V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Sustainable Agriculture Production for (non-food) Horticultural Crops

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	10%	0%
202	Plant Genetic Resources	20%	0%	5%	0%
204	Plant Product Quality and Utility (Preharvest)	15%	0%	10%	0%
205	Plant Management Systems	15%	0%	15%	0%
211	Insects, Mites, and Other Arthropods Affecting Plants	10%	0%	15%	0%
212	Pathogens and Nematodes Affecting Plants	15%	0%	10%	0%
215	Biological Control of Pests Affecting Plants	10%	0%	10%	0%
216	Integrated Pest Management Systems	10%	0%	20%	0%
601	Economics of Agricultural Production and Farm Management	5%	0%	5%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	22.0	7.0	9.3	3.0
Actual Paid Professional	24.0	0.0	5.6	0.0
Actual Volunteer	5.0	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**
787391	0	563879	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
787391	0	930414	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

Experiments were conducted to determine the effect of fertilizer concentration applied to stock plants on cutting production, cutting quality, postharvest performance and rooting in propagation. This research provided new guidelines for the improved production, transport and propagation of un-rooted cuttings that have been implemented by South Carolina growers.

New management strategies for insect pests of cotton have saved South Carolina cotton producers millions of dollars and resulted in additional profit due to optimal timing of insecticide use. Results from research to develop treatment thresholds for bollworm in transgenic cotton suggest that available transgenic technologies will likely require different pest management strategies.

New methods developed for detecting pathogens in plants, soil, and water are being used for national regulatory issues involving the organism that causes Ramorum blight on numerous ornamental plant species shipped all over the country and Sudden Oak Death in the coastal forests of California and Oregon and. These new strategies should enhance detection of this quarantined pathogen and limit its spread and ultimately result in improved plant health, increased profitability for ornamental crop producers and retailers, and more sustainable landscapes and forests.

Turfgrass researchers have determined that by switching golf greens to bermudagrass, from bentgrass, a golf course can realize a $7,000 savings in maintenance costs per acre. Work continued to determine BMPs for growing desirable turfgrassses with minimal inputs to support the SC golf course industry.

An environmentally sustainable water treatment system, called a constructed wetland system, developed by Clemson research is serving the nursery and greenhouse industries. Tailored to manage nutrient, pesticide and pathogen contaminants, it can provide an environmentally sound and economically feasible alternative to traditional systems. Results from this research showed measurably cleaner water using the new system. Nitrogen, phosphorus, temperature and Phytophthora spp. colony-forming units were consistently lower after water was treated in the constructed wetland.

Fine-root activity is a crucial determinant of plant productivity, ecosystem nutrient cycling and global carbon sequestration. A multi-year study was completed on soil compaction and amendment treatments for urban trees, using the latest miniature camera equipment and RootFly minirhizotron image analysis software. Statistical models were developed that relate urban tree root growth to soil water content and

temperature. Mulch was found to be the most effective of the individual treatments, increasing both organic matter and water content of the soil.

The U.S. micro-propagation industry, with more than 150 laboratories nationwide, is under pressure from low-cost imports. Research to lower the cost for U.S. laboratory production of plant material yielded progress in developing a liquid-matrix system that prevents hyperhydricity in sensitive plants, both herbaceous and woody. Specific nutrients also were identified that are critical to the subsequent growth of laboratory plants in greenhouse nurseries. Response surface methods and experimental platforms have been developed to allow in vitro biologists to refine media formulations for critical applications.

In Extension, programs such as Turfgrass and Landscape Maintenance, Professional Turf School, Tree Planting, and designing and constructing sustainable landscapes were conducted. Meetings were held with the Southern Region Integrated Pest Management group to discuss a smart-phone app that the group is developing. Agents conducted media programs and made information available through websites.

Research focused, using techniques available through biotechnology, on ways to eradicate, contain and manage viral diseases impacting fruit in SC as well as increaseing the capacity to manipulate and control pest species such as the fruitfly.

Economic impact of international institutions (WTO, IMF, World Bank) and trade agreements on the competitiveness of southern agriculture were reviewed. Presentations were documented outlining information identified by the researchers. The researchers investigated the dispesiral of L. serricorne among habitats by defining food resource use pattern and dietary history.

2. Brief description of the target audience

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

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	13382	1742809	103	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	2	13	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Disclosures

Year	Actual
2012	1

Output #2

Output Measure

- Licenses

Year	Actual
2012	0

Output #3

Output Measure

- Number of people completing horticultural educational workshops

Year	Actual
2012	13382

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of Master Gardeners reporting activities and programs
2	Number of participants gaining knowledge

Outcome #1

1. Outcome Measures

Number of Master Gardeners reporting activities and programs

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2839

3c. Qualitative Outcome or Impact Statement

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

What has been done
Master Gardener and Jr. Master Gardener trainings were conducted. Master Gardeners received certification and contributed service in their communities. One example of MG activities was work done by the Lexington County Master Gardener Volunteers. They designed and installed an educational memorial garden at the Lexington County Extension Office for the purpose of beautifying county property, educated the residents of Lexington County about horticulture by labeling plant material, and remembering those LCMGV who have faithfully served the South Carolina Master Gardener Program in Lexington. Other MG projects included collecting and sending out weekly soil samples, conducting plant clinics, native plant tours, and school garden programs.

Clemson Extension and The City of North Charleston, Department of Recreation partnered with support from SCDHEC/ACHIEVE/ Keep North Charleston Healthy, completed the installation of three community gardens in North Charleston. A Junior Master Gardener Club was started in October. Students have applied the knowledge that they have learned about plants that grow in the Charleston area. They hand delivered 60 potted plants that they painted to Twin Oaks Nursing Home patients and entertained patients. During the Carolina Yard and Animal Tour, students painted bird houses and pots for Carolina Yards. Students now have three community gardens in North Charleston. A fall crop of lettuces, broccoli, mustard and herbs was planted on September 9th, the National Day of Caring with the help of Trident United Way volunteers. The community garden has provided vegetables for students at each JMG meeting and community members continue to harvest for their use.

Results
Master Gardeners reported adopting sound horticultural practices and they are improving their communities through beautification projects and community service. Some 57,525 hours of service was contributed, which represents a value of $1,035,450 in program support.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Number of participants gaining knowledge

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	12851

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 1,696 horticultural programs were conducted reaching 13,382 persons. Programs this year included Turfgrass and Landscape Maintenance, Professional Turf School, Tree Planting, and designing and constructing sustainable landscapes. Meetings were held with the Southern Region Integrated Pest management group to discuss a smart-phone app that the group is developing. Agents conducted trainings for Master Gardeners and community organizations.

A total of 12,672 consumers received information through HGIC Information Center. There were

almost 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.

In addition, South Carolina growers produced a cotton crop valued at $211,848,000. Over 40,000 acres of sod and nursery/field grown floriculture were affected by Extension programming. A Tobacco Research and Demonstration Plot Tour was conducted during the summer.

Results
Of the 13,382 persons participating in horticultural programs, 96% reported a gain in knowledge. In addition, 176 people were certified as new Master Gardeners.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Local government and non-profit partnerships created)

Brief Explanation

Clemson Extension and the North Charleston Department of Recreation partnered with support from SCDHEC/ACHIEVE/ Keep North Charleston Healthy. .... .

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Of the 13,382 persons participating in horticultural programs, 96% reported a gain in knowledge.

Key Items of Evaluation

Turfgrass researchers have determined that by switching golf greens to bermudagrass, from bentgrass a golf course can realize a $7,000 savings in maintenance costs per acre .