practices; and more than 53% of participants increased their physical activity levels.

Over 900 children at Head Start centers and elementary schools located in the Midlands and Low Country were educated on the attention-getting curriculum of the OrganWise Guys. Each participant received a book to read with their parents and information.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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
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
- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	650	306

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The National Restaurant Association has estimated that the average cost of a food-borne illness outbreak to an establishment is about \$75,000.

**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 306 food service employees received a course completion certificate, representing 199 food establishments. The food handlers can potentially affect 52,819 people.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
----------------	-----------------------

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 coalitions formed (partners, public/private, academic)

#### **2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

#### **3a. Outcome Type:**

Change in Action Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	5	73

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

Adults, young adults and children are becoming aware about their health and that of their families. Benefits are gained by engaging in activities that help reduce the risk of developing diseases and maintaining a healthy diet.

Many churches, communities and organizations are concerned with the well-being of youth and families.

##### **What has been done**

Over 4,342 persons completed educational workshops and received training through food demonstrations, meal planning reading food labels and physical activities.

To build family strengths, families were encouraged to spend quality time with each other, especially their children at least once a week.

##### **Results**

Sixty percent of the participants became more health conscious and now following a meal plan, keeping food safe and increased their physical activity.

Forty-five percent of the parents began to spend more quality time with their children either at an event, activity or eating somewhere together.

The 1890 Research and Extension program hosted an inaugural camp fair for the Orangeburg Cluster. The camp fair provided a showcase for countywide camps, such as SNAPS (Sound Nutrition and Practical Science) to enhance their program efforts. Over 20 vendors from a variety of agencies participated, i.e., YMCA, Clemson University and the Orangeburg Consortium for the Arts.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
723	Hazards to Human Health and Safety

**Outcome #4**

**1. Outcome Measures**

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

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	275	160

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

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

**What has been done**

Volunteers assisted with Food Safety and Education programs and EFNEP programs.

**Results**

Volunteers contributed over 1,538 hours of service to foods programs, which represent a \$20,000 value of program support.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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

## **Outcome #5**

### **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 Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	15	64

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

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

#### **What has been done**

Extension Specialists assisted local food processing establishments in developing food products and processes development. Commercial food processors around the USA were reached and informed about a canning workshop and over 100 processors were contacted in South Carolina through media, mail, email and phone. A national audience was reached through a website and a brochure was distributed nationally.

#### **Results**

Sixty four new or improved food products were analyzed entered the market as a result of adopting recommended practices.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
503	Quality Maintenance in Storing and Marketing Food Products

**Outcome #6**

**1. Outcome Measures**

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

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	45000	2707591

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

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

**What has been done**

Extension agents advertised nutrition, health and food safety programs through television, radio, and news articles for magazines and newspapers. Over 36 hours of radio and television programming featured the availability of fresh fruits and vegetables at farmers markets, ways to improve nutrition and health, and Farm City Week. Nutrition and health displays were presented at local schools. An "Eat Fresh" Farmers Market Day was held on the campus of SC State.

**Results**

It is estimated that over 2,707,591 persons were potentially reached through media programs.

**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
724	Healthy Lifestyle

## **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**

There is an increasing Hispanic and Latino population in South Carolina. Celebrando La Salud is an educational program focusing on nutrition and food-related practices for Hispanic/Latino adults. The program contains an educational curriculum that is designed for educators to use when teaching low-income Hispanic families with young children to learn healthy lifestyle choices.

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

### **1. Evaluation Studies Planned**

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

### **Evaluation Results**

In EFNEP, pre and post surveys were conducted. Ninety percent of participants showed improvement in one or more nutrition practices; 92% showed improvement in one or more food resource management practices (i.e., planning meals, comparing prices, using grocery lists, or not running out of food); 72% percent showed improvement in one or more food safety practices; and more than 53% of participants increased their physical activity levels.

### **Key Items of Evaluation**

**V(A). Planned Program (Summary)**

**Program # 7**

**1. Name of the Planned Program**

Community, Leadership, and Economic Development

**V(B). Program Knowledge Area(s)**

**1. Program Knowledge Areas and Percentage**

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

**V(C). Planned Program (Inputs)**

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

<b>Year: 2010</b>	<b>Extension</b>		<b>Research</b>	
	<b>1862</b>	<b>1890</b>	<b>1862</b>	<b>1890</b>
Plan	14.0	8.0	5.4	9.0
Actual	14.0	5.0	3.0	2.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
639344	419508	160070	347449
1862 Matching	1890 Matching	1862 Matching	1890 Matching
639344	219789	540102	181862
1862 All Other	1890 All Other	1862 All Other	1890 All Other
140563	0	0	0

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

The Economic and Community Development program promoted community engagement, enhancement, and improvement that is linked to sustainable economic development. Support was provided for the state and local agribusiness community, such as farmers markets. Agents organized the coastal farm-to-chef initiative focused on the distribution of local agriculture products in coastal restaurants. Agents conducted youth and adult leadership training and team building programs, promoted participation in task forces and committees, conducted board development training and organizational capacity building to nonprofit organizations.

Agents trained 115 entrepreneurs and small business owners in the FastTrac business training program in cooperation with the SC FastTrac Alliance. Sixty new farmers are being trained in cooperation with local organizations in appropriate business use for tourism-based natural resources. Through 1890, 12 businesses received technical assistance in the Rural Business Program. Three Homebuyers seminars were held. Eight homeowners received rehabilitation services.

Economic impact assessment data for agriculture and forestry was collected for selected counties in the state, analysis of the direct contribution by major agribusiness sectors was conducted, and research, collaborations, capacity building and leadership for sustainable community and economic development were fostered.

An 1890 research project is investigating Understanding the Effects of Citizen Participation and Community Development in Selected Rural and Urban Cities in South Carolina. The researcher has developed several databases for the project: (1) A database of municipal elected officials in all cities in South Carolina. The database includes the race and gender of each official. It also includes the political and governmental structure of each city. This allows an analysis of the relationship between race and community development policies. (2) A database of the distribution Community Development Block Grant funds and projects for the selected cities was studied. This allows the study to determine how federal funds are used by the cities to enhance community development. (3) A database of community development indicators was developed. This database includes employment statistics, per capita income, racial composition, housing stock, education, poverty, and travel distance to work by city, census tracts, census blocks and precinct; that cover 1980, 1990 and 2000. This database allows the study to discern what areas and neighborhoods in each city have benefited from developmental policies over the last forty years. (4) Databases of voter registration, voter participation, and voter preferences for each city by precinct for selected cities under study were developed. With the socio-economic profile of precincts and the voting data, the study interrogates the relationship between political participation and community

development. (5) Databases of community development indicators and political participation using GIS software were developed. Maps to display development across each city were created. (6) Databases of newspaper articles, city council meeting minutes and other documents have been developed in Nvivo and coded. This database allows the study to discern the major projects, issues, participants, conflicts, interests, and controversies regarding community development in rural and urban cities in South Carolina. A community development survey has been completed. Municipal officials knowledgeable of community development issues completed the questionnaire. A survey provided useful data regarding how cities in South Carolina confront community and economic development issues. Approximately 106 officials returned the survey; a return rate of 39 percent of 270 cities in South Carolina. Knowledge and data generated from the project has been integrated into the researcher's urban politics and state and local government courses, which includes the map and the socio-economic data and analysis. A final bulletin is being written for publication.

South Carolina State University 1890 is, also, conducting research focusing on The Potential of Educational Attainment, Business Climate and Investment-Based Economic Development in South Carolina. The project is analyzing factors that affect the educational attainment and investment in South Carolina and developing a model for South Carolina to accentuate the role of education and investment as sources of economic development. The major components of the study include the following: (1) An in-depth analysis of the factors affecting educational attainment in South Carolina and (2) studying the factors such as business climate that influence investment, economic development, and employment. The components will be incorporated into a model to promote educational attainment and economic development in the state. The findings of the study should provide empirical support to the state and local governmental agencies in formulating their policies and implementing the programs related to educational improvement and economic development. The data estimated the models, reported the results and prepared a paper for presentation at the 2010 International Academy of Economics and Business Conference. The paper was submitted for publication.

An 1890 researcher is studying the Examination of South Carolina's Chapter 13 Low Income Bankruptcy Filings under the New Law of 2005. The investigation is on-going. At the present, surveys are being sent out to filers.

## **2. Brief description of the target audience**

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.

### **V(E). Planned Program (Outputs)**

#### **1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	14000	2400	300	100
<b>Actual</b>	22238	750000	0	0

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

**Patent Applications Submitted**

Year: 2010  
 Plan: 0  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
<b>Plan</b>	0	8	
<b>Actual</b>	0	2	2

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Publications, business plans and housing grants

Year	Target	Actual
2010	18	12

**Output #2**

**Output Measure**

- New Products, processes, procedures and policies  
 Not reporting on this Output for this Annual Report

**Output #3**

**Output Measure**

- Total number of people completing educational workshops

Year	Target	Actual
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2010	14000	13865
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**Output #4**

**Output Measure**

- Number of board members trained

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	60	29

**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 National Issues Forums convened or moderated
5	Number of participants engaged in community promotion projects

**Outcome #1**

**1. Outcome Measures**

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

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	8000	13769

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

This program will promote engagement, community enhancement and improvement that is linked to community image, sustainable economic development, and improved quality of life for the citizens of South Carolina.

**What has been done**

Some 530 educational programs were conducted, reaching 13,850 people. Some 1,019 people participated in Palmetto Leadership, Senior Leadership and Junior Leadership programs.

**Results**

Of the 13,850 persons reached through educational programming, 99% reported a gain in knowledge. 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. The Palmetto Leadership program provided participants with a venue to give back to their community through a class service project experience. Participants were better able to grow their professional and personal networks, providing new opportunities for collaboration and more efficient and effective community service. Historically, most graduates of the leadership class will involve themselves on boards, community action groups, and task forces to help the community. Class members have become members of non-profit boards. Our last research indicated that 70% of the graduates were still involved in a responsible community project three years after graduation. Some 108 people in other programs successfully collaborated with others in the region to address an issue.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
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- 608 Community Resource Planning and Development
- 803 Sociological and Technological Change Affecting Individuals, Families, and Communities
- 806 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 National Issues Forums convened or moderated

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	8	9

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Citizens need to understand public issues and learn methods for addressing concerns in a productive manner in order to promote unified public policy.

**What has been done**

The community leadership program provides a facilitated and constructive forum where conflicting interests and policies can be addressed through the action plans of established and emerging leaders. These programs also help create the next generation of informed leaders.

**Results**

Nine National Issues Forums covered topics such as Violent Kids, Health Care Costs, and Security Jam- a public policy Internet-based dialogue regarding how to create a safer world.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

**Outcome #5**

**1. Outcome Measures**

Number of participants engaged in community promotion projects

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	100	4464

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

There is a need to assist in building local economies. The CLED program promotes engagement in community enhancement and improvement that is linked to sustainable economic development and improved quality of life.

**What has been done**

The South Carolina Adopt-A-Highway program continues to be one of the most successful litter abatement programs in the country. As a result of these efforts, 151 groups participated in 2009. A total of 22 new groups were added, far surpassing the recommended 10 new groups per year required by the South Carolina Department of Transportation's Community Relations Office.

**Results**

Across the county, 66,495.5 pounds of litter were removed from 234 miles of highway. Volunteers donated 6,012.25 hours of time to make their communities more aesthetically pleasing. Based on the 2009 estimated dollar value of volunteer time at \$20.25 per hour, this provided a savings of \$121,748.06 to our state and local government.

The two 2009 River Sweep events involved participation from a total of 71 volunteers who contributed 225 hours of service to cleaning up their local waterways. A total of 1,920 pounds of litter, 440 pounds of aluminum and steel, and 61 tires from local rivers were removed.

A series of workshops was held to help small businesses in Marion County maintain and grow their market share through e-commerce and use of social media. Classes focused on developing e-commerce opportunities and innovative ways to use social media as a business marketing tool. Two of the business owners who participated in the program now have active e-commerce sites up and running and report an increase in sales. They report that tools such as Facebook helps keep them in contact with customers. Use of these tools will allow these businesses to grow their business without relying solely on the local economy.

#### 4. Associated Knowledge Areas

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

#### 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 and Data Collection)

##### 1. Evaluation Studies Planned

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

- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

### **Evaluation Results**

Our last research indicated that 70% of the graduates were still involved in a responsible community project three years after graduation. Of the 13,850 persons attending Extension educational programs, 99% reported a gain in knowledge.

### **Key Items of Evaluation**

**V(A). Planned Program (Summary)**

**Program # 8**

**1. Name of the Planned Program**

4-H Youth Development and Families

**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%	15%	0%	10%
802	Human Development and Family Well-Being	15%	15%	0%	20%
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	10%	10%	0%	20%
806	Youth Development	70%	60%	0%	50%
	<b>Total</b>	100%	100%	0%	100%

**V(C). Planned Program (Inputs)**

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	40.0	17.0	0.0	3.0
Actual	33.0	16.0	0.0	2.5

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1166539	549245	0	392822
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1166539	287758	0	205610
1862 All Other	1890 All Other	1862 All Other	1890 All Other
256074	0	0	0

**V(D). Planned Program (Activity)**

## 1. Brief description of the Activity

4-H is a youth development educational program that is committed to assisting youth and adults in acquiring knowledge, life skills, and attitudes that will enable them to become self-directing, contributing, and productive members of society. Participants are youth ages 5-19 who are currently taking part in programs by Extension personnel in cooperation with volunteers. 4-H is characterized as being community centered, volunteer led, Extension staff supervised, research based, home and family oriented, publicly and privately funded and responsive to change.

Cooperative Extension programs were conducted to provide a wide variety of experiential educational opportunities and curricula through a number of different delivery modes such as clubs, short-term interest programs, camps, and other means. Youth participated in agriculture, natural resources and environmental stewardship, science, engineering and technology, nutrition and fitness, leadership and citizenship, and many other helpful learn-by-doing projects. Volunteers led educational programming that provided productive youth/adult partnerships. Youth from South Carolina and surrounding counties in Georgia participated in Livestock and Gardening projects.

4-H clubs were established in Hispanic communities with the help of middle school teachers and ESOL teachers. Agents have produced media programs via newspapers, newsarticles, television, radio, websites, Youtube, and other media formats.

The Youth and Family Development program at SC State provided youth with skills needed to become well- rounded students. Lessons covered leadership, conflict resolution, stress, financial management, gardening, social skills, and diversity. Programs were offered to adults that assisted youth with their overall well being. Teaching basic computer skills, providing nutrition information, and opportunities for volunteering were just a few activities provided for adults. The 4-H Extension office staff are committed to providing relevant activities that will help increase the quality of life for the citizens of South Carolina.

An 1890 research project is examining the Effects of Community Action Research and Professional Development Activities on the Roles and Partnerships of Rural Pre-Service and In-Service Teachers. The research project is investigating the effectiveness of Community Action Research Professional Development (CARPD) Intervention Model activities on the Classroom Roles and partnerships of Rural Pre-Service and In-Service Teachers in rural low-achieving schools. Approximately 30 In-Service teachers are engaged in the study.

Another 1890 research project is looking at the Impact of Culturally Relevant Teaching on Rural African American Students' Achievement. To-date, an electronic database for rural schools has been developed. Submitted 2 manuscripts for publication.

1890 is conducting research to Augmentative Communication Technology (Project ACT) for Providers and Consumers in Rural Settings. The researcher has conducted individual and small group instructional sessions on the use of augmentative communication materials and devices; made individualized assessment and intervention for community users and potential users of augmentative communication materials and devices; prepared brochures and instructional materials for dissemination to speech-language pathology students and practitioners and devised a referral form for clinicians and supervisors to submit clients to the SC State Speech-Language-Hearing Clinic needing AAC/AT assessment and intervention services. A final research bulletin is being published.

1890 is researching Barriers to Parents' Participation in Education in Rural South Carolina. The project aims to identify the barriers that must be overcome in order for parents to participate more successfully in their children's education. Parents from 8 elementary schools in the Orangeburg District 5 school system

are being interviewed in focus group sessions based on the school that the child attends and the child's grade level. In addition to the focus groups held, student assistants transcribed data from the focus group sessions, categorize information and input into NVivo software system for analysis.

**2. Brief description of the target audience**

The target audience included all youth between the ages of five and nineteen, parents and other adults interested in the development of South Carolina youth, volunteers, adult learners, teachers, policymakers, as well as social service agencies.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	3350	50	60000	45000
<b>Actual</b>	2523	1334593	93126	483965

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

**Patent Applications Submitted**

Year: 2010  
 Plan: 0  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
<b>Plan</b>	0	0	
<b>Actual</b>	0	1	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of educational workshops conducted

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	2800	3644

**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.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	340	247

**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, meeting S.C. educational standards by utilizing National 4-H Cooperative Curriculum System (4-HCCS) curriculum materials as available
2	Number of youth who gain knowledge in leadership and citizenship projects 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, meeting S.C. educational standards by utilizing National 4-H Cooperative Curriculum System (4-HCCS) curriculum materials as available

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	900	1039

### **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, 201 new volunteers were trained. These along with other volunteers taught others using approved curriculum materials.

#### **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 5,175 hours of volunteer service, which represents a \$93,150 value of program support. Volunteers reported seeing significant improvement in the children's overall reading, writing, 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 the children's self-confidence and self-pride increased.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

## **Outcome #2**

### **1. Outcome Measures**

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

### **2. Associated Institution Types**

- 1862 Extension
- 1890 Extension
- 1890 Research

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	3500	4068

### **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.

#### **What has been done**

South Carolina 4-Hers participated in statewide Ambassador Training, Senior Leadership Training, Senior and Junior Teen Weekend, and State Congress to help them serve more effectively in their leadership roles at the club, county, regional, or state levels.

#### **Results**

Coordinators and volunteers have reported that youth are learning organizational and time management skills that will be useful as they enter college.

The 1890 Extension Program collaborated with area schools and other community programs to conduct 153 leadership and basic life skills workshops to 3155 youth participants.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	350	8910

**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 of the community.

**What has been done**

Some 66 youth provided leadership in service learning community projects.

**Results**

Examples of teen leadership and service include a 4-H member who organized a Medical Supply Drive for Haiti through South Carolina 4-H Program. One elementary school and two high schools participated. Almost \$700 was collected to purchase medical supplies. The supplies were delivered to Orangeburg County where they were separated and boxed with the supplies collected from surrounding counties. The supplies were taken to Kansas where they were loaded on a container to be shipped to Haiti. Bamberg and Barnwell County 4-H Clubs collected over \$1,000 worth of medical supplies in an effort to reach his goal of collecting a truck load of supplies for the people of Haiti.

The Marion County Jr. Leadership Club teamed up with Katie's Project to distribute gowns, shoes, and other accessories to young ladies who needed them for prom. A trailer with 300 gowns, shoes, and accessories arrived at the Marion County Clemson Extension Office. Seventy-five young ladies took part in this event. Each family would have spent around \$200 to purchase these items. The Club estimated that \$15,000 was saved by Marion County families as a result of this project.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	13000	25059

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Youth need opportunities to develop assets such as communication skills, organizational abilities, wise decision-making skills, independence, and self-confidence and caring. They have opportunities for such development by participating in the 4-H Plants and Animals project.

**What has been done**

Over 718 Plants and Animals programs were conducted reaching 26,600 youth. Youth from South Carolina and surrounding counties in Georgia participated in Dairy Heifer, Livestock, Barrow, Swine, Sheep, Beef, Poultry, Gardening, Goat and Horse projects.

**Results**

In Anderson County, volunteers worked a livestock show and raised \$9,124 to host the show. 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
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	Quantitative Target	Actual
2010	1500	1076

**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. 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**

Some 1,076 youth were reached by volunteers in Science Technology and Engineering projects. S. C. 4-H teens continue training and practical application in GPS/GIS systems. Two Gifted and Talented classes were taught at elementary schools and two summer courses were taught in Robotics. Seventy-three youth completed the course.

**Results**

The youth in the Robotics course built a car from Lego blocks that contained a computer controlling device. Youth are gaining knowledge and skills in geospatial technology and systems.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
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

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension
- 1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	9000	13389

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Gaining knowledge in nutrition and fitness can help youth make decisions that will positively affect their lifestyles as they mature into adulthood.

**What has been done**

Some 640 Nutrition, Fitness, and Safety programs were conducted reaching 13,389 youth. Youth participated in programs such as Diabetes Wellness, Kids in the Kitchen, Etiquette, Healthy Lifestyles, MyPyramid, Camps, Nutrition Basics, and Color Me Healthy.

**Results**

Ninety-six percent of the youth participating in 4-H nutrition and fitness programs reported that they gained knowledge.

**4. Associated Knowledge Areas**

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

**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	Quantitative Target	Actual
2010	2300	8806

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Youth need opportunities to develop assets such as organizational abilities, wise decision-making skills, independence, and self-confidence and should demonstrate caring. They have opportunities for such development through participating in the 4-H Natural Resources and Shooting Sports project.

**What has been done**

Some 215 programs were conducted reaching over 8,846 persons. Some 677 youth participated in hunting safety programs. Youth participated in day camps and natural resource clubs in Jr. Naturalists and Fisheries, Enviroscope, Food and Cover Establishment for wildlife programs, and Recycling Clubs.

**Results**

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.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
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
- 1890 Extension
- 1890 Research

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	40	498

### **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**

Forty-one programs were conducted reaching 498 youth. Youth gave presentations and demonstrations during club and county level contests and gave speeches at community organizations promoting 4-H.

#### **Results**

Youth successfully prepared and gave presentations. They demonstrated good communication skills, organizational abilities, reasoning skills, and self-confidence.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

## **V(H). Planned Program (External Factors)**

### **External factors which affected outcomes**

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

### **Brief Explanation**

4-H clubs are being established in the Hispanic communities with the help of middle school teachers and ESOL teachers.

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

### **1. Evaluation Studies Planned**

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

### **Evaluation Results**

On average, 95% of the youth participating in 4-H Youth Development programs indicated they gained knowledge, self-confidence and organizational skills.

### **Key Items of Evaluation**

**V(A). Planned Program (Summary)**

**Program # 9**

**1. Name of the Planned Program**

Environmental Conservation for Wildlife

**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%
	<b>Total</b>	100%	0%	0%	0%

**V(C). Planned Program (Inputs)**

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	0.0	0.0	0.0
Actual	4.0	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
151510	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
151510	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
33401	0	0	0

**V(D). Planned Program (Activity)**

1. Brief description of the Activity

Master Naturalist educational programs were conducted for adults and Jr. Master Naturalists was conducted for youth. Master Wildlife programs were also conducted; some conducted as part of the online course for teachers. Agents also wrote news articles pertaining to nuisance wildlife. Agents feature newsletters pertaining to cogongrass on webpages and answer questions through Facebook. In addition, agents conducted pond clinics and programs to educate landowners/managers and Aquatic Pesticide Applicators about the most up to date control recommendations for aquatic weed management.

A Clemson Extension Specialist is a southern US partner for maintaining the national web-based clearinghouse Internet Center for Wildlife Damage Management (<http://icwdm.org>). Landowners have established recommended food plots for deer and turkey.

**2. Brief description of the target audience**

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, ranchers, poultry and swine producers, 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, children in school, after-school, summer and 4-H, programs, Extension administrators, and support staff.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	3000	1000	0	0
<b>Actual</b>	7618	164427	0	0

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

**Patent Applications Submitted**

Year: 2010  
 Plan: 0  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
<b>Plan</b>	0	0	
<b>Actual</b>	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of people completing educational workshops

2010 Clemson University and South Carolina State University Combined Research and Extension Annual Report of Accomplishments and Results

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	3000	4593

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of people reporting knowledge gained

**Outcome #1**

**1. Outcome Measures**

Number of people reporting knowledge gained

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	2500	4377

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

This program will promote 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 run environmental education programs. The South Carolina Master Naturalist Program aims 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**

The 12-week Master Naturalist course in cooperation with the State Parks Service, SC Department of Natural Resources and countless other non-profit organizations was delivered to persons throughout the state.

The majority (over 72%) of wildlife habitat in SC is owned by private landowners. In total, 113 wildlife and naturalists programs were conducted reaching 4,593 persons.

**Results**

Eighty-three previously trained and new volunteers reported Master Wildlife and Master Naturalist activities. Volunteers contributed 4,500 hours of service, which at \$20 per hour is a \$90,000 value of program support. The courses had a major impact on improving lands for wildlife and other natural resources. Graduate volunteers have developed a Junior Naturalist Program.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

#### V(H). Planned Program (External Factors)

##### External factors which affected outcomes

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

##### Brief Explanation

As state resources become more limited it is important to look to other sources of labor to help maintain the natural spaces and help run environmental education programs. The SC Master Naturalist Program addresses this issue.

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

##### 1. Evaluation Studies Planned

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

##### Evaluation Results

Of the 4,593 persons participating in Environmental Conservation for Wildlife educational programs, 95% reported a gain in knowledge.

##### Key Items of Evaluation

**V(A). Planned Program (Summary)**

**Program # 10**

**1. Name of the Planned Program**

Sustainable Forest Management

**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%	0%	0%
124	Urban Forestry	20%	0%	0%	0%
	<b>Total</b>	100%	0%	0%	0%

**V(C). Planned Program (Inputs)**

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	6.0	1.0	1.0	0.0
Actual	1.0	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
7185	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
7185	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
84987	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**

Private landowners, loggers, professional resource managers, foresters and other natural resource professionals, road building and site preparation contractors, family forest landowners, consulting foresters that assist private landowners, and the general public

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	3300	400	0	0
<b>Actual</b>	1560	54	0	0

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

**Patent Applications Submitted**

Year: 2010  
 Plan: 0  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
<b>Plan</b>	0	4	
<b>Actual</b>	0	4	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of people completing educational workshops

Year	Target	Actual
2010	3100	192

**Output #2**

**Output Measure**

- Disclosures

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	0	0

**Output #3**

**Output Measure**

- New Products, Processes, Procedures and Policies

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	1	0

**Output #4**

**Output Measure**

- Percent increase of outside funds for grants, contracts and gifts

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	6	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 landowner acres impacted.

## **Outcome #1**

### **1. Outcome Measures**

Number of people reporting increased knowledge

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	2300	188

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

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. This program will promote the use of Best Management Practices of forest systems and other natural resources to improve South Carolina's forest productivity and promote natural resource conservation.

#### **What has been done**

Extension agents developed and provided 9 educational programs on alternate income opportunities for landowners, reaching 192 persons. Tax accountants participated in a Timber Tax Workshop. Information was made available to assist landowners with the new tax laws to help them gain the most profit from their timber operation.

The Area Forest and Wildlife Agent partnered with the South Carolina Forestry Commission and the U.S. Forest Service to offer a training on identifying and managing the impacts of Heterobasidion Root Disease. The program was held in Hampton and was attended by natural resource professionals, consulting foresters, and Forestry Commission service foresters. The program consisted of field investigations to identify the fungus, survey techniques to use, and discussions on how to manage infected stands and strategies to prevent infection.

#### **Results**

After participation in the Timber Tax workshop, 100% of the accountants indicated they had gained knowledge on the new tax laws; 95% indicated they will be better prepared to advise their clients in the new tax laws.

The Heterobasidion Root Disease program consisted of field investigations to identify the fungus,

survey techniques to use, and discussions on how to manage infected stands and strategies to prevent infection. In follow-up surveys, participants indicated they managed more than 685,000 acres of root rot susceptible sites on the Coastal Plain of South Carolina. They said that the information received from the training would help them save an estimated \$425,000 and earn an estimated \$188,000 in the future when managing their clients' timber resources on susceptible sites.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources

**Outcome #2**

**1. Outcome Measures**

Number of landowner acres impacted.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	14000	685000

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The Sustainable Forest Management program promotes the use of Best Management Practices of forest systems and other natural resources to improve South Carolina's forest productivity and promote natural resource conservation.

**What has been done**

Sustainable Forestry educational programs were delivered to 192 people. Ten landowners or managers participating in the Coordinated Pine Management in Conservation Landscapes tour owned or managed more than 68,000 acres of forest land.

**Results**

These programs increased the number of acres of forests in South Carolina using sustainable forestry practices, restored longleaf pine ecosystems and facilitated the conservation of ecosystems. Those participating in the Pine Management tour reported that they gained knowledge and that the information will help them improve the management of their lands for

conservation values by improving the use of prescribed fire on 43,000 acres of land. Additional evaluation is planned. Accounting for the Heterobasidion Root Disease Program reported earlier, over 685,000 acres have been impacted.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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 and Data Collection)**

##### **1. Evaluation Studies Planned**

- After Only (post program)
- Retrospective (post program)
- During (during program)

##### **Evaluation Results**

Of the 192 people attending Sustainable Forest Management Programs, 98% reported that they gained knowledge.

##### **Key Items of Evaluation**

**V(A). Planned Program (Summary)**

**Program # 11**

**1. Name of the Planned Program**

Global Food Security and Hunger

**V(B). Program Knowledge Area(s)**

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
202	Plant Genetic Resources	5%	5%	0%	5%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	0%	10%	0%
204	Plant Product Quality and Utility (Preharvest)	20%	10%	10%	10%
205	Plant Management Systems	20%	10%	5%	5%
211	Insects, Mites, and Other Arthropods Affecting Plants	10%	10%	0%	5%
212	Pathogens and Nematodes Affecting Plants	20%	5%	10%	10%
213	Weeds Affecting Plants	5%	5%	0%	0%
215	Biological Control of Pests Affecting Plants	5%	5%	0%	15%
216	Integrated Pest Management Systems	5%	5%	0%	5%
301	Reproductive Performance of Animals	0%	0%	10%	5%
302	Nutrient Utilization in Animals	0%	10%	5%	5%
303	Genetic Improvement of Animals	0%	5%	10%	5%
304	Animal Genome	0%	0%	10%	0%
305	Animal Physiological Processes	0%	0%	5%	0%
307	Animal Management Systems	0%	10%	10%	5%
311	Animal Diseases	0%	0%	10%	0%
601	Economics of Agricultural Production and Farm Management	5%	10%	0%	10%
604	Marketing and Distribution Practices	5%	5%	0%	10%
701	Nutrient Composition of Food	0%	5%	5%	5%
	<b>Total</b>	100%	100%	100%	100%

**V(C). Planned Program (Inputs)**

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890

Actual	34.0	7.5	8.8	3.0
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**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1565765	294634	300000	556159
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1565765	154367	600000	291101
1862 All Other	1890 All Other	1862 All Other	1890 All Other
343752	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

This year programs focused on Risk Management for Agricultural Farms, Agricultural Bio-security, Sustainable Agricultural Production Systems, Pesticide Applicator Training, Horticultural Crop Management and Integrated Pest Management. Programs included nematode and rust management for soybean, nutrient management for corn and soybean, foliar disease management for corn, and zone management for precision agriculture. Results were the increased efficiency of water utilization and crop growth.

Horticultural crop production practices include variety selection and pest management for commercial producers of vegetables, peaches and other fruits. Horticulture crops programs were conducted, reaching over 8,640 people. Extension personnel reported that recommended Horticulture integrated crop management (ICM) practices were adopted on over 532,798 acres. Over 103,694 acres were planted in high-value crops such as kohlrabi, cilantro and leeks. Extension programs support the "S.C. Grown" initiative of the state Agriculture Department for fruits, vegetables and herbs. The National eOrganic Project has expanded as the organic agriculture Extension Service website: [www.eorganic.info](http://www.eorganic.info). Evaluation programs provided growers with comprehensive and updated information on performance so that they can make informed decisions, especially about the selection of profitable peach varieties for new plantings. In addition, agents promoted and encouraged activities that foster sustainable agricultural practices and policies.

Clemson Scientists saved peach growers \$20 million by developing a test to target treatment for brown rot, reducing fungicide use and preventing yield loss. Peaches are a \$64 million crop in South Carolina.

About 130 agricultural plants in the United States are pollinated by bees, and the annual value of honey bee pollination to U.S. agriculture is estimated at over \$9 billion. The honey bee is facing serious challenges from pests and diseases. Research on integrated pest management approaches at Clemson have been expanded on the small hive beetle that feeds on honey and pollen in the hive, fouls the honey and destroys bee food supplies. Clemson scientists have identified optimal pesticide applications to keep the pest population below the economic injury level. Some beekeepers in the Southeast cut costs and losses \$2,000 by using improved pest management practices.

The 1890 Vegetable Production System (Commercial vegetable production and marketing, Home and

Community gardening projects) is designed to engage small part-time and limited resource farmers and producers in the production and marketing of local grown, fresh produce, such as cabbage, collards, corn, etc. Commercial producers and home gardeners are taught updated agriculture practices and techniques to include sustainable agriculture practices and (IPM) to render their small farm and gardening projects productive, profitable and sustainable. Activities include production meetings, workshops, field demonstrations, farm tours and one- on-one training.

At 1890 Research, scientists are conducting the following studies: (1) Molecular Analysis of Responses to Male Pheromones in *Drosophila*. The research responsibilities consisted of the following: the fruit fly culture, including the raising, the collecting, and the sorting by sex; and the observing and the analyzing of the fruit fly mating behavior. Background controls for stocks of insertion mutants have been tested for mating speed. Sample size of mating data for wild caught lines was increased. Mating data for four RNAi lines were obtained. One paper was submitted to PLOS for publication. (2) Economic Impacts of International Trade and Domestic Policies on Southern Agriculture. The researcher completed a matrix of world trade flows in melons and cucumbers and complete the estimation. Designed generalized gravity models of international trade in melons and cucumbers. Set-up codes for regional free trade groups to include NFATA, EU, ASEAN, MERCOSUR, AND COMESA, and MAGREB NATIONS. Implemented the exchange rate volatility formula and addressed the impacts of exchange rate volatility on trade flows.

(3) Another researcher focused on the Innovative, Reduced-risk Management Strategies for Anobiidae Pest in Stored Products Environments. Trapping programs were continued in four different feed and flour mills in the state of South Carolina using lures (pheromone and kairomone) for *L. serricornis*, and three different designs of traps. Traps were monitored weekly/biweekly and *L. serricornis* caught in traps were counted and collected for further analysis. Ten different stored product insect species are being raised in the laboratory and colonies are maintained regularly. (4) Another research is experimenting with the Characterization and Application of *Sphingomonas* PAH Utilization Mutants. The overall objectives of the investigation are to characterize the genes, disrupted via transpositional mutagenesis, involved in polycyclic aromatic hydrocarbon (PAH) degradation in two novel *Sphingomonas* strains, enhance the expression of the genes, and to apply the enhanced strains to PAH contaminated soils to assess their effectiveness in bioremediation. The possibility of applying these strains to marine water contaminated with PAHs is also possible, if the strains are viable in this environment. To answer what has been done: bacteria has been cultured in the medium R2A and tested for purity. Assays are being developed to assess the bioremediation capacity of the different cultures. Briefly, seven milliliters of individual cultures are aliquotted into 20ml GC-headspace vials, allowing for about 13 ml of air. The presterilized vial is crimp-sealed with a teflon-lined septum. The entire vial contents will be extracted when necessary, so duplicates for each timepoint and variable tested were prepared. Substrates (5mM) were delivered in the carrier solvent hexanes (at most 250ul, usually 25ul) and included 10 n-Alkanes, 4 n-Alkanes, phenanthrene and pyrene. The 10 n-Alkane substrate stock was as follows in 1mg/ml concentrations Decane, Dodecane, Tetradecane, Hexadecane, Octadecane, Eicosane, Docosane, Tetracosane, Hexacosane, and Octacosane; and the four n-Alkane mix was Decane, Dodecane, Tetradecane, Hexadecane. A Generalized Gravity Model of international trade in vegetables has been specified for each crop. The model has been adjusted to account for the unique characteristics of vegetable production, exports, and trade. It is estimated using the econometric techniques of random and fixed estimation models required for panel data analysis (RATS, 2008) and used to compute potential import trade creation and export diversion effects. The results will identify economic and noneconomic factors affecting the flows of trade in the above vegetables. We have evaluated the impacts of the exchange rate volatility on trade flows. Also, we have addressed the impacts of short term exchange rate volatility from long term exchange rate volatility. Finally, (5) another study investigated whether burning candles could be hazardous for human health, and if so, which particular categories of candles were more dangerous. Also, burning candles produce soot, which certainly could damage furniture, carpets, beddings, walls, etc. Economically, it is undesirable for the users. The research has been completed and a bulletin is being published.

**2. Brief description of the target audience**

The research has the potential to address food security needs for vulnerable populations in the US and around the world. In addition, training will reach producers, small farmers, Extension personnel, producers, horticultural and agronomic crops businesses, agency personnel, and homeowners.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	{NO DATA}	{NO DATA}	{NO DATA}	{NO DATA}
<b>Actual</b>	67763	310875	179	128

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

**Patent Applications Submitted**

Year: 2010

Plan:

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
<b>Actual</b>	0	20	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of people completing educational workshops

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	{No Data Entered}	22942

**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

**Outcome #1**

**1. Outcome Measures**

Number of people reporting increased knowledge

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	{No Data Entered}	22142

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

This program will develop and implement agricultural and horticultural production systems in South Carolina that are economically sustainable, safe and environmentally sound. Commodities and communities will be protected with environmentally and economically sound practices, which will result in abundant, high quality supplies of food and fiber products and improved quality of life.

**What has been done**

Some 511 programs were conducted reaching 22,144 persons. Some programs focused on Integrated Crop Management for Horticultural Crops such as blackberries, strawberries, watermelon, collards, cabbages, corn and peaches. Agents assessed for possible freeze damage to peaches. They answered calls regarding plant disease for commercial businesses and individual landowners. Beekeeping programs were conducted. Specialists taught drip irrigation water management for vegetable production and taught sessions on nutrient mitigation and remediation. Agents produced and delivered programs and information for media, including TV, radio, websites and newsletters.

Specialists made presentations at national professional association meetings.

**Results**

Of the 22,144 persons participating in educational programs, 95% reported a gain in knowledge. Eighty percent of the individuals adopted practices and 20% planned to adopt.

**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
- 213 Weeds Affecting Plants
- 216 Integrated Pest Management Systems
- 604 Marketing and Distribution Practices

**Outcome #2**

**1. Outcome Measures**

Number of acres affected by integrated crop management

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension
- 1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	{No Data Entered}	532798

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

This program will develop and implement agricultural and horticultural production systems in South Carolina that are economically sustainable, safe and environmentally sound. Commodities, homes, and communities will be protected with environmentally and economically sound practices, which will result in abundant, high quality supplies of food and fiber products and improved quality of life.

**What has been done**

Over 532,798 acres were affected by Integrated Crop Management. Integrated Pest Management(IPM) strategies were applied on 43,485 acres of collards and 150,000 acres of

**Results**

In the area of Sustainable Production Systems for Agronomic Crops, the gross value of Soybean Production in S.C. is \$139 million. The potential yield loss due to Asian Soybean Rust is \$13,900,000. Based on CU recommendations, South Carolina growers spray less than 25% of the total acreage for rust only once at a cost of less than \$8 per acre = \$1,180,000. Less than 1% of the South Carolina soybean crop is lost to rust = \$1,390,000. (Cost of needed protective sprays

is \$1,180,000; rust cost S.C. soybean industry is \$2,570,000; cost of original projected 20% yield loss in South Carolina is \$27,800,000. The savings to growers is \$25,230,000.) The research on selected soybean seeds showed that the seeding rates can be reduced by 40% if soybeans are planted during the optimum planting window. With this reduction, the savings would be \$18 per acre, about a \$10 million savings for SC growers; therefore, the profitability of soybeans can be significantly increased with reduced seeding rates.

Preliminary trials of a string bloom thinner in South Carolina peaches show that labor costs to remove green fruit, 35 DAFB (days after full bloom), were reduced by \$111 to \$137 per acre. While this was the targeted outcome, the amount of fruit greater than 3 inches in diameter increased by 15-22%. This affords both a costs savings and an increase in product value. With production acreage in South Carolina increasing as well as labor and other production costs rising, continued research is underway to fine tune equipment and operational function of the equipment. Hopefully, this will lead to grower acceptance and commercial field application.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
202	Plant Genetic Resources
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
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

#### V(H). Planned Program (External Factors)

##### External factors which affected outcomes

- Economy
- Competing Public priorities

##### Brief Explanation

With production acreage in South Carolina increasing as well as labor and other production costs rising, continued research is underway to fine tune equipment and operational function of the equipment. Hopefully, this will lead to grower acceptance and commercial field application.

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

### **1. Evaluation Studies Planned**

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

### **Evaluation Results**

Over 511 programs were conducted reaching 22,942 participants. Of those participating, 95% reported a gain in knowledge.

### **Key Items of Evaluation**

**V(A). Planned Program (Summary)**

**Program # 12**

**1. Name of the Planned Program**

Sustainable Energy

**V(B). Program Knowledge Area(s)**

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	0%	0%	40%	0%
123	Management and Sustainability of Forest Resources	100%	0%	0%	0%
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	20%	0%
402	Engineering Systems and Equipment	0%	0%	10%	0%
511	New and Improved Non-Food Products and Processes	0%	0%	30%	0%
	<b>Total</b>	100%	0%	100%	0%

**V(C). Planned Program (Inputs)**

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	3.0	0.0	2.1	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
113991	0	80000	0
<b>1862 Matching</b>	<b>1890 Matching</b>	<b>1862 Matching</b>	<b>1890 Matching</b>
113991	0	140000	0
<b>1862 All Other</b>	<b>1890 All Other</b>	<b>1862 All Other</b>	<b>1890 All Other</b>
25051	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

The Clemson University Extension Service staff developed and conducted educational programs to inform landowners about best management and conservation practices and continue to advise farmers on switchgrass as bio-fuel.

A market was developed for switchgrass as a biofuel, leading to a \$20 million annual contract for South Carolina growers to sell switchgrass to European power plants.

Researchers are analyzing sorghum to improve its ability to be converted to ethanol. Additionally, the research will provide data that will help producers of related crops, including corn, rice and turfgrass. South Carolina uses nearly 2.5 times more energy than it produces, according to U.S. Energy Information Administration. While the state does not have oil, natural gas or coal resources, biofuels from crops show promise as renewable energy sources that can be produced here.

**2. Brief description of the target audience**

Research and extension programming in sustainable energy impacts all the citizens of South Carolina as power and fuel consumption grows with the population, along with the costs. New fuel options and new approaches to the generation of energy which can be environmentally safe and cost effective will be critical to growing the state's economy in the future.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	{NO DATA}	{NO DATA}	{NO DATA}	{NO DATA}
<b>Actual</b>	4644	369300	0	0

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

**Patent Applications Submitted**

Year: 2010

Plan:

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
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<b>Actual</b>	0	8	0
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**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of people completing educational workshops

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	{No Data Entered}	2572

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	New income sources for South Carolina farmers by finding markets for crops which can be converted to energy
2	Number of people gaining knowledge

**Outcome #1**

**1. Outcome Measures**

New income sources for South Carolina farmers by finding markets for crops which can be converted to energy

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	{No Data Entered}	1

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The identification of alternative energy sources is a critical national and international issue because of the limited availability of petroleum products and the volatility in prices.

**What has been done**

Clemson has conducted extensive research and field testing to determine best practices for the production of switchgrass in the Southeastern United States.

**Results**

Researchers at the Pee Dee Research and Education Center in Florence have teamed with a Charleston South Carolina company to begin supplying switchgrass to European power plants as a substitute for coal to generate electricity.

Carolina-Pacific LLC will ship more than 350,000 tons of switchgrass per year beginning in 2012. The initiative will be worth more than \$20 million a year to the state of South Carolina farmers during the next decade. This initiative will be a huge benefit to South Carolina farmers and rural communities along the I-95 corridor.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

**Outcome #2**

**1. Outcome Measures**

Number of people gaining knowledge

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	{No Data Entered}	2486

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Forestry and crops for bioenergy production can contribute to the goal of energy independence for the country. In addition, many landowners are unaware of best practices for broadening sustainable forestry on their land.

**What has been done**

The Clemson University Cooperative Extension Service staff developed and conducted educational programs to inform landowners about best management and conservation practices. Over 64 programs were conducted. Thirty-one loggers received logger education certification. In addition, agents are serving as a part of the eXtension Community of Practice for wood energy, serving on statewide bio-energy committees, advising farmers on switch grass as bio-fuel and making presentations to advisory councils on alternative fuels for the 4-H Science, Engineering and Technology program.

**Results**

Of the 2,572 persons participating in educational programs, over 97% reported a gain in knowledge.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
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
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

### **Brief Explanation**

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

### **1. Evaluation Studies Planned**

- After Only (post program)
- Retrospective (post program)
- During (during program)

### **Evaluation Results**

Post program evaluations reveal that of the 2,572 persons participating in educational programs, over 97% reported a gain in knowledge.

### **Key Items of Evaluation**

**V(A). Planned Program (Summary)**

**Program # 13**

**1. Name of the Planned Program**

Childhood Obesity

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
703	Nutrition Education and Behavior	50%	45%	0%	55%
723	Hazards to Human Health and Safety	5%	30%	0%	10%
724	Healthy Lifestyle	45%	25%	0%	35%
	<b>Total</b>	100%	100%	0%	100%

**V(C). Planned Program (Inputs)**

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	14.0	3.0	0.0	2.0

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	90880	0	215005
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	47621	0	112541
1862 All Other	1890 All Other	1862 All Other	1890 All Other
813746	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. Good nutrition is important not only because it promotes a feeling of well-being, but it also has an important role in disease prevention. Activities included summer and day camps, programs through schools and childcare centers, churches and community centers were held.

Agents and specialists developed nutrition curriculum, kits, videos, and media programs to reach children. Specialists are conducting menu analysis at facilities that serve children. Partnerships were formed between the Center for Healthy Living, the Youth Learning Institute, the Department of Food Science and Human Nutrition to position Clemson University to be a national leader in addressing the obesity epidemic.

Researchers are developing new crops for health conscious consumers seeking enriched fruits and vegetables. In South Carolina, about 60 percent of the population is obese or overweight and over 20 percent of children are obese. Obesity related medical costs amount to about \$1 billion in South Carolina. Research on environmental factors can influence phytochemicals, which offer health benefits and can be used to develop practical ways to improve productivity of greenhouse. Small sustainable farmers can especially benefit with value-added produce. With increasing knowledge of the importance of vegetables in the diet, vegetable consumption is increasing about 15 percent per year.

An 1890 research is concentrating on An Integrated Approach to the Prevention of Obesity in High Risk Families. Previous methods to prevent obesity and interventions to promote weight loss/weight control have been unsuccessful at stemming the increase in weight gain among both children and adults. Low income and minority populations are especially vulnerable to obesity, but reasons are unknown. It is clear the causes of obesity are multi-factorial involving complex interactions between physiological, behavioral, social, and environmental variables. The researcher has conducted an expert field review of key behavioral measures purported to contribute to excessive weight gain in children aged 4-10 years old and assessed parent-child interactions in the target population as they relate to key behaviors identified as being associated with resilience to overweight.

Another researcher is Exploring African American College Students' Health Orientations and Behaviors. Exploring the health status of African Americans remains an important topic for public health researchers and government agencies (Centers for Disease Control and Prevention, 1998; Duncan, 2003). The incidence of obesity impacts African Americans at a high rate (Kumanyika, Gary, Lancaster et al., 2005). However, it is well known that eating fruits and vegetables improves an individual's health over his or her lifetime (U.S. Department of Health and Human Services & U.S. Department of Agriculture, 2005). Despite this fact, research shows that African Americans are less likely to consume an appropriate and daily amount of vegetables and fruits (Moser, Green, Weber, & Doyle, 2005). The study explores issues to examine the impact of nutrition, physical activity, and perceptions of health concerns on students' attitudes and behaviors. To-date, the researcher has critically reviewed and summarized 20 relevant research articles, (b)analyzed 10 articles related to health orientations of African American College Students and (c) analyzed the methodology in 10 studies pertaining to Health Orientation research.

## **2. Brief description of the target audience**

The research has the potential to impact a significant portion of the citizens in the state, since 60% is estimated to be obese or overweight. There is also the real potential of reducing medical costs in the state. Parents, youth, those enrolled in EFNEP and SNAP-ed are the target audiences. For the 1890 Program, emphasis was, specifically, placed on food stamp recipients, low-income individuals, EFNEP--limited resource families, youth, and the general public.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	{NO DATA}	{NO DATA}	{NO DATA}	{NO DATA}
<b>Actual</b>	0	0	53360	38719

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

**Patent Applications Submitted**

Year: 2010

Plan:

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
<b>Actual</b>	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of people completing educational workshops

Year	Target	Actual
2010	{No Data Entered}	55439

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of people gaining knowledge to prevent childhood obesity.

**Outcome #1**

**1. Outcome Measures**

Number of people gaining knowledge to prevent childhood obesity.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension
- 1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	{No Data Entered}	34996

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

In South Carolina, about 60 percent of the population is obese or overweight and over 20 percent children are obese. Overweight, obesity and the associated risk factors of unhealthy eating and inadequate amounts of physical activity increase the risk for developing other chronic conditions such as diseases, such as diabetes, cardiovascular disease, certain cancers, arthritis, sleep apnea, and depression. Obesity related medical costs amount to about \$1 billion in South Carolina.

**What has been done**

Over 4,084 educational programs were conducted reaching approximately 55,439 children. A series of Expanded Food and Nutrition Education Programs were conducted for 1810 families and 13,142 children and youth limited resource adults to improve nutrition, food safety, food resource management, food security, and physical activity practices.

Children of all ages from elementary, middle, and high school were reached through Veg-Olympics, Chef Combo, MyPyramid, gardening projects, Color Me Healthy, Zest Quest, EFNEP and SNAP-ed. Parents and Childcare Providers were reached through trainings. In addition, Extension Specialists are conducting nutrient analysis of menus at a local daycare and at the Youth Learning Institute. Specialists are also adapting the Chef Combo curriculum into Spanish for children ages 3-5.

**Results**

More than 7,280 volunteer hours were contributed for the project. Ninety-five percent of the participants indicated that they gained knowledge. Ninety percent of participants showed

improvement in one or more nutrition practices; 92% showed improvement in one or more food resource management practices (i.e., planning meals, comparing prices, using grocery lists, or not running out of food); 72% percent showed improvement in one or more food safety practices; and more than 53% of participants increased their physical activity levels.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
723	Hazards to Human Health and Safety
724	Healthy Lifestyle

#### V(H). Planned Program (External Factors)

##### External factors which affected outcomes

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

##### Brief Explanation

Several curriculums are being designed for Spanish speaking audiences.

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

##### 1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

#### Evaluation Results

Eighty-eight percent of participants in the EFNEP program showed improvement in one more nutrition practices; 87% showed improvement in one or more food resource management practices (i.e., planning meals, comparing prices, using grocery lists, or not running out of food); 66% percent showed improvement in one or more food safety practices; and more than 48% of participants increased their physical activity levels.

#### Key Items of Evaluation

**V(A). Planned Program (Summary)**

**Program # 14**

**1. Name of the Planned Program**

Climate Change

**V(B). Program Knowledge Area(s)**

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	0%	0%	40%	0%
132	Weather and Climate	0%	0%	20%	0%
135	Aquatic and Terrestrial Wildlife	0%	0%	40%	0%
	<b>Total</b>	0%	0%	100%	0%

**V(C). Planned Program (Inputs)**

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	0.5	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	25542	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	25542	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**

Climate change and global warming will affect our food supply. South Carolina is the No. 2 peach-producer in the nation and growers are concerned. Many fruit and nut trees need sufficient chilling hours to make fruit, and the trees also need to be hardy enough to withstand a late frost.

Researchers are examining dormancy and chilling of fruit trees in South Carolina. Focusing on peach trees, research could help breeders and growers develop trees better attuned to the local winter environment. The genetic and cellular signals that begin dormancy and the developmental events involved in bud formation and non-growth seasonal phases are being examined.

**2. Brief description of the target audience**

Federal, state and local agencies

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	{NO DATA}	{NO DATA}	{NO DATA}	{NO DATA}
<b>Actual</b>	0	0	0	0

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

**Patent Applications Submitted**

Year: 2010  
 Plan:  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
<b>Actual</b>	0	6	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Disclosures

Year	Target	Actual
2010	{No Data Entered}	0

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	New knowledge to assist growers deal with the impact of climate change

### **Outcome #1**

#### **1. Outcome Measures**

New knowledge to assist growers deal with the impact of climate change

#### **2. Associated Institution Types**

- 1862 Research

#### **3a. Outcome Type:**

Change in Condition Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	{No Data Entered}	0

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

Climate change impacts individuals and businesses along the coast and growere all across the state.

##### **What has been done**

This is a new program and work on coastal sea levels and changes in crop strategies

##### **Results**

Results should begin to appear in subsequent years

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
101	Appraisal of Soil Resources
132	Weather and Climate
135	Aquatic and Terrestrial Wildlife

## **V(H). Planned Program (External Factors)**

### **External factors which affected outcomes**

- Public Policy changes
- Government Regulations
- Competing Public priorities

### **Brief Explanation**

Concerns about the longer term impact of climate change are often overshadowed by more immediate economic concerns.

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

### **1. Evaluation Studies Planned**

### **Evaluation Results**

### **Key Items of Evaluation**