2010 North Carolina A&T State University Research Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 05/19/2011

I. Report Overview

1. Executive Summary

OVERVIEW

The School of Agriculture and Environmental Sciences (SAES) continues to focus on its six strategic program initiatives that have been realigned to correspond with NIFA's top five priorities: (1) Human and Community Development, (2) Sustainable Energy [SAES-Biotechnology and Biodiversity], (3) Climate Change [SAES-Soil and Water Quality], (4) Food Safety [SAES-Agromedicine, Nutrition and Food Safety], (5) Global Food Security and Hunger [SAES- Small Scale Agriculture, and International Trade and Development], (6) Childhood Obesity. Overall, 2009 was a productive year with highlights and accomplishments in the following areas:

Program Growth

Once again, the Agricultural Research Program (ARP) in the School of Agriculture and Environmental Sciences (SAES) at North Carolina A&T State University (NCA&TSU) exceeded the previous year's extramural funding and achieved the highest amount ever received by the program. The program's outside funding grew by 25 percent over the previous year. This occurred, in large part, due to our success with meeting or exceeding funding goals for the six program initiatives. It also occurred as a result of the school's success in receiving 33 grants and full complement of the School's allotted initial Evans-Allen state grant funding. SAES's partnership with the National Center for Food Protection and Defense of the U. S. Homeland Security has led to additional funding from the agency.

The SAES is in its fifth year as a partner in the new North Carolina Research Campus (NCRC) at Kannapolis, North Carolina. The NCRC is funded by the North Carolina General Administration for the 8 state-funded universities. Our laboratories are fully staffed and operational. The opportunity to participate in this new research consortium grew as a result of our active and successful research and demonstrated capacities involving the Food Safety Initiative. Our primary research focus is on post harvest technologies, with specific emphasis on fruits and vegetables. Several tours and seminars are conducted each year to introduce SAES faculty to the NCRC consortium and engage faculty in the various research initiatives of the consortium. SAES administrators and faculty identified areas of bio-mass utilization from by-products obtained from production of fruits and vegetables and economic analyses of potential commercial uses of those products as leading areas for faculty research.

The program continues to grow despite changes in administration. Interim Dean, Dr. Donald McDowell, continues to provide leadership for the School during the year, and Associate Dean for Research, Dr. Shirley Hymon-Parker, provides leadership for the research activities in SAES.

Efforts were made to employ an evaluation specialist, but to no avail. For the 2012-2016 Plan of Work, NCA&T and NCSU has responded to NIFA's suggestion and will submit a joint plan.

Breakthroughs and Developments

The SAES researchers continue their efforts in addressing food safety related to peanuts. Clinical studies being conducted with the University of North Carolina at Chapel Hill School of Public Health are designed to confirm the hypo-allergenicity of treated peanuts and hopefully the absence of allergic reaction

among patients who are exposed to the treated peanuts. Obtaining confirmation of reduced or absent allergic reaction among patients would be a key finding in demonstrating the safety of the product and enhancing its potential for commercialization.

Results of food safety study suggest that natural ingredients may be used to control the growth of Salmonella in peanut butter. This finding has great potential because it shows that control of a pathogen causing illness may be possible without the use of any chemicals. Additionally, process technology can change the quality characteristics of the finished product. Findings from the study are not related to any previous work done in this area. Thus, researchers are continuing this study and have filed a disclosure and patent of their work.

Coordination with Cooperative Extension

One of the major goals of SAES is the continued integration of the Cooperative Extension and the Agricultural Research Programs. Past integrated activities have yield positive impacts on issues facing North Carolina. Work will also continue on combining NCA&T State University's NIFA Plan of Work with that of North Carolina State University, which should yield more impactful outcomes. Critical to this development, however, is the independence and lack of critical mass of the research scientists and Cooperative Extension Specialists to pursue research and agricultural support services consistent with the mission of SAES and NCA&TSU. One productive strategy this past year was to coordinate combined efforts of Research and Cooperative Extension on several Evans-Allen projects and Capacity Building proposals, especially in the Human and Community Development and Food Safety arenas. These efforts were a result of several meetings held throughout the year to help researchers increase their understanding of how issues that families, groups and communities face might be incorporated into research proposals involving research and outreach. Extension faculty were also in attendance and sought collaboration on proposed research initiatives. Successful examples of collaboration between Extension and research include the demonstration and training of crop and livestock production technology during Small Farms Week, and field days, integrated high tunnels agroforestry technology for hog producers and small farms, and tools for promoting healthy lifestyles to reduce childhood obesity. The continued success of such efforts will be evidence once vacant positions in Extension are filled with specialists that complement the work of research faculty.

Regional Projects

Currently, research scientists are involved in three regional projects: (1) Economic Impacts of International Trade and Domestic Policies on Southern Agriculture (SCD331); (2) Genetic and Functional Genomic Approaches to Improve Production and Quality of Pork (NC 1037), and (3) Local Food Choices, Eating Patterns, and Population Health (NC1033:7).

HIGHLIGHTS FROM PLANNED PROGRAMS

Human and Community Development

Work continues on creating coordination among the Community Based Organization (CBO) in the Southeast US to address issues facing the region. A major conference ("Nonprofits in the Service of Communities: Experiences from the Field") was held that focused on data sharing and collaboration. Participant evaluations indicate that the workshop was successful. The project developed a database of CBOs involved in collaborative efforts to address poverty and gathered descriptive data on collaboration efforts among the groups.

A study seeking to understand the underlying factors affecting health care in the Black Belt was completed. The data collected from the surveys were geocoded to identify the spatial characteristics of the Black Belt Region. The regional analysis yielded mixed results. The maps that were developed show some relation between surveys results and their spatial location, but the scale at which the data were collected did not allow the causes to be specifically determined. Nevertheless, the analysis provided a good indicator of some overall trends, and has provided a preliminary step to more local analyses,

producing a better findings of the localized factors that affect the variance among data points.

Two hundred parents from 10 North Carolina counties participated in a study to evaluate the effectiveness of the Parenting Matter Curriculum. Preliminary data suggest that the curriculum positively affect participating parents' behavior. Parents gained knowledge and skills needed to help strengthen their families while helping their children to grow and develop into positive productive citizens.

Sustainable Energy [SAES- Biotechnology and Biodiversity]

Animal waste remains a major problem in NC that negatively impacts quality of life for many rural citizens and profitability of the livestock industry. Researchers are investigating a hydrothermal liquefaction process that is anticipated to have positive impact on both of these problems by converting waste into usable biofuels.

Researchers are also gaining new knowledge about the immune response in goats and cows at the molecular level, which is expected to lead to new management strategies for producers. The study focused on natural resistance to parasitic infection in goats. The effect on gene expression of Nystatin, a lipid raft inhibitor and anti-fungal agent, was tested, yielding positive results. Twelve DNA sequences have been identified and deposited in GENBANK. Identification of genes and systems relevant to understanding of host parasite system could lead to control strategies that might reduce U.S. livestock losses upwards of $48 billion annually from infectious bacteria and parasites.

Alternative feed ingredients such as oats and barley are now finding their place as major players in the swine and poultry feed industry. Potentially up to 35% of the corn in the diet of growing pigs could be replaced with mixtures of oats, barley and sugar beet pulp with better productivity. The benefits, healthier pigs and higher feed conversion efficiency, which means that pigs will reach market weight at a much earlier age, thus improving the profitability of hog production.

A major economic impact on North Carolina swine producers are the pathogenic outbreaks and contaminations caused by the disease scours. Efforts are underway to study the mechanisms of virulence and to develop vaccines for possible prevention and treatment. This is particularly important in that North Carolina ranks second nationally in swine production. The Gastroenteric Disease Center at Penn State University is a major collaborator. The current focus is on the study of antigenic components of pathogenic and E.coli isolates of porcine origin from North Carolina and assessing their feasibility as vaccines for the prevention of these diseases.

Bio-fuel winter canola and summer sweet sorghum crops were introduced to farmers through field demonstrations. This project is contributing toward the Fueling North Carolina's Future committee recommendation for the state to locally grow and produce biomass for the production of 10% of North Carolina fuel consumption by 2017.

Climate Change [SAES- Soil and Water Quality]

Researchers are continuing their work using the NCA&T University farm to develop and evaluate ways to improve soil and water quality in the state. Specifically, the focus is on sustainable tillage practices as well as on providing alternative ways for small farmers to treat hog wastes.

Food Safety[SAES-Agromedicine, Nutrition and Food Safety]

Peanut skins are a by-product of the peanut processing industry with reportedly little or no economic value. However, they are rich in polyphenols, including procyanidins, catechins, phenolic acids and resveratrol. The results of two studies suggest alternative value-added utilizations of peanut skins as a dietary supplement and food preservative. These studies indicate that (1) long term ingestion of peanut skin correlate with improved serum profile in test rats and that (2) peanut skin extracts exhibited significant antibacterial effect in raw ground beef.

The development and characterization of naturally occurring and safe functional (bioactive) compounds from agricultural sources such as grapes, peanuts and sweet potatoes will not only help in the national effort to reduce the incidence of diet-related chronic diseases, but also add value to the US agricultural sector. This is especially so since the global functional foods market is estimated to be $48 billion per year, with the United States leading the world with its $18.25 billion annual sales. Furthermore, agricultural by-products offer plentiful and inexpensive sources of bioactive compounds for the growing needs of the functional food market. Both grape seed and skin contain potent antioxidants that may be used as natural preservatives in foods to prevent lipid oxidation and rancidity development.

Food scientists developed non-toxic, low cost, and broadly effective alternative plant-based produce washes that provide long-lasting protection against foodborne pathogens throughout processing and distribution, leaving only residues that possess health benefits instead of toxicity. The natural antimicrobial formulations developed will be suitable for decontamination of produce immediately after harvest and for use by grocery stores or consumers. The washes may be used by farm workers, food handlers, food service workers, or households to effectively remove enteric pathogens including E. coli, salmonella and listeria.

Researchers are also producing a high quantity of alpha-galactosidase and beta-galactosiase for health benefits. They are working on developing a new technology that could be applied in the food industry to ensure food-grade probiotics of over expressed alpha-galactosidase and beta-galactosidase. This research team is interested in response surface methodology as a tool to optimize the production of these enzymes. They are also interested in using chemical mutagenesis to produce high enzyme producing mutant for potential application in food products.

Global Food Security and Hunger[SAES -Small Scale Agriculture & International Trade and Development]

A survey focusing on the determinants of small farm success in North Carolina was completed. Due to the declining numbers of small farm production in the state, it is critical to determine what can be done to reverse this trend. Previous studies have suggested that viable predictors of success for small farm operators included: education in the use computers (including programming and financial management), effective marketing strategies, enterprise diversification and income. A questionnaire/survey was developed to test previous findings and case studies were conducted for further verification. The result revealed that farmers rarely utilized computers and instead kept manual records. The findings also suggest that income may not be as important as believed. The overall "love of farming" seemed to be the driving force behind the farmer's view of success, not profit.

SAES researchers have found that there are alternative nutrient sources for enhancing profitability and environmental stewardship in livestock production. The target audiences of this study were limited resource and sustainable livestock producers across NC and other Southeastern US regions. This project provided insights into less expensive alternative feeds/forage for livestock. Pearl millet is a forage crop that is more tolerant to drought and at the same time has comparable nutritional value when compared to the traditional corn forage crop. Severe drought has and continues to be a dominant crop production constraint across the Southeastern US, especially for live stock producers. With increased climate change and variability, the risk of drought will likely also increase and the pattern of drought sensitive areas may become more irregular. Providing information on alternative feed source for livestock will help mitigate economic risk associated with reduced crop yield or total failure due to moderate or severe drought.

The Edible and Medicinal Mushroom Project offered small-scale and limited-resource farmers -- especially tobacco growers -- a new alternative farm-based enterprises. Over 400 of North Carolina's small farmers have been trained to grow and market shiitake, maitake and other varieties of mushrooms. The project has assisted farmers and community organizations in qualifying for grant funding; spun a new

biotech company, was critical in the formation of the North Carolina Mushroom Growers Association; spurred the development of a train-the-trainer.

Although major breakthroughs in marketing NC food and agricultural products abroad has been limited, there has been substantial study of the marketing opportunities for NC producers and sharing of this information with producers and potential entrepreneurs. This continued focus and effort is expected to yield future benefits for North Carolina producers.

Childhood Obesity

SAES scientists have also derived data useful to understanding the impact of location on the access and affordability of food. Study results were presented to local and statewide planners and policy makers who were invited to attend a conference about the local food environment in Greensboro. Attendees were provided with information regarding food access in relation to availability and affordability of food in general, and fruits and vegetables in particular, in Greensboro. Data presented at the conference showed that the availability of fruits and vegetables is lower in low income areas of the city than in higher income areas. However, the quality of fresh fruits and vegetables available in low income areas were better or equal to higher income areas.

An on-going longitudinal study has been examining the food preferences, food selection, and eating practices of African American parents and their pre-school aged children. The goal of the project is to determine the factors that influence the food preferences, selections and eating habits of participants, and educate parents and children about healthy eating and physical activities that can improve their health and quality of life.

A study is being conducted to examine the use of social media in promoting healthy lifestyles to reduce the incident of childhood obesity.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	0.0	20.0
Actual	0.0	0.0	0.0	39.1

II. Merit Review Process

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

- ☐ Internal University Panel
- ☐ External University Panel
- ☐ External Non-University Panel
- ☐ Combined External and Internal University Panel
- ☑ Combined External and Internal University External Non-University Panel
- ☐ Expert Peer Review
- ☐ Other

2. Brief Explanation

The primary responsibility of the research director is to determine the need, priority, and scientific feasibility of the proposed projects and the development and implementation procedure for project documentation, merit review, and selection. The procedure assures that the research proposals are scientifically sound, relevant to society's food and agricultural needs, and not duplicative of efforts undertaken elsewhere. Prior to proposals development, alignment of the topic with the needs of the state and the direction of the six program initiatives in the School of Agriculture and Environmental Sciences is determined. Upon agreement by the department chair, the associate dean for research, the research director, and the principal investigator prepare a proposal on the topic for submission through the Evans Allen program. The merit review process includes a review by five peer reviewers from both within and outside the University who are knowledgeable in or familiar with the area of research. The principal investigator is responsible for incorporating suggestions made by the reviewers and must give reasons for any substantive suggestions not included or addressed. The proposal is then reviewed by the associate dean for research who determines if additional review and substantive revision is necessary. Upon acceptance by the associate dean for research and research director, the proposal is submitted for budgetary review by the Office of Agricultural Research and then transmitted to NIFA/USDA for approval.

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 of traditional stakeholder groups
- ☐ Survey of traditional stakeholder individuals
- ☐ Survey of the general public
- ☐ Survey specifically with non-traditional groups
- ☐ Survey specifically with non-traditional individuals
- ☐ Survey of selected individuals from the general public
- ☑ Other (Grassroots Leadership Conferences)

Brief explanation.

There are on-going activities that encourage stakeholder participation. In addition to the formal meetings involving Agricultural Research Program administrators and stakeholders, the program conducts several outreach activities as a means for gathering input from those impacted by the school's research activities or who use the research results. One major event is the Small Farms Week, an activity jointly sponsored by the Cooperative Extension Program and the Agricultural Research Program. During this week, farmers, commodity group representatives, and consumers attend activities held both on and off campus involving Extension and research. A second major event is the Grassroots Leadership Conference. Administrators and researchers in the Agricultural Research Program participate in three conferences held in the three Extension programming

regions of the state (eastern, central and mountain) to listen to the issues, concerns, and the needs of farmers, community leaders, residents, volunteers, members of the Strategic Planning Council, specialized committee members and county and staff members. These grassroots conferences also assist the Agricultural Research Program in needs assessment for proposal development and program priorities. Through these activities, SAES shares information about research underway at the University, and receives input from those that use the research results. Other major outreach activities include field days that bring farmers, commodity groups, and consumers into direct contact with specific SAES scientists and research projects. Feedback is also sought about research and research related activities by the scientists, their research teams, and by staff associated with ARP and the University; the input is then shared with SAES and incorporated into future research activities.

A major statewide commission that continues to affect our research program and all aspects of the School of Agriculture and Environmental Sciences is UNC Tomorrow, an initiative of the General Administration for the 16 public state universities. This initiative is affecting the substance and community involvement with the research program particularly related to concerns of global readiness and economic transformation of communities. Our planned programs support multiple aspects of these concerns.

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
- ☐ Other

Brief explanation.

The individual and group stakeholders are identified by their membership in organizations that are agriculturally-related in the state. This includes all farmers and grower groups, cooperatives and community organizations. The dean, other administrators and many faculty members serve on various boards across the state that either serve stakeholders or have stakeholders on the boards.

Diverse methods are (advisory groups, town hall meetings, conferences, workshops, etc,) used to collect information and data on stakeholder needs. There is a proactive effort including face-to-face meetings with groups as well as reading/reviewing current documents (strategic plans, newspapers, newsletters, etc.) that identify research needs of individuals and communities in North Carolina.

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

1. Methods for collecting Stakeholder Input

- ☑ Meeting with traditional Stakeholder groups
- ☑ Survey of traditional Stakeholder groups
- ☑ Meeting with traditional Stakeholder individuals
- ☐ Survey of traditional Stakeholder individuals
- ☑ Meeting with the general public (open meeting advertised to all)
- ☐ Survey of the general public
- ☑ Meeting specifically with non-traditional groups
- ☐ Survey specifically with non-traditional groups
- ☐ Meeting specifically with non-traditional individuals
- ☐ Survey specifically with non-traditional individuals
- ☐ Meeting with invited selected individuals from the general public
- ☐ Survey of selected individuals from the general public
- ☑ Other (Reading/reviewing documents by groups or about groups that describe needs)

Brief explanation.

The method for collecting the information primarily is through meetings and also includes surveys completed by the faculty as well as published reports and white papers.

3. A statement of how the input will be considered

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

Brief explanation.

Administrators and faculty use the input about stakeholder needs in determining the direction and nature of research projects as well as in hiring scientists needed in the identified subject matter areas.

Brief Explanation of what you learned from your Stakeholders

Major input from the stakeholders confirms their continuing concern about the funding issues: (1) biofuel, (2) health, wellness and nutrition, (3) youth development, and (4) water quality and quantity.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	0	3950947

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	0	0	0	3070729
Actual Matching	0	0	0	1831361
Actual All Other	0	0	0	367245
Total Actual Expended	0	0	0	5269335

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	0	0	0	452255

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Human and Community Development
2	Sustainable Energy
3	Climate Change
4	Food Safety
5	Global Food Security and Hunger
6	Childhood Obesity

Add previously unplanned program

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Human and Community Development

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
601	Economics of Agricultural Production and Farm Management				20%
802	Human Development and Family Well-Being				15%
803	Sociological and Technological Change Affecting Individuals, Families, and Communities				15%
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures				20%
805	Community Institutions, Health, and Social Services				30%
	Total				100%

Add knowledge area

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	0.0	4.5
Actual	0.0	0.0	0.0	4.5

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	0	266999
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	25986
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	12237

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct research studies in the following areas; (1) to determine the challenges of new manufactured home owners in the site installation of the units and to develop recommendations to the industry for improving the installation process, (2) to develop a database of community-based organizations (CBOs) by location, program priorities, capacity and method of operation to encourage collaboration among CBOs, policymakers, businesses and development agencies, and (3) to define factors that impact leadership development in rural areas that could lead to new or improved programs for developing future leaders and contributing to the sustainability of rural communities.

- Present findings at professional meetings.

- Publish research findings in professional journals.

- Share findings with Extension educators, end users or stakeholders, and with other groups that may use the information in improving collaboration and/or methods of information delivery.

2. Brief description of the target audience

Individuals and families living in rural areas

- Underserved populations
- Rural communities
- Policy makers
- Community based organizations
- Scientific Community

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	564	456197	48	0
Actual	419	346835	72	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	7	
Actual	0	7	7

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- # entries in database of community-based organizations

☐ Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	150	100

Output #2

Output Measure

- # presentations at professional meetings

☐ Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	8	4

Output #3

Output Measure

- # media occurrences

☐ Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	14	10

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# organizations accessing and using database of community-based organizations
2	% improved leadership development in rural communities
3	# policy makers using data to change policies affecting individuals, families and communities

Add Cross-cutting Outcome/Impact Statement or Unintended or Previously Unknown Outcome Measure

Outcome #1

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

organizations accessing and using database of community-based organizations

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◯ Change in Knowledge Outcome Measure
◉ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	100	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

☐ 601 - Economics of Agricultural Production and Farm Management
☐ 802 - Human Development and Family Well-Being
☐ 803 - Sociological and Technological Change Affecting Individuals, Families, and
☐ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and
☑ 805 - Community Institutions, Health, and Social Services

Outcome #2

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

% improved leadership development in rural communities

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◯ Change in Knowledge Outcome Measure
◉ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	20	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

☐ 601 - Economics of Agricultural Production and Farm Management
☐ 802 - Human Development and Family Well-Being
☑ 803 - Sociological and Technological Change Affecting Individuals, Families, and
☐ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and
☑ 805 - Community Institutions, Health, and Social Services

Outcome #3

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

policy makers using data to change policies affecting individuals, families and communities

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◉ Change in Knowledge Outcome Measure
◯ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	7	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

- ☐ 601 - Economics of Agricultural Production and Farm Management
- ☑ 802 - Human Development and Family Well-Being
- ☑ 803 - Sociological and Technological Change Affecting Individuals, Families, and
- ☑ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and
- ☑ 805 - Community Institutions, Health, and Social Services

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.)
- ☐ Other

Brief Explanation

The outcomes listed in the Human and Community Development Planned Program focus on long-term attainment. The identified measures are very specific to studies in increasing the effectiveness of community based organizations, in developing rural community leadership and to change the lending practices of North Carolina home mortgage institutions. These initiatives take time to achieve the stated outcome.

There are also other research studies that are having impact in this planned program. However, outcomes and measures of these outcomes need time to show results and impact.

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

(OPTIONAL SECTION)

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)
- ☐ 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
- ☐ Other

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 2

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
133	Pollution Prevention and Mitigation				20%
201	Plant Genome, Genetics, and Genetic Mechanisms				10%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants				10%
302	Nutrient Utilization in Animals				10%
308	Improved Animal Products (Before Harvest)				20%
311	Animal Diseases				10%
403	Waste Disposal, Recycling, and Reuse				20%
	Total				100%

Add knowledge area

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	0.0	3.0
Actual	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	0	271381
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	246220
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	25133

V(D). Planned Program (Activity)

1. Brief description of the Activity

Scientists conducted research to expand understanding of the mechanism of scours and characterize strains that cause the disease; to improve understanding of the biology of edible and medicinal exotic mushrooms to be able to identify appropriate commercial strains; they also developed technologies to convert corn stalks and cheese whey into biofuels and biomaterials including hydrogen, bioethnol and succinic acid; they experimented with non-antibiotic additives in poultry production to control poultry diseases of Campylobacter jejuni and Salmonella; and to decipher gene expression associated with combating bacterial infection (mastitis) in cattle.

- Gave presentations at professional meetings and during various Cooperative Extension programs
- Published findings in professional journals and in the Agricultural Research Program research magazine
- Apply for patents for new discoveries
- Conducted tours, workshops and other activities to share findings with Extension educators and with companies that may commercialize products.

2. Brief description of the target audience

- Companies involved in biotechnology applications
- Farmers involved in or considering producing agricultural products using biotechnology
- Consumers

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	1026	456197	194	0
Actual	1217	356999	210	0

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

Patent Applications Submitted

Year: 2010
Plan: 2
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	0	8	
Actual	0	13	13

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- # presentations at professional meetings

☐ Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	9	8

Output #2

Output Measure

- # media occurrences

☐ Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	4	4

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of licenses of current patents
2	# breakthoughs in new uses for biomass or other agricultural co-products in North Carolina
3	# improved plant production resulting from new propagation techniques
4	# technologies to prevent/treat animal diseases

Add Cross-cutting Outcome/Impact Statement or Unintended or Previously Unknown Outcome Measure

Outcome #1

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

# of licenses of current patents

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

○ Change in Knowledge Outcome Measure
○ Change in Action Outcome Measure
◉ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	1	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

☐ 133 - Pollution Prevention and Mitigation
☐ 201 - Plant Genome, Genetics, and Genetic Mechanisms
☐ 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
☑ 302 - Nutrient Utilization in Animals
☐ 308 - Improved Animal Products (Before Harvest)
☑ 311 - Animal Diseases
☑ 403 - Waste Disposal, Recycling, and Reuse

Outcome #2

1. Outcome Measures

☐ Not Reporting on this Outcome Measure

breakthoughs in new uses for biomass or other agricultural co-products in North Carolina

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

○ Change in Knowledge Outcome Measure
○ Change in Action Outcome Measure
◉ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	1	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
North Carolina ranks as the second largest hog producting state in the country. Intensive confinement livestock farms produce large amounts of manure that need to be treated.

What has been done
A novel cattail to bioethanol process was successfully developed.

Results
Findings contribute to greater ethanol production in North Carolina, increased economic opportunities in rural areas, and reduction in US dependence on imported petroleum.

4. Associated Knowledge Areas

☑ 133 - Pollution Prevention and Mitigation
☐ 201 - Plant Genome, Genetics, and Genetic Mechanisms
☐ 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
☑ 302 - Nutrient Utilization in Animals
☑ 308 - Improved Animal Products (Before Harvest)
☐ 311 - Animal Diseases
☑ 403 - Waste Disposal, Recycling, and Reuse

Outcome #3

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

improved plant production resulting from new propagation techniques

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◉ Change in Knowledge Outcome Measure
◯ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	1	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

☐ 133 - Pollution Prevention and Mitigation
☑ 201 - Plant Genome, Genetics, and Genetic Mechanisms
☑ 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
☐ 302 - Nutrient Utilization in Animals
☐ 308 - Improved Animal Products (Before Harvest)
☐ 311 - Animal Diseases
☐ 403 - Waste Disposal, Recycling, and Reuse

Outcome #4

1. Outcome Measures

☐ Not Reporting on this Outcome Measure

technologies to prevent/treat animal diseases

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◉ Change in Knowledge Outcome Measure
◯ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	1	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Outdoor pork production represents an important opportunity for small scale, limited resources farmers across the state.

What has been done
This research has been extended to goats and has led to collaborative projects with other 1890 universities and Extension groups.

Results
The research will help small farmers to understand and apply best practices for production efficiency when raising hogs outdoors for animal welfare, and producers and consumer acceptance of pork productions systems.

4. Associated Knowledge Areas

☐ 133 - Pollution Prevention and Mitigation
☐ 201 - Plant Genome, Genetics, and Genetic Mechanisms
☐ 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
☐ 302 - Nutrient Utilization in Animals
☐ 308 - Improved Animal Products (Before Harvest)
☑ 311 - Animal Diseases
☐ 403 - Waste Disposal, Recycling, and Reuse

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.)
- ☐ Other

Brief Explanation

Changing public policy; state, federal and grant funding, and regulatory conditions can impact the relevance and utility of this program. Natural and/or man-made disasters can impact both the conduct and delivery of this program as well as its implementation in the agricultural and forestry communities and the bioprocessing industries.

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

(OPTIONAL SECTION)

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)
- ☐ 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
- ☐ Other

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

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
102	Soil, Plant, Water, Nutrient Relationships				34%
112	Watershed Protection and Management				22%
133	Pollution Prevention and Mitigation				8%
205	Plant Management Systems				28%
403	Waste Disposal, Recycling, and Reuse				8%
	Total				100%

Add knowledge area

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	0.0	2.0
Actual	0.0	0.0	0.0	3.4

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	0	449082
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	201709
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	56516

V(D). Planned Program (Activity)

1. Brief description of the Activity

Scientists conducted research studies to develop low-cost water filtration systems using nutshell-based activated carbons; determine and measure the effectiveness of cover crops in meeting the nutrient needs in organic cropping systems; use constructed wetlands for treatment of swine wastewater; and assess how soil management practices, especially no-till approaches, affect soil quality over time.

• Presented findings at professional meetings.
• Published research findings in professional journals.
• Shared findings with Extension educators and with other groups that may use the information to improve the viability of small scale agricultural operations.

2. Brief description of the target audience

• Extension educators
• Small-scale and limited resource farmers
• Environmental groups interesting in preserving soil and water quality

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	482	456197	0	0
Actual	854	512224	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	7	
Actual	0	5	5

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- # field days

☐ Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	1	2

Output #2

Output Measure

- # presentations at professional meetings

☐ Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	6	4

Output #3

Output Measure

- # workshops on improved soil and water management practices

☐ Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	4	4

Output #4

Output Measure

- # media occurrences

☐ Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	8	8

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of farmers adopting improved soil and water quality management practices
2	Development of water treatment (wetlands) for small-scale farmers

Add Cross-cutting Outcome/Impact Statement or Unintended or Previously Unknown Outcome Measure

Outcome #1

1. Outcome Measures

☐ Not Reporting on this Outcome Measure

Number of farmers adopting improved soil and water quality management practices

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◉ Change in Knowledge Outcome Measure
◯ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	60	54

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Intensive tillage and limited reintroduction of low organic matter are two major factors contributing to soil degradation in the southeastern United States. Small scale vegetable growers need information on pre-determined combinations of practices they can adopt that will rapidly and effectively improve soil quality and crop productivity.

What has been done
Research has been completed that has contributed to the knowledge base in using no tillage, cover crops and compost to improve soil quality. A workshop was held to share this information with small scale producers.

Results
Fifty-four producers attended the workshop. Participants reported that the information presented was most useful and helpful in their on-farm operation.

4. Associated Knowledge Areas

☑ 102 - Soil, Plant, Water, Nutrient Relationships
☑ 112 - Watershed Protection and Management
☑ 133 - Pollution Prevention and Mitigation
☐ 205 - Plant Management Systems
☑ 403 - Waste Disposal, Recycling, and Reuse

Outcome #2

1. Outcome Measures

☐ Not Reporting on this Outcome Measure

Development of water treatment (wetlands) for small-scale farmers

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

○ Change in Knowledge Outcome Measure
○ Change in Action Outcome Measure
◉ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Constructed wetlands treated with waste water have potential to emit high greenhouse gases that may contribute to global warming.

What has been done
A study conducted to quantify the gas fluxes in constructed wetlands and anaerobic lagoons treated with swine waste water to identify microbial community responsible for the emission of greenhouse gases from these sources.

Results
Result will be useful in estimating emission of gases from swine waste and predicting its contribution to global warming. Findings can be useful in modeling and predicting future global warming scenarios.

4. Associated Knowledge Areas

☐ 102 - Soil, Plant, Water, Nutrient Relationships
☑ 112 - Watershed Protection and Management
☑ 133 - Pollution Prevention and Mitigation
☐ 205 - Plant Management Systems
☑ 403 - Waste Disposal, Recycling, and Reuse

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.)
- ☐ Other

Brief Explanation

Weather-related issues can and will have a major impact on environmental research and outreach programs. The economy and any changes in program funding can have significant impact not only on the research, but also on adoption of BMPs and other technologies that can impact agricultural operations and related environments on the farm, in watershed, and communities. Public policy and regulations will dictate, to a large degree, the topics that are of most concern or interest to the agricultural community as well as local communities. Funding reductions create significant impediments in a number of these research/outreach areas, many of which require significant human resources and expensive data collection approaches.

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

(OPTIONAL SECTION)

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)
- ☐ 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
- ☐ Other

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Food Safety

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)				10%
502	New and Improved Food Products				30%
503	Quality Maintenance in Storing and Marketing Food Products				10%
701	Nutrient Composition of Food				18%
703	Nutrition Education and Behavior				12%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins				20%
	Total				100%

Add knowledge area

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	0.0	5.2
Actual	0.0	0.0	0.0	10.0

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	0	822267
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	636399
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	167591

V(D). Planned Program (Activity)

1. Brief description of the Activity

Scientists conducted studies to determine functional food ingredients from selected North Carolina agricultural by-products; to evaluate select plant extracts as potential food preservatives and anticarcinogens; to enhance the microbiological quality of probiotic supplements; to determine food knowledge and practices among different population subgroups and develop targeted and focused intervention methods for maximum effect; and improve healthy eating and physical activity of Hispanic women.

• Present findings at professional meetings and with Cooperative Extension agents and programs
• Publish research findings in professional journals and Agricultural Research Program's research magazine.
• Seek patents for new discoveries.
• Conduct tours, workshops and other activities to share findings with Extension educators and with companies that may commercialize products.

2. Brief description of the target audience

The target audience for this research are the following:
• Extension educators for use in programs and outreach activities
• Companies involved in health and nutrition related products and/or food safety
• Consumers

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	1077	456197	76	0
Actual	1084	544235	109	0

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

Patent Applications Submitted

Year:	2010
Plan:	1
Actual:	1

Patents listed
US Published Application No. US 2010-0080870 entitled "Processing for Preparing Hypoallergenic and/or Non-Allergenic Peanut Butter and Associated Products" Inventors: Ahmedna, Mohamed; Yu, Jianmei; and Goktepe, Ipek; was filed Dec 4, 2009.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	0	8	
Actual	0	16	16

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- # presentations at professional meetings

☐ Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	7	20

Output #2

Output Measure

- # media occurrences

☐ Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	9	9

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of companies purchasing licenses for food and food safety related patents
2	# breakthroughs in new technologies to address food safety
3	# new food products that industry can manufacture to improve health

Add Cross-cutting Outcome/Impact Statement or Unintended or Previously Unknown Outcome Measure

Outcome #1

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

# of companies purchasing licenses for food and food safety related patents

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

○ Change in Knowledge Outcome Measure
◉ Change in Action Outcome Measure
○ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	1	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

☐ 204 - Plant Product Quality and Utility (Preharvest)
☑ 502 - New and Improved Food Products
☐ 503 - Quality Maintenance in Storing and Marketing Food Products
☐ 701 - Nutrient Composition of Food
☐ 703 - Nutrition Education and Behavior
☑ 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and

Outcome #2

1. Outcome Measures

☐ Not Reporting on this Outcome Measure

breakthroughs in new technologies to address food safety

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

○ Change in Knowledge Outcome Measure
◉ Change in Action Outcome Measure
○ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	3	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The development and characterization of naturally occurring safe functional (bioactive) compound from agricultural sources such as grapes, peanut, and sweet potatoes will help to reduce the incidence of diet related chronic diseases and add value to US agricultural sector.

What has been done
Research conducted to examine one free radical scavenging capacity of polyphenol extracts from muscadine and (2) stability of polyphenol in grape promace as affected by drying method.

Results
Grape seed and skin contain potent antioxidants that may be useful as natural preservatives in food to prevent liquid oxidation and rancidity development. A mild drying method can better preserve the bioactive components in grape promace.

4. Associated Knowledge Areas

☐ 204 - Plant Product Quality and Utility (Preharvest)
☑ 502 - New and Improved Food Products
☑ 503 - Quality Maintenance in Storing and Marketing Food Products
☐ 701 - Nutrient Composition of Food
☐ 703 - Nutrition Education and Behavior
☐ 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and

Outcome #3

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

new food products that industry can manufacture to improve health

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◉ Change in Knowledge Outcome Measure
◯ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	1	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

☑ 204 - Plant Product Quality and Utility (Preharvest)
☑ 502 - New and Improved Food Products
☐ 503 - Quality Maintenance in Storing and Marketing Food Products
☑ 701 - Nutrient Composition of Food
☐ 703 - Nutrition Education and Behavior
☐ 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and

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.)
- ☑ Other ()

Brief Explanation

Anything that competes for public funding or that affects public policy can have an impact on this plan of work. Changes in appropriations could affect funding support while changes in food regulations, public priorities, and population changes could affect specific program activities. Catastrophic events, such as hurricanes, could seriously affect funding and program activities for extended periods of time.

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

(OPTIONAL SECTION)

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)
- ☐ 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
- ☐ Other

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 5

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				10%
205	Plant Management Systems				15%
401	Structures, Facilities, and General Purpose Farm Supplies				20%
604	Marketing and Distribution Practices				15%
610	Domestic Policy Analysis				20%
611	Foreign Policy and Programs				20%
	Total				100%

Add knowledge area

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	0.0	3.5
Actual	0.0	0.0	0.0	10.4

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	0	1099420
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	505281
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	101772

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conducted studies in the following areas: (1) defining opportunities for rural entrepreneurs and connecting them with small-scale agricultural enterprises, existing rural businesses and prospective entrepreneurs; (2) determining viable alternatives to tobacco for small scale producers including floriculture production in tobacco greenhouses, outdoor and indoor mushroom production, and specialty melons and other crops; (3) seek improved methods for washing green leafy vegetables for use especially by small scale farmers; (4) identify factors influencing successful small farm operations in North Carolina that can be developed into a protocol for evaluating the predicted success of small farm operations; (5) economic assessment of changes in trade agreements; (6) bioterrorism threats and economic fuel requirements on various industry sectors; and (7) new domestic and international markets for North Carolina producers with particular emphasis on small scale operations.

• Present findings at professional meetings.
• Publish research findings in professional journals.
• Share findings with Extension educators and with other groups that may use the information to improve the viability of small scale agricultural operations, and use to assist small scale producers in finding markets for their products.

2. Brief description of the target audience

The targeted audiences include the scientific community, the general public, small-scale farmers and operations, small businesses, producers of small scale agriculture, and traditionally underserved populations and communities in North Carolina.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	1038	456197	0	0
Actual	2532	518835	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	6	
Actual	0	21	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- # presentations at professional meetings

☐ Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	8	20

Output #2

Output Measure

- # media occurrences

☐ Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	9	10

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase in number of producers/growers of alternative crops/enterprises
2	Increase in production and sales of alternative crops and enterprises
3	% farmers in groups indicating increase in knowledge about small scale operations
4	# of small farmers trained and involved in alternative farming
5	# of new regional or national markets found for NC products

Add Cross-cutting Outcome/Impact Statement or Unintended or Previously Unknown Outcome Measure

Outcome #1

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

Increase in number of producers/growers of alternative crops/enterprises

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◉ Change in Knowledge Outcome Measure
◯ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	250	240

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

☑ 202 - Plant Genetic Resources
☑ 205 - Plant Management Systems
☐ 401 - Structures, Facilities, and General Purpose Farm Supplies
☐ 604 - Marketing and Distribution Practices
☐ 610 - Domestic Policy Analysis
☐ 611 - Foreign Policy and Programs

Outcome #2

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

Increase in production and sales of alternative crops and enterprises

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◉ Change in Knowledge Outcome Measure
◯ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	4000	2500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

☐ 202 - Plant Genetic Resources
☑ 205 - Plant Management Systems
☑ 401 - Structures, Facilities, and General Purpose Farm Supplies
☐ 604 - Marketing and Distribution Practices
☐ 610 - Domestic Policy Analysis
☐ 611 - Foreign Policy and Programs

Outcome #3

1. Outcome Measures

☐ Not Reporting on this Outcome Measure

% farmers in groups indicating increase in knowledge about small scale operations

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◉ Change in Knowledge Outcome Measure
◯ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	75	137

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The mushroom production program is providing a viable alternative to tobacco for small farmers in North Carolina.

What has been done
The mushroom initiative continues to offer assistance to small producers by offering demonstration workshops, by conducting research on how to best match the strains with the environmental requirements in the varying state regions, and also by providing expertise on producer problems and disease control and marketing issues.

Results
The number of producers continues to grow. The number has grown from 450 to 517 producers since last year.

4. Associated Knowledge Areas

☑ 202 - Plant Genetic Resources
☑ 205 - Plant Management Systems
☐ 401 - Structures, Facilities, and General Purpose Farm Supplies
☑ 604 - Marketing and Distribution Practices
☐ 610 - Domestic Policy Analysis
☐ 611 - Foreign Policy and Programs

Outcome #4

1. Outcome Measures

☐ Not Reporting on this Outcome Measure

# of small farmers trained and involved in alternative farming

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◉ Change in Knowledge Outcome Measure
◯ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	70

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
With the decline in tobacco production in the state, many small scale farmers are forced to either cease farming or shift production to viable alternatives.

What has been done
Scientists have researched and developed alternative production opportunities for small scale farmers particularly in the areas of pasture pork, mushrooms, and organic vegetables. This information has been shared in many forms and very effectively through field days on the university farm.

Results
The Small Farms Conference is held annually at NCA&T and part of the conference is a field day on the university farm. Two hundred and fifty-five persons participated in the field day and 70 responded to an evaluation survey. Respondents indicated that the information presented was helpful and relevant, especially the sessions on marketing locally grown crops, mushroom production training, and seeding and transplant management. Once again, all indicated that they would likely attend farm field days in the future.

4. Associated Knowledge Areas

☑ 202 - Plant Genetic Resources
☑ 205 - Plant Management Systems
☑ 401 - Structures, Facilities, and General Purpose Farm Supplies

- ☐ 604 - Marketing and Distribution Practices
- ☐ 610 - Domestic Policy Analysis
- ☐ 611 - Foreign Policy and Programs

Outcome #5

1. Outcome Measures

☐ Not Reporting on this Outcome Measure

# of new regional or national markets found for NC products

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

○ Change in Knowledge Outcome Measure
○ Change in Action Outcome Measure
◉ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	25

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Connecting farmers with potential buyers of their products is the lifeline of financial success for small farmers.

What has been done
Scientists in agricultural economics involved with the L.C. Cooper, Jr. International Trade and Development Center met with farmers to train them and connect them with viable markets.

Results
The Center identified a broker/retailer and a restaurant operator who is willing to buy free range pork directly from farmers at a premium price. As a result 20 small pork farmers are negotiating a contract with the potential buyer to supply 15 pigs per farmer per week. A similar effort was developed for mushroom growers with 5 regional markets accepting their products at a premium price.

4. Associated Knowledge Areas

- ☐ 202 - Plant Genetic Resources
- ☑ 205 - Plant Management Systems

- ☐ 401 - Structures, Facilities, and General Purpose Farm Supplies
- ☑ 604 - Marketing and Distribution Practices
- ☐ 610 - Domestic Policy Analysis
- ☐ 611 - Foreign Policy and Programs

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.)
- ☐ Other

Brief Explanation

Changes in both competitive and noncompetitive funding will greatly influence our ability to conduct the planned research as well as deliver the results to our stakeholders. Field research could be significantly impacted by natural disasters such as hurricanes.

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

(OPTIONAL SECTION)

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)
- ☐ 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
- ☐ Other

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

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
724	Healthy Lifestyle				60%
802	Human Development and Family Well-Being				40%
	Total				100%

Add knowledge area

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	0.0	1.8
Actual	0.0	0.0	0.0	4.0

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	0	161580
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	215766
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	3996

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Childhood Obesity Planned Program is designed to provide guidance and education so that individuals and families are able to make informed, science-based decisions about how their food choices impact their health and well-being. To meaningfully address the issue of childhood obesity will take education as well as changes in the environment to make healthy eating and physical activity possible for all citizens. Early and continued education of children about the importance of eating smart and exercising is critical. Families are the foundation of the solution to overweight and obesity. They provide children's first learning environment and have the potential to make that environment supportive of healthy eating and physical activity patterns that prevent childhood overweight. Schools are also places of extraordinary influence on behavior and the development of lifelong behavior patterns. This influence stems not only from educational offerings, but also from environmental cues, role modeling, and peer influence. Schools and faith communities offer opportunity to reach participants in a group setting. Researchers are employing technology through online delivery of education and social media to reach youth with research-based information. In addition, they work with policy makers at the local and state level to inform them of policies that would support healthy eating, physical activity, and good health in adults and children.

2. Brief description of the target audience

The targeted audiences include parents, the scientific community, the general public, and healthcare professionals.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	179	456197	0	0
Actual	403	346835	60	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	6	
Actual	0	4	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- # presentations at professional meetings

☐ Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	5	5

Output #2

Output Measure

- # media occurrences

☐ Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	9	6

Output #3

Output Measure

- # of research projects focusing on developing regional and international markets for NC products

☐ Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	5	5

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of different NC products exported
2	# of small farmers and businesses trained and becoming involved in export of their products
3	% of increased income by farmers and businesses served by the International Trade Center
4	% of stakeholders who use the information and policy research in their decision making
5	# of new regional or national markets found for NC products
6	# of small farmers and businesses trained in finding regional and national markets for their products
7	# parents and children with increased knowledge about appropriate portion sizes of food in-take
8	# parents and children making healthier food selections for themselves

Add Cross-cutting Outcome/Impact Statement or Unintended or Previously Unknown Outcome Measure

Outcome #1

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

# of different NC products exported

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◯ Change in Knowledge Outcome Measure
◉ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	4	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

Outcome #2

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

# of small farmers and businesses trained and becoming involved in export of their products

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◯ Change in Knowledge Outcome Measure
◯ Change in Action Outcome Measure
◉ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	5	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

Outcome #3

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

% of increased income by farmers and businesses served by the International Trade Center

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◯ Change in Knowledge Outcome Measure
◯ Change in Action Outcome Measure
◉ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	10	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

Outcome #4

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

% of stakeholders who use the information and policy research in their decision making

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◯ Change in Knowledge Outcome Measure
◯ Change in Action Outcome Measure
◉ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	25	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

Outcome #5

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

# of new regional or national markets found for NC products

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◉ Change in Knowledge Outcome Measure
◯ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	12	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

Outcome #6

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

# of small farmers and businesses trained in finding regional and national markets for their products

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◉ Change in Knowledge Outcome Measure
◯ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	30	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

Outcome #7

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

parents and children with increased knowledge about appropriate portion sizes of food in-take

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

◉ Change in Knowledge Outcome Measure
◯ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

- ☑ 724 - Healthy Lifestyle
- ☑ 802 - Human Development and Family Well-Being

Outcome #8

1. Outcome Measures

☑ Not Reporting on this Outcome Measure

parents and children making healthier food selections for themselves

2. Associated Institution Types

☑ 1890 Research

3a. Outcome Type:

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

- ☑ 724 - Healthy Lifestyle
- ☑ 802 - Human Development and Family Well-Being

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.)
- ☐ Other

Brief Explanation

Possible reduction in budget support for program area which will impact researcher's ability to deliver programs (due to budget, travel and time restrictions), changes in public policy or mandates that relate to the program area. Availability of adequate grant funds is also a major external factor.

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

(OPTIONAL SECTION)

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)
- ☑ 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
- ☐ Other

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}