

# 2008 Tennessee State University Research Annual Report of Accomplishments and Results

**Status: Accepted**  
**Date Accepted: 06/08/09**

2008 Tennessee State University Research Annual Report of Accomplishments and Results

## I. Report Overview

### 1. Executive Summary

This report consists of the FY 2008 results and accomplishments of the Tennessee State University School of Agriculture and Consumer Sciences. The School of Agriculture and Consumer Sciences (SACS) is the principal agricultural and environmental research, outreach and academic entity at Tennessee State University (TSU). Prior to 2003, agricultural research at TSU was performed under the entity known as the Cooperative Agricultural Research Program (CARP) and was situated in the Division of Academic Affairs at Tennessee State University. In 2002 CARP was elevated to the Institute for Agricultural and Environmental Research, assuming a broader research role to include the environmental sciences as they interface with agriculture, and other emerging frontiers with promises for the agricultural sector. To further bolster agricultural research at TSU, IAgER and the Tennessee State University Cooperative Extension Program were combined with the School of Agriculture and Consumer Sciences in late 2008. This action combined the strengths of all three units to better advance the academic, research, and outreach agenda for agriculture at TSU. The goal of agriculture research at TSU remains the same: to generate and communicate new scientific knowledge in the agricultural and environmental sciences for the prosperity of the citizens of Tennessee, the nation and the world. We aspire to be synonymous with excellence and a place of destination for scientific inquiry in the fields of agricultural and environmental sciences. To fulfill our mission and achieve our vision, our research is organized around research themes of State, National, and International significance. Our research infrastructure consists of excellent facilities on the main campus of Tennessee State University and a state-of-the-art 20,000 sq. ft. Otis Floyd Nursery Research Center in McMinnville, Tennessee. The School of Agriculture and Consumer Sciences is staffed by dedicated faculty and staff who have received their education and training from many of the best institutions and training centers in the United States and in several countries around the world. This group of individuals strives each day to advance the agricultural and environmental research at Tennessee State University and make a positive difference in our society.

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

| Year:2008     | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 60.4 |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 55.8 |

## II. Merit Review Process

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

- Internal University Panel
- External University Panel
- Expert Peer Review

### 2. Brief Explanation

Each Planned Program in this Annual Report was approved by separate external and internal review panels. These panels were composed of agricultural research administrators in the 1890 University system. Potential Planned Programs were evaluated for relevance, scientific soundness, and appropriateness of planned outcomes. Only those proposed programs that were approved by both panels were developed into Planned Programs. A number of strategies have been developed to assure that approved programs are periodically reviewed to ensure they are meeting goals and remaining relevant: prior to the initiation of research projects/programs, researchers initiate and contact with appropriate stakeholders, *i.e.*, government agencies, community groups/representatives, professional organizations, extension personnel, or industry groups, to identify and prioritize critical needs. Periodically during research projects researchers initiate contact with appropriate stakeholders to evaluate the degree of program/project success. An administrator within the School of Agriculture and Consumer Sciences meets with every project leader semiannually to monitor the progress of the planned programs. If the program is not progressing as planned, appropriate remedial steps are initiated. We feel that these procedures will contribute significantly to ensuring the Planned Programs are executed completely and with maximum benefit to stakeholders.

### III. Stakeholder Input

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

- Targeted invitation to traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals

#### Brief Explanation

When appropriate to the project, either community groups, industry associations or individual stakeholders were contacted and solicited for participation. For example, our research programs relating to environmental concerns works closely with the Cumberland River Compact, a non-profit organization concerned with the health and well-being of the Cumberland Watershed, which encompasses much of Middle Tennessee. In projects that have clientele who are low income and have young children, agencies such as Head Start, Habitat for Humanity, and Good Food for Good People were involved. In programs where needs were more commodity-based, trade organizations (i.e. Tennessee Nursery and Landscape Association, Tennessee Goat Producers Association, Guinea Fowl Breeders Association) were contacted and utilized for input and direction. In other cases, individuals were contacted and participation was requested. For much of the research in the area of nursery plants, surveys of nursery producers were performed and periodic meetings were held with a Nursery Advisory Group that is maintained by the University.

#### 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
- Needs Assessments
- Use Surveys
- Other (See explanation below.)

#### Brief Explanation

The methods used for identifying stakeholders vary, depending upon the program. We try to identify stakeholders in a manner that will lead to the most useful and accurate feedback about stakeholder concerns as possible. Groups that serve the stakeholders (community based groups) or groups that represent stakeholders (industry and trade associations) are a primary source of input. Individuals are utilized where there are no associated groups representing the program area, or when an opportunity for face-to-face interaction (*i.e.* at an association meeting, field site visit, or community event) is presented. In these cases, individuals involved the program outputs are identified and queried for input.

#### 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 specifically with non-traditional individuals
- Survey specifically with non-traditional individuals

#### Brief Explanation

Most stakeholder input is collected in either face-to-face discussions or via survey instruments. Each of these methods is effective. The face-to-face discussions are often held with community group or trade association representatives, or with individual stakeholders in a group setting, this allows for questions and answers to direct and stimulate discussion of areas of importance to stakeholders. Survey instruments are a useful tool to assess information from broader groups of stakeholders. While some stakeholders prefer the anonymity and brevity of a survey instrument (often resulting in increased participation), a survey instrument does not always allow for discussion of previously unrecognized areas of concern.

**3. A statement of how the input was considered**

- To Identify Emerging Issues
- Redirect Research Programs
- To Set Priorities

**Brief Explanation**

Stakeholder input is used on many levels in research projects. It is used to determine priority areas of research, the manner in which research is conducted, and how research results are communicated.

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

Examples of information gained from stakeholders are primarily project-specific. In the specific area of research into the elimination of fire ants from nursery production areas, individual discussions held with regulatory agencies produced information indicating a change in regulatory judgment – that treatment of individual fire ant infestations would be considered in a quarantine plan, rather than a requirement for area-wide treatments. The knowledge of this change adds new option to our research in developing environmentally safe, cost effective methods to eliminate fire ants in nursery production. Also of interest in our environmental research was feedback from stakeholders indicated that most were genuinely concerned about the proper environmental stewardship of a particular watershed being investigated. Prior to the feedback, it was generally assumed that stakeholders would place monetary concerns over environmental concerns. Knowledge of this information will help in the design and dissemination of our findings and recommended practices.

**IV. Expenditure Summary**

| <b>1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)</b> |                       |                 |                    |
|--|-----------------------|-----------------|--------------------|
| <b>Extension</b>   |                       | <b>Research</b> |                    |
| <b>Smith-Lever 3b &amp; 3c</b>   | <b>1890 Extension</b> | <b>Hatch</b>    | <b>Evans-Allen</b> |
| 0  | 0                     | 0               | 2635897            |

| <b>2. Totaled Actual dollars from Planned Programs Inputs</b> |                                |                       |                 |                    |
|---|--------------------------------|-----------------------|-----------------|--------------------|
|   | <b>Extension</b>               |                       | <b>Research</b> |                    |
|   | <b>Smith-Lever 3b &amp; 3c</b> | <b>1890 Extension</b> | <b>Hatch</b>    | <b>Evans-Allen</b> |
| <b>Actual Formula</b>   | 0                              | 0                     | 0               | 1839104            |
| <b>Actual Matching</b>  | 0                              | 0                     | 0               | 757276             |
| <b>Actual All Other</b>                                       | 0                              | 0                     | 0               | 960526             |
| <b>Total Actual Expended</b>                                  | 0                              | 0                     | 0               | 3556906            |

| <b>3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous years</b> |   |   |   |   |
|--|---|---|---|---|
| <b>Carryover</b>   | 0 | 0 | 0 | 0 |

## V. Planned Program Table of Content

| S. NO. | PROGRAM NAME   |
|--------|--|
| 1      | Assessment of nutrients in the Collins River basin   |
| 2      | Analyzing the green industry and related sub-sectors in Tennessee: challenges and prospects          |
| 3      | Biopesticides to control diseases and insects and improve water quality from container nursery stock |
| 4      | Controlling imported fire ants in the nursery industry using behavior modifying chemicals            |
| 5      | Development of treatments to manage quarantine insects in field nursery production                   |
| 6      | Developing a recombinant antibody-based biosensor for rapid detection of salmonella in foods         |
| 7      | Evaluation of pathogen infectivity in stressed plants.   |
| 8      | Evaluation of poinsettias and seasonal alternative crops for production in Tennessee                 |
| 9      | Evaluating strategies to promote the goat meat industry in Tennessee                                 |
| 10     | Evaluation and characterization of heirloom varieties of tomato, pepper and eggplant                 |
| 11     | Evaluation of doe reproductive output, fitness and longevity among three meat goat breeds            |
| 12     | Functional studies on cold and heat-regulated genes using tomato as a model plant                    |
| 13     | Germplasm collection and evaluation of Goldenseal clones with superior properties                    |
| 14     | Improving families through improved nutrition and well-being of limited resource households          |
| 15     | Impact of the tobacco buyout program and strategies to promote economic viability of small farmers   |
| 16     | Management strategies to improve meat goat and guinea fowl production                                |
| 17     | Molecular approaches for the study of leaf surface microorganisms in ornamental crops                |
| 18     | Nutritional and management strategies to improve growth and production performance of guinea fowl    |
| 19     | Pathology research to benefit the Tennessee nursery industry   |
| 20     | Reducing the costs of food borne illnesses to small producers, selected food handlers and consumers  |
| 21     | Reducing risk of food borne illness by characterizing food pathogens and risky consumer practices    |
| 22     | Characterization of antibiotic resistant food borne pathogens in fresh produce                       |

**Program #1**

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

**1. Name of the Planned Program**

Assessment of nutrients in the Collins River basin

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

**1. Program Knowledge Areas and Percentage**

| KA Code | Knowledge Area                      | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|-------------------------------------|-----------------|-----------------|----------------|----------------|
| 112     | Watershed Protection and Management |                 |                 |                | 100%           |
|         | <b>Total</b>                        |                 |                 |                | 100%           |

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

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

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 2.6  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 2.6  |

**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              | 85693          |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 35285          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 44756          |

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

**1. Brief description of the Activity**

Characterize sub-watershed. Assess concentrations of nitrogen, phosphorous, suspended sediments in streams in the Collins river basin. Provide experiential learning opportunities to TSU students. Communicate research findings to appropriate scientific and stakeholder groups.

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

Nursery and other agricultural producers. Fertilizer producers. Regulatory and watchdog agencies.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 1               |              |
| 2008        | 0                | 0               | 0            |

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

**Output Target**

**Output #1**

**Output Measure**

- Scientific publications pertaining to water quality measurement techniques and watershed analysis results

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 0             |

**Output #2**

**Output Measure**

- Development of water quality analysis techniques

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 1             |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>   |
|--------------|---|
| 1            | Increase in number of nursery producers with increased awareness of problem/situation |
| 2            | Number of water bodies removed from 303(d) list                                       |
| 3            | Number of agricultural producers per year developing a nutrient management plan       |
| 4            | Number of students per year gaining experiential learning in water quality analysis   |

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

Increase in number of nursery producers with increased awareness of problem/situation

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 10                  | 6      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Nursery crop growers are not aware of the impact of their fertilizer and lime management practices on surface water. As a result of this issue, water managers and residents that live in the Collins River watershed and the State regulatory agency (Tennessee Department of Environment & Conservation, TDEC) care because of the possible effects of nursery crop production on the water quality of inflows (tributaries) to the Collins River.

**What has been done**

Three major tributaries (Mountain creek, Charles creek, Hills creek) of the Collins River were sampled in the summer of 2008 during ten consecutive weeks for Nitrate-N, Ammonium-N, Ortho-Phosphorus, Calcium, Magnesium, Potassium and Sodium. The following water quality parameters: pH, Temperature, Dissolved oxygen, Turbidity, Specific conductance and Total dissolved solids were also monitored.

**Results**

The average nitrate concentrations in the creeks were low. Mountain creek (0.02-1.41 mg/L) Charles creek (0.7-1.22 mg/L), Hills creek (0.06-0.50 mg/L). Phosphorus ranged from 0.02 mg/L in Mountain creek and Hills creek to 0.08 mg/L in Charles creek. Additionally, all the creeks at the time of sampling had relatively low concentrations of cations except calcium. Mountain creek (0.9-3.0 mg/L of Na; 0.5-8.4 mg/L of K; 4.0-9.0 mg/L of Mg and 25.1-51.32 mg/L of Ca); Charles creek (0.4-2.0 mg/L of Na; 0.76-1.27 mg/L of K; 6.0-10.30 mg/L of Mg and 38.04-55.84mg/L of Ca); Hills creek (0.33-0.89 mg/L of Na; 0.88-1.35 mg/L of K; 6.69-10.74 mg/L of Mg and 37.9-63.77 mg/L of Ca). Considering the hydro-geologic conditions of Middle Tennessee, with abundance of limestone rocks, it was expected that calcium will be relatively high. Water quality parameters data during base flow were as follows: Mountain creek (Average pH value = 7.8, water temperature = 20.550C, dissolved oxygen 6.7 mg/L, turbidity = 2.2 NTU, Specific conductance = 245 $\mu$ s and total dissolved solids = 155gram/L). Charles creek (Average pH value = 8.1, water temperature = 20.120C, dissolved oxygen 7.8 mg/L, turbidity = 4.72 NTU, Specific conductance = 261 $\mu$ s and total dissolved solids = 168 gram/L). Hills creek (Average pH value = 6.6, water temperature = 21.280C, dissolved oxygen 6.6 mg/L, turbidity = 5.03 NTU, Specific conductance = 356 $\mu$ s and total dissolved solids = 283 gram/L).

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                      |
|---------|-------------------------------------|
| 112     | Watershed Protection and Management |

**Outcome #2****1. Outcome Measures**

Number of water bodies removed from 303(d) list

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Collins River is listed in the State's 303(d) list of impaired water body. As a result the State regulatory agency (TDEC) cares. In a long run TDEC would like to see Collins River removed from the 303(d) list.

**What has been done**

Major inflow creeks of the Collins River are being monitored during summer, fall and spring for nutrients and water quality parameters.

**Results**

It is too soon to conclude that the in-flow creeks monitored (Mountain creek, Charles creek, Hills creek) do not contribute to the impairment of the water quality of the Collins River. More sampling seasons are needed to ascertain why Collins River is on the 303(d) list.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                      |
|---------|-------------------------------------|
| 112     | Watershed Protection and Management |

**Outcome #3****1. Outcome Measures**

Number of agricultural producers per year developing a nutrient management plan

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 5                   | 0      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

The Collins River is a major source of public water supply and recreational source for the residents of the Collins River watershed. The Collins River watershed drains four (4) rural counties in Middle Tennessee. As a result of this issue, water managers and residents that live in the watershed and the State regulatory agency (Tennessee Department of Environment & Conservation, TDEC) care because of the possible effects of nursery crop production on the water quality of inflows (tributaries) to the Collins River.

**What has been done**

Major inflow creeks of the Collins River are being monitored for major fertilizer nutrient

**Results**

Project is still at the data acquisition stage. However, data obtained during base flow and storm events will be shared with growers during annual trade shows.

**4. Associated Knowledge Areas**

| <b>KA Code</b> | <b>Knowledge Area</b>               |
|----------------|-------------------------------------|
| 112            | Watershed Protection and Management |

**Outcome #4****1. Outcome Measures**

Number of students per year gaining experiential learning in water quality analysis

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| <b>Year</b> | <b>Quantitative Target</b> | <b>Actual</b> |
|-------------|----------------------------|---------------|
| 2008        | 1                          | 2             |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

There is the need to train future workforce (students) to meet the need of water resource issues, especially in the area of water quality assessment and monitoring.

**What has been done**

Two students hired as student work-aide are involved in the project and gaining both research and extension experiential training.

**Results**

The students are assisting in instrument(s) calibration and stream water sampling.

**4. Associated Knowledge Areas**

| <b>KA Code</b> | <b>Knowledge Area</b>               |
|----------------|-------------------------------------|
| 112            | Watershed Protection and Management |

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

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

**Brief Explanation****V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

- Before-After (before and after program)
- During (during program)
- Comparisons between program participants (individuals,group,organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #2**

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

**1. Name of the Planned Program**

Analyzing the green industry and related sub-sectors in Tennessee: challenges and prospects

**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 |                 |                 |                | 50%            |
| 604          | Marketing and Distribution Practices                     |                 |                 |                | 50%            |
| <b>Total</b> |  |                 |                 |                | 100%           |

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

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

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 2.2  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 2.2  |

**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              | 72509          |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 29857          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 37870          |

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

**1. Brief description of the Activity**

Provide information to green industry and related sub-sector service providers at special events such as trade shows and field days.

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

Green industry producers, landscape businesses, consumers of green industry products and services, and policy makers.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 2               |              |
| 2008        | 0                | 1               | 1            |

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

**Output Target**

**Output #1**

**Output Measure**

- Scientific publications and policy papers relating to economic analysis of the green industry in Tennessee

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 2             | 1             |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>   |
|--------------|---|
| 1            | Percentage of program participants with potential problems, knowledge of exports and their information needs determined |
| 2            | Percentage of program participants with an increase in exports of nursery products and producers' income                |
| 3            | Percentage of program participants with increased sales and income  |
| 4            | Percentage of program participants receiving assistance in decreasing knowledge gaps, marketing and market access       |
| 5            | Percentage of program participants with increased knowledge of exports potential and opportunities by producers         |

**Outcome #1**

**1. Outcome Measures**

Percentage of program participants with potential problems, knowledge of exports and their information needs determined

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 100                 | 100    |

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

**Issue (Who cares and Why)**

The nursery industry has shown faster growth than other agricultural activities. Over the years, imports have by far exceeded exports. Although there is significant domestic demand for nursery products, exports can provide additional source of revenue for nursery business owners.

**What has been done**

A mail survey of nursery businesses covering a number of Southeastern states is conducted to assess issues impinging on export.

**Results**

Analysis of the data shows that nursery businesses have opportunities and also face a number of challenges in the export business. Specifically it was found that providing exporters with information about the market and regulatory policies in countries to which the products are exported are important. The role of government and private sector organizations in providing the above information is crucial. To more accurately reflect the accomplishments of this outcome measure it will be renamed 'Number of additional producers with potential problems, knowledge of exports and their information needs determined' in future reports.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area   |
|---------|--|
| 601     | Economics of Agricultural Production and Farm Management |
| 604     | Marketing and Distribution Practices                     |

**Outcome #2**

**1. Outcome Measures**

Percentage of program participants with an increase in exports of nursery products and producers' income

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 20                  | 20     |

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

**Issue (Who cares and Why)**

Nursery business owners are interested in the general performance of the sub-sector to ensure profitability. This applies both to the domestic and export markets. Volatility in exports is related to a number of issues including transaction costs and regulations. From the vantage point of nursery exporting businesses there is need to ensure stability in income.

**What has been done**

A mail survey was used to gauge the key issues of trade, regulations and transaction costs. The latter represents costs that are incurred to carry out a transaction both prior to and after sale pertaining to search, bargaining and contracting as well as monitoring cost. Business owners strive to minimize transaction costs to acquire adequate income.

**Results**

Analysis of the data revealed that sanitary and phyto-sanitary regulations and lack of knowledge about trade legislation and associated policy parameters in the countries to which products are exported represent key sources of transaction costs.

To more accurately reflect the status of this outcome measure, it will be renamed 'Number of producers with an increase in exports of nursery products and income' in future reports.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area   |
|---------|--|
| 601     | Economics of Agricultural Production and Farm Management |
| 604     | Marketing and Distribution Practices                     |

**Outcome #3**

**1. Outcome Measures**

Percentage of program participants with increased sales and income

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 50                  | 55     |

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

**Issue (Who cares and Why)**

Given that nursery businesses provide employment and income for a number of people it is important to understand issues which impact increase in sales and income which affect people's livelihood.

**What has been done**

A case study approach is used to illicit information from state agricultural marketing agency regarding sales. Knowledge gained is critical in enhancing income of businesses engaged in export.

**Results**

To be successful in the export business a number of strategies should be pursued. These include attending trade shows; visiting key export destinations and showcasing own business by inviting visitors. It is also important to assess the utility and cost effectiveness of alternative marketing channels such as direct sale to consumers versus selling through agents.

To more accurately reflect the status of this outcome measure, it will be renamed 'Number of producers with with an increase in with increased sales and income' in future reports.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---------|----------------|
|---------|----------------|

**Outcome #4****1. Outcome Measures**

Percentage of program participants receiving assistance in decreasing knowledge gaps, marketing and market access

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 75                  | 75     |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Access to relevant information which will enable business operations to fully participate in the market place is crucial. Close examination of this issue is important to understand their competitiveness. Landscape businesses are an important component of the nursery and greenhouse business. They provide a wide range of services including landscape and turf grass maintenance as well as plant installation.

**What has been done**

A survey of landscape businesses in the Nashville area is conducted to acquire feedback on operations of the businesses, including their size, gap in knowledge about the business, opportunities and challenges. It is important to get an understanding of the above issues to assess how well the businesses are doing.

**Results**

It was found that landscape services are very closely linked to nursery businesses. They range in size from small to large. Labor availability, weed suppression, water supply and pest regulations are noted to be major problems. Services provided by landscape businesses include landscape and turf maintenance as well as plant installation. Results of the survey provide insights on a number of issues relating to landscape businesses.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area   |
|---------|--|
| 601     | Economics of Agricultural Production and Farm Management |
| 604     | Marketing and Distribution Practices                     |

**Outcome #5****1. Outcome Measures**

Percentage of program participants with increased knowledge of exports potential and opportunities by producers

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 50                  | 50     |

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

**Issue (Who cares and Why)**

Increase in knowledge of export potential and opportunities for producers will enable businesses to enter the international market thereby expanding their market base and associated income.

**What has been done**

Data on nursery exporting businesses was acquired from the Tennessee Department of Agriculture covering a few years. This is the best available data at this time that can be used to assess the trend in knowledge of nursery products export potential that will benefit businesses.

**Results**

A review of nursery exports from Tennessee shows only few businesses are engaged in pursuing export opportunities. This may be due to a number of reasons including differences in the level of knowledge about export potential among nursery business owners. This difference can persist as long as there is no information sharing among businesses. The existence of asymmetric information limits knowledge about export opportunities and potential income that could have been obtained. To more accurately reflect the status of this outcome measure, it will be renamed 'Number of producers with increased knowledge of exports potential and opportunities by producers ' in future reports.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area   |
|---------|--|
| 601     | Economics of Agricultural Production and Farm Management |
| 604     | Marketing and Distribution Practices                     |

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Economy
- Public Policy changes
- Government Regulations
- Populations changes (immigration,new cultural groupings,etc.)

**Brief Explanation**

{No Data Entered}

**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

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

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #3**

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

**1. Name of the Planned Program**

Biopesticides to control diseases and insects and improve water quality from container nursery stock

**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%            |
| 215     | Biological Control of Pests Affecting Plants |                 |                 |                | 80%            |
|         | <b>Total</b>                                 |                 |                 |                | 100%           |

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

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

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 4.4  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 3.9  |

**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              | 128541         |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 52927          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 67134          |

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

**1. Brief description of the Activity**

The research proposed under this project will identify multiple new biopesticide compounds that can manage soil-borne pathogen and insect problems in container nurseries. The research will be used to expand grower options and offer alternatives that are safer for farm labor and the environment. In addition to finding and developing alternative pest management options, we intend to demonstrate that a significant reduction in offsite environmental contamination can be accomplished by grower adoption of biopesticide pest management options.

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

Nursery producers. Policy makers for regulatory pests like fire ants (e.g., regulatory entities involved with decision making on quarantine treatment approval). Pesticide and chemical manufacturers.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 0               |              |
| 2008        | 0                | 0               | 1            |

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

**Output Target**

**Output #1**

**Output Measure**

- Scientific publications documenting the efficacy of biopesticides in container nursery crops

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 2             |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>   |
|--------------|---|
| 1            | New strategies to reduce the offsite movement of conventional pesticides in container nurseries using biorational insect and pathogen treatments. |
| 2            | Increase in number of producers aware and educated about the problem  |
| 3            | Number of new biopesticide treatments developed   |
| 4            | Percent reduction in pesticide movement offsite of research facility  |

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

New strategies to reduce the offsite movement of conventional pesticides in container nurseries using biorational insect and pathogen treatments.

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 1                   | 0      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Pesticide and nutrient movement offsite from nurseries is a concern for both regulatory agencies and the general public. Pesticides and nutrients can have adverse effects on aquatic systems and water supply sources for human usage. Biopesticides with shorter residuals and lower acute toxicity may offer advantages in the prevention of non-point source pollution from nurseries, while still offering the opportunity to control problematic pests and pathogens.

**What has been done**

Multiple biopesticides and rates have been tested for controlling pests and pathogens in containerized nursery stock. Treatments have been tested both as container drenches or container dip treatments. Biological control agents of pathogens have also been tested for controlling powdery mildew.

**Results**

Results at this time consist of Japanese beetle, fire ant, and pathogen efficacy studies. A number of promising biopesticides have been identified for Japanese beetle control. Pathogen studies have indicated two bacteria, two yeasts, and one fungus can control powdery mildew. The use of other non-plant-pathogenic micro-organisms to control powdery mildew, if perfected, will eliminate conventional fungi offsite movement from powdery mildew control programs. It is anticipated the majority of biopesticides evaluated will have shorter residual persistence, and therefore, less potential for off-site movement.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                               |
|---------|--|
| 215     | Biological Control of Pests Affecting Plants |
| 133     | Pollution Prevention and Mitigation          |

**Outcome #2****1. Outcome Measures**

Increase in number of producers aware and educated about the problem

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 200                 | 400    |

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

**Issue (Who cares and Why)**

Pesticide and nutrient movement from nurseries may bring increased regulatory action against nursery producers, which could result in fines and impacts on their profitability. Therefore, it is important to provide educational training regarding water quality management and proper pest and pathogen control techniques to ensure pesticides and nutrients are applied properly to container nurseries to minimize environmental impact. In addition, increased educational awareness to producers regarding the benefits and efficacy of biopesticide substitutions for conventional pesticides may provide further benefit by minimizing the potential regulatory consequences to nursery stakeholders.

**What has been done**

An educational presentation on proper fire ant management techniques was given to about 100 nursery producers and landscape managers attending the Tennessee State University (TSU) Cooperative Extension Program Ornamental and Turfgrass Pest Management Workshop on 16 September 2008. About 325 participants with the International Plant Propagators Society (IPPS) were given field demonstrations of nursery plant dipping, drenching, floodjet, and flatfan spray techniques for applying pesticide treatments during a tour of the TSU Otis L. Floyd Nursery Research Center. Presentations have also been given to the Tennessee State University Nursery Advisory Group on pathogen, Japanese beetle, and imported fire ant research projects.

**Results**

Nursery stakeholders and landscape managers received training on proper management techniques and control options for insect pests and pathogens. Educational training will better enable producers to perform proper pest management practices that minimize unintentional offsite movement of pesticides and improve pesticide-handling safety for nursery workers. Growers also benefit from increased knowledge about alternative low impact pest and pathogen management techniques like biopesticides and pathogen biological control agents.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                               |
|---------|--|
| 215     | Biological Control of Pests Affecting Plants |
| 133     | Pollution Prevention and Mitigation          |

**Outcome #3**

**1. Outcome Measures**

Number of new biopesticide treatments developed

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 1                   | 1      |

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

**Issue (Who cares and Why)**

The nursery and greenhouse industries are important sectors of U.S. Agriculture providing about 2 million jobs according to recent economic estimates. Biopesticides offer an environmentally-friendly and worker-friendly alternative to conventional pesticides for the treatment of pests and pathogens in containerized nurseries. According to the U.S. Environmental Protection Agency, biopesticides have multiple advantages over conventional pesticides, including: 1) inherently less toxic, 2) often affect only the target pest, 3) often effective in small quantities, 4) decompose quickly, and 5) can reduce reliance on conventional insecticides. In addition, many biopesticides are exempt from pesticide registration requirements, which can reduce the development cost to chemical manufacturers and potentially lower the costs to nursery stakeholders.

**What has been done**

Multiple biopesticides were evaluated for ability to control third instar Japanese beetles infested into containerized nursery plants, including Ecotrol, Azatin XL, Cinnacure, Muscle, Triact 70, and Armorex. Other tests evaluated combinations of these biopesticides with low rates of conventional insecticides (bifenthrin, carbaryl, and trichlorfon) to determine if biopesticide + low rates of conventional pesticides could enhance control of third instar Japanese beetle grubs. Container media treated with biopesticides or combinations of biopesticides plus low rates of conventional insecticides were preliminarily tested against hybrid imported fire ant workers in the laboratory. Armorex was also field tested against hybrid imported fire ant colonies as a drench treatment. Other biological agents were tested against powdery mildew.

### Results

Three biopesticides demonstrated 100% efficacy against third instar Japanese beetle at rates tested, including Azatin XL, Triact 70, and Armorex. The test that combined biopesticides with low rate conventional insecticides has not been evaluated for Japanese beetle grub control at this time. However, biopesticide-treated container media samples collected from this test and tested against hybrid imported fire ant workers at 2 months post-treatment indicate inconsistent and generally ineffective control. Biopesticides combined with bifenthrin did provide adequate fire ant control, but the combination did not provide an advantage over just using bifenthrin alone in the control of worker fire ants. Armorex drench evaluations applied against fire ant colonies in the field in early summer 2008 achieved 100% control 7-14 days post treatment at 10 and 15 ml/gal rates. However, late summer evaluations resulted in 95% control. Two bacteria, two yeasts, and one fungus provided effective biological controls of powdery mildew. The bacteria and fungus also improved the growth of the nursery plants. All of the biopesticide and biological control agents evaluated have the potential to reduce off-site movement of conventional pesticides.

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area                               |
|---------|--|
| 215     | Biological Control of Pests Affecting Plants |
| 133     | Pollution Prevention and Mitigation          |

### Outcome #4

#### 1. Outcome Measures

Percent reduction in pesticide movement offsite of research facility

*Not reporting on this Outcome for this Annual Report*

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

#### External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Government Regulations

#### Brief Explanation

{No Data Entered}

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

#### 1. Evaluation Studies Planned

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

#### Evaluation Results

{No Data Entered}

#### Key Items of Evaluation

{No Data Entered}

**Program #4****V(A). Planned Program (Summary)****1. Name of the Planned Program**

Controlling imported fire ants in the nursery industry using behavior modifying chemicals

**V(B). Program Knowledge Area(s)****1. Program Knowledge Areas and Percentage**

| KA Code | Knowledge Area  | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|---|-----------------|-----------------|----------------|----------------|
| 211     | Insects, Mites, and Other Arthropods Affecting Plants |                 |                 |                | 100%           |
|         | <b>Total</b>  |                 |                 |                | 100%           |

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 2.6  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 2.6  |

**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              | 85693          |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 35285          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 44756          |

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

The research proposed under this project will identify compounds useful in keeping fire ants out of nursery plants that are being held for shipment as well as from areas where they are a nuisance and where it is not practical to use conventional insecticides because of health and environmental concerns.

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

Nursery producers, schools, parks and recreational facilities, nursing homes.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 1               |              |
| 2008        | 0                | 0               | 0            |

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

**Output Target**

**Output #1**

**Output Measure**

- Scientific publications describing the isolation, characterization and efficacy of behavior modifying chemicals in fire ant.

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 0             |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>  |
|--------------|--|
| 1            | Increase in number of growers with increased awareness of issue                      |
| 2            | Percentage of nurseries adopting control strategies using newly discovered chemicals |

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

Increase in number of growers with increased awareness of issue

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 100                 | 100    |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Control of imported fire ant is important for the agricultural industries of Tennessee and for public well-being. Species

specific imported fire ant attractants/repellents will target fire ant without adversely impacting native ant species and beneficial insects.

**What has been done**

Poisson and Dufours glands been extracted from red, black and hybrid fire ant species. Analysis of the glands has been completed.

**Results**

Laboratory assays have shown that Poisson gland extracts of red imported fire ants is species-specific. Field evaluation of the extracts are underway. Communication of results to growers will commence when field analysis is completed.

**4. Associated Knowledge Areas**

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

**Outcome #2****1. Outcome Measures**

Percentage of nurseries adopting control strategies using newly discovered chemicals

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Control of imported fire ant is important for the agricultural industries of Tennessee and for public well-being. Species specific imported fire ant attractants/repellents will target fire ant without adversely impacting native ant species and beneficial insects.

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

Poisson and Dufours glands been extracted from red, black and hybrid fire ant species. Analysis of the glands has been completed.

#### **Results**

Laboratory assays have shown that Poisson gland extracts of red imported fire ants is species-specific. Field evaluation of the extracts are underway. Communication of results to growers will commence when field analysis is completed.

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

| <b>KA Code</b> | <b>Knowledge Area</b>                                 |
|----------------|---|
| 211            | Insects, Mites, and Other Arthropods Affecting Plants |

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

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

- Natural Disasters (drought, weather extremes, etc.)
- Government Regulations

##### **Brief Explanation**

Severe drought hampered the field evaluations of isolated ant-produced chemicals, resulting in a lower-than-expected number of scientific publications pertaining to this area. It is expected these trials will be completed in summer of 2009.

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

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

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

##### **Evaluation Results**

{No Data Entered}

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

{No Data Entered}

**Program #5**

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

**1. Name of the Planned Program**

Development of treatments to manage quarantine insects in field nursery production

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

**1. Program Knowledge Areas and Percentage**

| KA Code | Knowledge Area  | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|---|-----------------|-----------------|----------------|----------------|
| 211     | Insects, Mites, and Other Arthropods Affecting Plants |                 |                 |                | 100%           |
|         | <b>Total</b>  |                 |                 |                | 100%           |

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

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

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 4.6  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 4.1  |

**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              | 135131         |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 55642          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 70576          |

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

**1. Brief description of the Activity**

Research experiments will be conducted with labeled and experimental insecticide compounds that will lead to new or improved fire ant and Japanese beetle quarantine treatments for field nursery plants. The research will be used to expand grower options in the Federal Imported Fire Ant Quarantine and the U.S. Domestic Japanese Beetle Harmonization Plan. The TSU Entomology Program will partner with USDA-ARS and USDA-APHIS collaborators to achieve these outcomes.

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

Nursery producers and policy makers (i.e., regulatory entities involved with decision making on quarantine treatment approval). Pesticide and chemical manufacturers.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 2               |              |
| 2008        | 0                | 2               | 2            |

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

**Output Target**

**Output #1**

**Output Measure**

- Refereed publications pertaining to research findings

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 2             | 2             |

**Output #2**

**Output Measure**

- New techniques for control of Japanese beetle and imported fire ant

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 1             |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>  |
|--------------|--|
| 1            | Numerical increase in grower awareness via educational talks   |
| 2            | Number of educational trade articles to increase grower awareness  |
| 3            | Number of refereed manuscripts produced  |
| 4            | Development of an improved treatment method for Japanese beetle and imported fire ant                            |
| 5            | Approval of new insecticides or lower rates of existing insecticides in Fire Ant and Japanese Beetle quarantines |
| 6            | Insecticide label changes based on research  |

**Outcome #1**

**1. Outcome Measures**

Numerical increase in grower awareness via educational talks

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 100                 | 425    |

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

**Issue (Who cares and Why)**

Imported fire ant and Japanese beetle quarantines impact nursery grower stakeholders by imposing quarantine treatments on their plant shipping activities. Ineffective quarantine treatments can lead to the unintentional movement of these pests into new areas where they cause further multiple negative impacts, including damage to horticultural crops and turf (Japanese beetle) or damage to electrical systems, roads, harvesting equipment, wildlife populations, livestock health, and human health (imported fire ants).

**What has been done**

An educational presentation on general management of imported fire ants in nursery, turfgrass, and landscape environments was given to about 100 participants attending the Tennessee State University Cooperative Extension Program Ornamental and Turfgrass Pest Management Workshop on 16 September 2008. Field demonstrations of dipping, drenching, floodjet, and flatfan spray technologies for applying Japanese beetle and imported fire ant quarantine treatments were given to about 325 participants of the International Plant Propagators Society (IPPS) during a tour of the TSU Otis L. Floyd Nursery Research Center on 30 October 2007. In addition to these grower awareness presentations, a 30-minute presentation regarding the imported fire ant situation in the state of Tennessee was given to the Tennessee General Assembly House Agriculture Committee at the State Capitol Building on 29 January 2008.

**Results**

Nursery growers, turf producers, and landscape managers received training and demonstrations on the latest control techniques for imported fire ants and Japanese beetle. Information gained by stakeholders will improve the productivity of their businesses; provide better quarantine pest control reducing the risk of unintentional pest movement into new areas, and result in safer chemical handling by agricultural workers. The presentation given to the Tennessee General Assembly House Agriculture Committee provided information that will improve decision-making by state officials who pass legislation that may affect growers.

**4. Associated Knowledge Areas**

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

**Outcome #2**

**1. Outcome Measures**

Number of educational trade articles to increase grower awareness

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 1                   | 1      |

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

**Issue (Who cares and Why)**

Imported fire ants and Japanese beetles can cause significant economic impacts when introduced into new areas, as well as imposing time-consuming and expensive quarantine regulations on nursery growers.

**What has been done**

A summary entitled the "Statewide survey of imported fire ant species in Tennessee" was prepared for the Proceedings of the Imported Fire Ant and Invasive Ant Conference. In addition, imported fire ant insecticide research during this period has undergone summarization for the website of our USDA-APHIS cooperator. The website is currently under re-construction, but reports will be available when the website renovation is completed. Although not an educational trade article, a written summary was prepared and given to the Tennessee General Assembly House Agriculture Committee and the oral presentation is publicly available in the Tennessee General Assembly video archives.

**Results**

The statewide survey of imported fire ant species has been used to guide the release site selection of phorid-decapitating flies in Tennessee, resulting in another sustainable biological control option for fire management that will benefit both agricultural stakeholders and the general citizens of Tennessee. Grower awareness of statewide fire ant surveys and fire ant biological control programs informs growers that additional self-sustaining fire ant controls are available to assist with their management of this pest. Insecticide summaries of our research on the APHIS imported fire ant website is available to growers to improve their awareness of research activities. However, the greatest benefit of the research summaries is to facilitate decision-making for developing new treatments that will benefit growers. Likewise, information given to the Tennessee General Assembly House Agriculture Committee will also facilitate decision-making by legislators, which in turn will benefit nursery stakeholders.

**4. Associated Knowledge Areas**

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

**Outcome #3**

**1. Outcome Measures**

Number of refereed manuscripts produced

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 2                   | 0      |

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

**Issue (Who cares and Why)**

Imported fire ants and Japanese beetles are invasive species that have significant economic consequences when introduced into new areas. The lack of effective quarantine treatments for Japanese beetle and imported fire ants can prevent nursery growers from being able ship nursery products from infested to non-infested areas, reducing their potential market area.

#### What has been done

The following refereed manuscripts were published in 2008:

- 1) Oliver, J.B., M.E. Reding, S.O. Dennis, J.J. Moysenko, N.N. Youssef, M.G. Klein, A.A. Callcott, S.S. James, L.R. McAnally, and B.L. Bishop. 2008. Drench treatments for management of larval Japanese beetle (Coleoptera: Scarabaeidae) in field-grown balled and burlapped nursery plants. *J. Econ. Entomol.* 101 (4): 1158-1166.
- 2) Oliver, J.B., M.E. Reding, N.N. Youssef, M.G. Klein, B. Bishop, and P. Lewis. 2009. Surface-applied insecticide treatments for elimination of larval Japanese beetle (Coleoptera: Scarabaeidae) from field-grown nursery plants. *Pest Management Science*. Accepted for Publication July 18, 2008. (In Press).

#### Results

Research results published in the drench treatment manuscript indicate drench treatments of balled and burlapped (B&B) root balls with bifenthrin, chlorpyrifos, or thiamethoxam were more effective at controlling third instar Japanese beetle when applied in the spring than the fall. The study also found higher drench volumes (i.e., twice runoff volume = 5.14 liters per drench) did not improve grub control over lower drench volumes (i.e., runoff volume = 2.57 liters per drench), but rotation of root balls during drenching did improve grub control. The results of the study indicate an advantage to applying drench treatments in the spring to achieve more effective Japanese beetle quarantine control. Research results published in the surface-applied insecticide treatment manuscript support early instar grub control under nursery field conditions using multiple neonicotinoid insecticides, including clothianidin, dinotefuran, thiamethoxam, imidacloprid, and imidacloprid + cyfluthrin. The bisacylhydrazine ecdysteroid agonist, halofenozide, is also profiled in the manuscript. Results indicate clothianidin, thiamethoxam, and halofenozide provided grub control at levels equivalent to imidacloprid standards already approved for use in the Domestic Japanese Beetle Harmonization Plan. Therefore, the study provides support for using these alternative insecticides as substitutes to current imidacloprid standards, providing growers with more treatment options and potentially lower costs.

#### 4. Associated Knowledge Areas

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

#### Outcome #4

##### 1. Outcome Measures

Development of an improved treatment method for Japanese beetle and imported fire ant

##### 2. Associated Institution Types

•1890 Research

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

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

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

Current post-harvest fire ant and Japanese beetle treatment methods for field-grown nursery stock (e.g., chlorpyrifos dipping for fire ants and Japanese beetle or chlorpyrifos drenching twice daily for three consecutive days for fire ants) are expensive, time-consuming, and hazardous. Current pre-harvest fire ant and Japanese beetle treatment methods for field-grown nursery stock (e.g., chlorpyrifos granular broadcast for fire ants or imidacloprid band treatment for Japanese beetle) are expensive, require plant-shipping delays, or must be applied during the summer in advance of fall/winter shipping season, creating a scenario where plants may receive expensive treatments, but then are not sold due to changes in market demand.

**What has been done**

No new techniques have been developed at this time because the project No new techniques have been adopted by regulatory agencies at this time based on this research project. However, research has been performed to evaluate alternative drench treatment numbers in combination with balled and burlapped root ball rotation. Research has also been performed to evaluate Tree Rings as an alternative method to apply insecticides and biopesticides to both pre- and post-harvest field grown nursery stock.

**Results**

Research results indicate an advantage in Japanese beetle grub and imported fire ant control from rotating balled and burlapped root balls during drench treatment applications. Results indicate it is possible to reduce the number of chlorpyrifos drench applications from the current requirement of six consecutive applications over three days to one or two applications in a single day if root balls are rotated during the drench process and receive appropriate drench volumes. Results also indicate bifenthrin is working as effectively as chlorpyrifos for drench treatments, providing another alternative insecticide active ingredient option. Research results indicate insecticides like carbaryl, trichlorfon, and bifenthrin are effectively controlling Japanese beetle grubs or imported fire ants when applied to either pre- or post-harvest field grown nursery stock with Tree Rings.

**4. Associated Knowledge Areas**

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

**Outcome #5****1. Outcome Measures**

Approval of new insecticides or lower rates of existing insecticides in Fire Ant and Japanese Beetle quarantines

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Treatment options for field-grown nursery stock to meet imported fire ant and Japanese beetle quarantines are expensive, time-consuming, and limited. Before this project, there were only 3 options to satisfy imported fire ant quarantines for field-grown nursery, including a post-harvest root ball dip in chlorpyrifos, a post-harvest twice daily for three consecutive days drench in chlorpyrifos, or a fire ant bait + granular chlorpyrifos pre-harvest treatment. The only practical method for growers among the three approved fire ant treatments was the bait + granular chlorpyrifos option, but producers could not afford this treatment option due to the cost of the granular chlorpyrifos formulation labeled for nursery crops (about \$215 per treated acre). In addition, the granular fire ant treatment must be applied every 84 days and the dip or drench treatments every 30 days, which is a time interval too short for the typical field-grown nursery harvesting cycle (generally September to April). For Japanese beetle, there were only two quarantine treatment options for field-grown nurseries before this project, including a post-harvest root ball dip in chlorpyrifos or a pre-harvest band treatment of imidacloprid between May and July. As with fire ants, the dip treatment is not practical for Japanese beetle and the imidacloprid treatment must be applied before fall / winter harvesting begins, which is a cost-risk if plant sales demand subsequently declines during the fall and winter.

**What has been done**

Results from this project have been provided to the USDA-APHIS Soil Inhabiting Pests Section, the U.S. Domestic Japanese Beetle Harmonization Plan Regulatory Treatment Review Committee, and to insecticide manufacturing companies to facilitate decision-making for changes in regulations and insecticide labels.

**Results**

A new chlorpyrifos dip rate has been approved for Japanese beetle grub control in the Domestic Japanese Beetle Harmonization Plan (DJBP) as a result of this project for both balled & burlapped and containerized nursery stock. The new chlorpyrifos rate is 8 times less than the current rate, which not only lowers the chemical cost 8-fold, but also reduces the worker exposure risk and lowers the environmental hazard. A new Onyx Pro (bifenthrin) insecticide dip treatment has been approved in the DJBP for treatment of balled & burlapped and containerized nursery stock to control Japanese beetle grubs. The new Onyx Pro immersion treatment provides an alternative insecticide active ingredient to substitute for chlorpyrifos when meeting quarantine requirements for Japanese beetle grubs. The regulations to approve the Onyx Pro as a dip treatment for imported fire ants are in the approval process. If approved for fire ant use, the Onyx Pro fire ant dip treatment will allow field grown nurseries to certify balled and burlapped nursery stock for 6 months, which is 5 months longer than currently allowed with chlorpyrifos. Therefore, the Onyx Pro fire ant treatment will provide a certification period sufficiently long to match the B&B harvest and storage period that generally begins in September and ends around April.

**4. Associated Knowledge Areas**

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

**Outcome #6**

**1. Outcome Measures**

Insecticide label changes based on research

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 2      |

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

**Issue (Who cares and Why)**

Chlorpyrifos is the only insecticide approved for post-harvest treatment of field-grown nursery stock in imported fire ant and Japanese beetle quarantines. Chlorpyrifos has been under increased regulatory scrutiny by the U.S. Environmental Protection Agency (EPA). If this chemical becomes unavailable, either through regulatory action of the EPA or from lost manufacturing incentives, then nursery growers would have no alternatives to meet post-harvest quarantine certification for fire ants and Japanese beetle grubs.

**What has been done**

Support data was submitted to FMC Corporation for using Onyx Pro (bifenthrin) as a dip treatment for post-harvest balled & burlapped root balls to control imported fire ants and Japanese beetle grubs.

**Results**

A new Onyx Pro dip label has been approved and is now publicly available. Two new changes now appear on the label, including: 1) Onyx Pro dip treatment of containerized or balled & burlapped nursery stock for Japanese beetle grubs at a rate of 222 to 651 ml product / 100 gallons solution and 2) Onyx Pro dip treatment of containerized or balled & burlapped nursery stock for imported fire ants at a rate of 222 ml product / 100 gallons solution. This is the first time the active ingredient bifenthrin has been approved for use as a dip treatment. The new Onyx Pro dip is also now approved for use in the U.S. Domestic Japanese Beetle Harmonization Plan (as previously stated under Outcome #5), but regulatory approval of the treatment is still pending for the Federal Imported Fire Ant Quarantine. Therefore, the fire ant dip treatment is now allowed on the insecticide label, but regulatory changes in the Federal Imported Fire Ant Quarantine are pending.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---------|----------------|
|---------|----------------|

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Government Regulations

**Brief Explanation**

{No Data Entered}

**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

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

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #6**

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

**1. Name of the Planned Program**

Developing a recombinant antibody-based biosensor for rapid detection of salmonella in foods

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

**1. Program Knowledge Areas and Percentage**

| KA Code      | Knowledge Area  | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|--------------|---|-----------------|-----------------|----------------|----------------|
| 712          | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |                 |                 |                | 100%           |
| <b>Total</b> |   |                 |                 |                | 100%           |

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

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

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 1.8  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 1.8  |

**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              | 59326          |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 24428          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 30985          |

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

**1. Brief description of the Activity**

Conduct laboratory experiments to develop a biosensor; conduct field trials to evaluate the biosensor; transfer the developed technology to end users.

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

Food processors, packaged foods industry

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 1               |              |
| 2008        | 0                | 1               | 1            |

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

**Output Target**

**Output #1**

**Output Measure**

- Commercializable diagnostic assay for rapid detection of Salmonella in food.

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 0             | 0             |

**Output #2**

**Output Measure**

- Publications relating to rapid detection of Salmonella in foods

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 1             |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>   |
|--------------|---|
| 1            | Scientific publications concerning rapid detection of Salmonella in foods   |
| 2            | New technologies developed to detect Salmonella in foods                    |
| 3            | Transfer of new Salmonella detection procedures to commercial food industry |

**Outcome #1**

**1. Outcome Measures**

Scientific publications concerning rapid detection of Salmonella in foods

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 1                   | 1      |

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

**Issue (Who cares and Why)**

Traditional methods for the detection of Salmonella are time consuming. The rapid method developed through this research will reduce labor and time of analysis for meat and poultry processors and thus reduce the risk to consumers.

**What has been done**

Experiments were conducted to improve the detection limit of the three-channel surface plasmon resonance sensor for direct detection of Salmonella without enrichment procedures. Several approaches were explored to increase the cell concentration by incorporating sample preparation procedures before sensor analysis. These include acid extraction, centrifugation, gel filtration, and immunomagnetic separation. Experiments were also conducted to validate the sensor using analytical protocols developed for direct detection of Salmonella in chicken rinse water. This validation model was chosen to assess the potential applications of the sensor technology by poultry industry.

**Results**

Major improvements have been achieved by incorporating samples preparation procedures before sensor analysis. A protocol for sample preparation including glycine-hydrochloride extraction, centrifugation and gel filtration was developed in conjunction with sensor analysis. By eliminating enrichment procedures which normally require 8-16 hr incubation time, the new developed protocol could be performed in just less than 1 h. The results showed that S. typhimurium at a concentration as low as 4,000 CFU/ml could be detected by the sensor. This represents a major improvement in the detection limit of the sensor. This sensor technology, which requires minimal instrument investment and less labor intensity than other molecular methods, has potential advantages been applied by poultry industry at processing plants.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area  |
|---------|---|
| 712     | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |

**Outcome #2**

**1. Outcome Measures**

New technologies developed to detect Salmonella in foods

*Not reporting on this Outcome for this Annual Report*

**Outcome #3**

**1. Outcome Measures**

Transfer of new Salmonella detection procedures to commercial food industry

*Not reporting on this Outcome for this Annual Report*

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

**External factors which affected outcomes**

- Appropriations changes
- Government Regulations
- Competing Programmatic Challenges

**Brief Explanation**

{No Data Entered}

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

**1. Evaluation Studies Planned**

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

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #7****V(A). Planned Program (Summary)****1. Name of the Planned Program**

Evaluation of pathogen infectivity in stressed plants.

**V(B). Program Knowledge Area(s)****1. Program Knowledge Areas and Percentage**

| KA Code | Knowledge Area  | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|---|-----------------|-----------------|----------------|----------------|
| 203     | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |                 |                 |                | 30%            |
| 212     | Pathogens and Nematodes Affecting Plants                          |                 |                 |                | 50%            |
| 216     | Integrated Pest Management Systems                                |                 |                 |                | 20%            |
|         | <b>Total</b>  |                 |                 |                | 100%           |

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 1.9  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 1.9  |

**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              | 62622          |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 25785          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 32706          |

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

Research in the molecular response of plants to stress and subsequent pathogen establishment. Development of techniques to mitigate the exploitation of plant stress proteins by plants. Development of pathogen resistant plants.

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

Plant pest management researchers and agricultural producers.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 0               |              |
| 2008        | 0                | 1               | 1            |

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

**Output Target**

**Output #1**

**Output Measure**

- Techniques for inducing, detecting, and exploiting stress related proteins in plant disease resistance research

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 1             |

**Output #2**

**Output Measure**

- Scientific publications concerning pathogen infectivity in stress induced plants

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 1             |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>  |
|--------------|--|
| 1            | Number of integrated stress management and disease prevention strategies developed |
| 2            | Number of molecular mechanisms for plant stress identified                         |
| 3            | Number of stress and disease resistant plants developed                            |
| 4            | Number of additional growers, scientists and pest managers aware of issue          |

**Outcome #1**

**1. Outcome Measures**

Number of integrated stress management and disease prevention strategies developed

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

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

**Issue (Who cares and Why)**

Potato (*Solanum* spp.) the target species of this research is the fourth most important food crop in the world. As such, any improvements in the the ability to reduce yield losses in a sustainable manner are important. The integrated pest management strategies being examined in this project are sustainable.

**What has been done**

Infectivity analyses has been conducted using high and low virulence pathogens on stressed and non-stressed *Solanum* plants. This work is being performed among collaborators at Tennessee State University, University of Idaho, USDA/ARS station in Maine, and North Dakota State University.

**Results**

The results of this project clearly indicate proportional relationship between host-stress and severity of infection on the host in vitro.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area  |
|---------|---|
| 212     | Pathogens and Nematodes Affecting Plants                          |
| 203     | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |
| 216     | Integrated Pest Management Systems                                |

**Outcome #2**

**1. Outcome Measures**

Number of molecular mechanisms for plant stress identified

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 1                   | 2      |

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

**Issue (Who cares and Why)**

Knowledge of the nexus between stress and infectivity would be of great benefit in the development of stress resistant plants. The identification of these components at a molecular level will lead to a better understanding of the processes and speed the identification of plants with superior abilities to resist pests.

#### What has been done

Six regimes of temperature stress, that are reported to induce production of an array of stress protein (hsps), were provided by keeping the potato cultures at 42°C for 2, 4, 6, 16 and 24 hours before infection.

#### Results

Short duration stress (42°C for 2 hours before infection) prepares a host since soft-rot had less spread of infection on the hosts under these conditions compared to control. On the other hand increasingly longer stress treatment (42°C for 4, 6, 16 and 24 hours before infection) of the hosts successively increased the level of infection on the in vitro potato plants.

#### 4. Associated Knowledge Areas

| KA Code | Knowledge Area  |
|---------|---|
| 212     | Pathogens and Nematodes Affecting Plants                          |
| 203     | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |
| 216     | Integrated Pest Management Systems                                |

#### Outcome #3

##### 1. Outcome Measures

Number of stress and disease resistant plants developed

*Not reporting on this Outcome for this Annual Report*

#### Outcome #4

##### 1. Outcome Measures

Number of additional growers, scientists and pest managers aware of issue

##### 2. Associated Institution Types

•1890 Research

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 10                  | 10     |

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

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

Completion of the project will aid in the development of integrated pest management strategies and disease resistant plants. Thus the stakeholders who adopt and use these methods would benefit the production of potato and other crops

###### What has been done

Research results have been presented to departmental seminar audience. Research topic was circulated to Southern Nursery Association. An abstract has been published for Association of Research Directors meeting. Presentations are also being prepared for the Potato Association of America.

###### Results

More than 20 members of the target audience has been exposed to the research results. It is expected that information will also be communicated to more than 200 stakeholders at the Association of Research Directors and Potato Association of America meetings.

**4. Associated Knowledge Areas**

| <b>KA Code</b> | <b>Knowledge Area</b>   |
|----------------|---|
| 212            | Pathogens and Nematodes Affecting Plants                          |
| 203            | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |
| 216            | Integrated Pest Management Systems                                |

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes

**Brief Explanation**

{No Data Entered}

**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #8**

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

**1. Name of the Planned Program**

Evaluation of poinsettias and seasonal alternative crops for production in Tennessee

**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                               |                 |                 |                | 50%            |
| 205     | Plant Management Systems                              |                 |                 |                | 25%            |
| 211     | Insects, Mites, and Other Arthropods Affecting Plants |                 |                 |                | 25%            |
|         | <b>Total</b>  |                 |                 |                | 100%           |

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

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

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 2.3  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 0.8  |

**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              | 26367          |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 10857          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 13771          |

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

**1. Brief description of the Activity**

The intended plan for this program is presented below. However, due to personnel changes no research was performed in this program during this year; a limited amount of outreach activity was performed. The decision has been made to eliminate it from our Plan of Work.

To conduct greenhouse trials of a range of poinsettia cultivars and other seasonal crops. Partner with major U.S. suppliers. Provide training to growers, industry customer reps, and homeowners. Conduct poinsettia open house at which consumer preferences will be surveyed. Generate production and marketing information on new and established poinsettia cultivars as well as alternative seasonal crops.

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

Crop producers, plant breeders, retailers and marketers of ornamental plants, extension agents, homeowners.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 1               |              |
| 2008        | 0                | 0               | 0            |

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

**Output Target**

**Output #1**

**Output Measure**

- Scientific publications concerning traditional and novelty poinsettias and marketing trends with poinsettias and seasonal crops.

*Not reporting on this Output for this Annual Report*

**Output #2**

**Output Measure**

- Number of students receiving training in seasonal crop production and marketing

*Not reporting on this Output for this Annual Report*

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>   |
|--------------|---|
| 1            | Number of cultivars of seasonal crops evaluated                                 |
| 2            | Number of participants in consumer preference analysis                          |
| 3            | Number of students receiving training in seasonal crop production and marketing |

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

Number of cultivars of seasonal crops evaluated

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 50                  | 47     |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Poinsettia is a leading seasonal greenhouse crop. Each year many new varieties of Poinsettia are introduced. For producers, or potential producers, to make wise choices about the best variety to produce in their area, they need information on consumer preference and technical production information.

**What has been done**

New and established varieties of poinsettia were propagated and grown to finish. A poinsettia field day was held for general public and greenhouse professionals to rate varietal preference. These data were combined with production data.

**Results**

Consumer and producer preference data were communicated to the producer community via trade publication outlets.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area  |
|---------|---|
| 211     | Insects, Mites, and Other Arthropods Affecting Plants |
| 202     | Plant Genetic Resources                               |
| 205     | Plant Management Systems                              |

**Outcome #2****1. Outcome Measures**

Number of participants in consumer preference analysis

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 250                 | 327    |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Poinsettia is a leading seasonal greenhouse crop. Each year many new varieties of Poinsettia are introduced. For producers, or potential producers, to make wise choices about the best variety to produce in their area, they need information on consumer preference. A means to gauge this consumer preference is to have consumers rate a representative variety of poinsettia cultivars for preferred color, stature, etc.

**What has been done**

New and established varieties of poinsettia were propagated and grown to finish. A poinsettia field day was held for general public and greenhouse professionals to rate varietal preference. These data were combined with production data.

**Results**

327 persons attended the field day. A high proportion filled out consumer preference surveys. The information has been summarized and conveyed via trade publications.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area           |
|---------|--------------------------|
| 205     | Plant Management Systems |
| 202     | Plant Genetic Resources  |

**Outcome #3**

**1. Outcome Measures**

Number of students receiving training in seasonal crop production and marketing

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 1                   | 1      |

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

**Issue (Who cares and Why)**

It is important to train the next generation of agricultural scientists. One aspect of this training is hands-on experiential learning.

**What has been done**

One undergraduate student was hired to work on this project, the student participated all aspects of the project: varietal selection, plant propagation and maintenance staging of the field day and tabulation of data.

**Results**

An undergraduate student received hands-on experiential learning opportunity in greenhouse crop management and consumer preference analysis.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area  |
|---------|---|
| 211     | Insects, Mites, and Other Arthropods Affecting Plants |
| 202     | Plant Genetic Resources                               |
| 205     | Plant Management Systems                              |

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

External factors which affected outcomes

- Natural Disasters (drought,weather extremes,etc.)
- Economy
- Other (Personnel changes)

**Brief Explanation**

The loss of the lead scientist for this program negatively affected the outputs and outcomes of this project.This project will not be included in future Plans of Work.

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

**1. Evaluation Studies Planned**

- During (during program)
- Time series (multiple points before and after program)

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #9**

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

**1. Name of the Planned Program**

Evaluating strategies to promote the goat meat industry in Tennessee

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

**1. Program Knowledge Areas and Percentage**

| KA Code | Knowledge Area                       | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|--------------------------------------|-----------------|-----------------|----------------|----------------|
| 502     | New and Improved Food Products       |                 |                 |                | 10%            |
| 604     | Marketing and Distribution Practices |                 |                 |                | 90%            |
|         | <b>Total</b>                         |                 |                 |                | 100%           |

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

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

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 2.6  |
| <b>Actual</b> | 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              | 0              |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 0              |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 0              |

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

**1. Brief description of the Activity**

The intended activities for this program are presented below. However, due to loss of personnel for this project, none of these activities were performed. This program is being eliminated from our Plan of Work.

Case studies with representative goat producers to conduct economic analysis of various marketing channels in use. Focus group meetings with local retail businesses to assess the potential to make goat meat available at mainstream local retail markets. Primary survey of non-traditional consumers to evaluate the extent of goat meat acceptance. Primary survey of traditional goat consumers to identify issues and problems faced in local goat meat markets and their willingness to pay for desired quality and preferences. Meetings with goat producers, association and other related groups to promote goat industry.

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

Goat producers, traditional consumers ( individuals who eat goat meat), non-traditional consumers ( individuals who have never eaten goat meat before), goat producers and marketing associations, local restaurants and food businesses, policy makers.

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

**1. Standard output measures**

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

|      | Direct Contacts<br>Adults | Indirect Contacts<br>Adults | Direct Contacts<br>Youth | Indirect Contacts<br>Youth |
|------|---------------------------|-----------------------------|--------------------------|----------------------------|
| Year | Target                    | Target                      | Target                   | Target                     |
| Plan | 0                         | 0                           | 0                        | 0                          |
| 2008 | 0                         | 0                           | 0                        | 0                          |

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

**Patent Applications Submitted**

| Year   | Target |
|--------|--------|
| Plan:  | 0      |
| 2008 : | 0      |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|      | Extension | Research | Total |
|------|-----------|----------|-------|
| Plan | 0         | 2        |       |
| 2008 | 0         | 0        | 0     |

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

**Output Target**

**Output #1**

**Output Measure**

- Scientific publications concerning strategies to promote the goat meat industry in Tennessee  
*Not reporting on this Output for this Annual Report*

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>   |
|--------------|---|
| 1            | Increase in number of goat producers with knowledge of efficient marketing techniques                             |
| 2            | Increase in number of local restaurants and businesses with knowledge of potential goat meat demand by consumers. |
| 3            | Increase in number of goat producers educated in specific consumer preferences                                    |
| 4            | Increase in demand for goat meat in Tennessee by non-traditional new consumers in Tennessee.                      |
| 5            | Percent increase in goat meat production in Tennessee   |

**Outcome #1**

**1. Outcome Measures**

Increase in number of goat producers with knowledge of efficient marketing techniques

*Not reporting on this Outcome for this Annual Report*

**Outcome #2**

**1. Outcome Measures**

Increase in number of local restaurants and businesses with knowledge of potential goat meat demand by consumers.

*Not reporting on this Outcome for this Annual Report*

**Outcome #3**

**1. Outcome Measures**

Increase in number of goat producers educated in specific consumer preferences

*Not reporting on this Outcome for this Annual Report*

**Outcome #4**

**1. Outcome Measures**

Increase in demand for goat meat in Tennessee by non-traditional new consumers in Tennessee.

*Not reporting on this Outcome for this Annual Report*

**Outcome #5**

**1. Outcome Measures**

Percent increase in goat meat production in Tennessee

*Not reporting on this Outcome for this Annual Report*

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

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Government Regulations
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Personnel changes.)

**Brief Explanation**

This program had one Principal Investigator associated with it to conduct the bulk of the research. This PI has taken a leave of absence from the university, preventing the completion of the stated goals. This program will be removed from our Plan of Work.

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

**1. Evaluation Studies Planned**

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

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #10****V(A). Planned Program (Summary)****1. Name of the Planned Program**

Evaluation and characterization of heirloom varieties of tomato, pepper and eggplant

**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  |                 |                 |                | 50%            |
| 205     | Plant Management Systems |                 |                 |                | 50%            |
|         | <b>Total</b>             |                 |                 |                | 100%           |

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 4.2  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 3.6  |

**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              | 118652         |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 48857          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 61969          |

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

Conduct field, greenhouse and laboratory research experiments; install and evaluate field demonstration plots.

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

Agricultural research community, crop producers, plant breeders, retailers of vegetable and ornamental plant seeds, Extension agents, policy makers, homeowners.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 2               |              |
| 2008        | 0                | 1               | 1            |

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

**Output Target**

**Output #1**

**Output Measure**

- Scientific publications pertaining to adaptation and characterization of heirloom varieties of tomato, pepper and eggplant.

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 2             | 0             |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>   |
|--------------|---|
| 1            | Number of additional producers with increased knowledge of varieties, attributes and growing practices of heirloom varieties. |
| 2            | Additional number of consumers with increased knowledge of attributes of heirloom varieties.                                  |
| 3            | Additional number of students gaining knowledge of heirloom variety characteristics   |
| 4            | Number of linkage maps developed to facilitate marker-assisted breeding   |
| 5            | Number of graduate students trained in DNA based plant characterization techniques  |
| 6            | Number of DNA fingerprinting protocols established for true-to-type identification  |
| 7            | Number of protocols for DNA characterization to establish true-to-type identification of varieties examined in project        |
| 8            | Number of significant functional elements (such as amino acids and vitamins) characterized in heirloom varieties              |

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

Number of additional producers with increased knowledge of varieties, attributes and growing practices of heirloom varieties.

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 20                  | 40     |

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area           |
|---------|--------------------------|
| 205     | Plant Management Systems |
| 202     | Plant Genetic Resources  |

**Outcome #2****1. Outcome Measures**

Additional number of consumers with increased knowledge of attributes of heirloom varieties.

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 25                  | 30     |

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area           |
|---------|--------------------------|
| 202     | Plant Genetic Resources  |
| 205     | Plant Management Systems |

**Outcome #3****1. Outcome Measures**

Additional number of students gaining knowledge of heirloom variety characteristics

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 6                   | 6      |

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area           |
|---------|--------------------------|
| 205     | Plant Management Systems |
| 202     | Plant Genetic Resources  |

**Outcome #4****1. Outcome Measures**

Number of linkage maps developed to facilitate marker-assisted breeding

*Not reporting on this Outcome for this Annual Report*

**Outcome #5****1. Outcome Measures**

Number of graduate students trained in DNA based plant characterization techniques

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 1      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Molecular biology has advanced the knowledge base in biological science and technology at an unprecedented rate. Students should understand these principles since they need to take informed positions on the practical and ethical implications of such technologies, and may use them in the workplace.

**What has been done**

A minority graduate student has been trained in techniques to conduct DNA fingerprinting.

**Results**

Student research work on molecular markers contributed to presentation made at the 2008 Southern Nursery Association Research Conference in Atlanta, Georgia.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area          |
|---------|-------------------------|
| 202     | Plant Genetic Resources |

**Outcome #6****1. Outcome Measures**

Number of DNA fingerprinting protocols established for true-to-type identification

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 1      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Molecular markers are excellent tool for true-to-type identification of authentic plant material in order to ascertain their genuineness. AFLP is therefore a tool of choice since its reliability is based on two molecular techniques i.e., restriction digest and DNA amplification.

**What has been done**

DNAs were isolated from leaf samples using a DNeasy Plant Mini Extraction Kit (QIAGEN, Santa Clara, CA). These DNAs were verified in a 2 percent agarose gel and DNA concentrations were quantified. Subsequent AFLP amplification included restriction digestion of the sample DNA, ligation of the adaptors, pre-amplification of adapter-ligated DNA fragments, and amplification of the AFLP based DNA-fragments with selective AFLP primers. Agarose gel analyses were used to check for restriction digestion, pre-amplification and amplification of all plant DNA samples.

**Results**

More than 300 polymorphic AFLP markers were produced, that were used to fingerprint six heirloom tomato (*Lycopersicon esculentum*) varieties, i.e., Russian, Marizol Red, Andrew Rahart Jumbo, Brandy Wine, Tidwell German and Brimmer. These markers were also used to estimate genetic distance among the varieties.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area          |
|---------|-------------------------|
| 202     | Plant Genetic Resources |

**Outcome #7**

**1. Outcome Measures**

Number of protocols for DNA characterization to establish true-to-type identification of varieties examined in project

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 1      |

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

**Issue (Who cares and Why)**

The use of labeled primers (e.g. Fluorescent infra-red-dye (IRD) 800, Li-Cor Inc., Lincoln, NE) for comparative AFLP profiling of genomes helps automated (e.g., Global IRÁ,Â² DNA Analyzer and Sequencer) analyses.

**What has been done**

AFLP based fragments were generated via polymerase chain reaction (PCR) using an AFLP System-Analysis Kit (Invitrogen™ Life Technologies, Carlsbad, CA) while replacing eight EcoR I primers. For amplification of AFLPs, the Invitrogen™ EcoR I primers were replaced with IRD-800 labeled EcoR I primers obtained from LI-COR (Lincoln, NE).

**Results**

There are 62 primer pairs (unlabeled) recommended for AFLP fingerprinting of tomatoes. However, when unlabeled primers designed for EcoRI adaptors (E-primers) were replaced with fluorescent dye IRD-800 (Li-Cor Inc., Lincoln, NE) labeled primers, 20 AFLP primer pairs were identified that provided the most amplification for each variety. Thus protocols have been standardized for the use of IRD-800 labeled primers for automated analysis of tomato varieties.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area          |
|---------|-------------------------|
| 202     | Plant Genetic Resources |

**Outcome #8**

**1. Outcome Measures**

Number of significant functional elements (such as amino acids and vitamins) characterized in heirloom varieties

*Not reporting on this Outcome for this Annual Report*

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

**External factors which affected outcomes**

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

**Brief Explanation**

{No Data Entered}

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

**1. Evaluation Studies Planned**

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

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #11**

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

**1. Name of the Planned Program**

Evaluation of doe reproductive output, fitness and longevity among three meat goat breeds

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

**1. Program Knowledge Areas and Percentage**

| KA Code | Knowledge Area                      | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|-------------------------------------|-----------------|-----------------|----------------|----------------|
| 301     | Reproductive Performance of Animals |                 |                 |                | 70%            |
| 307     | Animal Management Systems           |                 |                 |                | 30%            |
|         | <b>Total</b>                        |                 |                 |                | 100%           |

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

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

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 2.3  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 2.3  |

**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              | 75805          |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 31214          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 39592          |

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

**1. Brief description of the Activity**

Conduct meat goat experiments on longitudinal doe performance, conduct producer workshops on assessing does for fitness and reproductive output.

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

Southeastern meat goat producers.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 1               |              |
| 2008        | 0                | 0               | 0            |

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

**Output Target**

**Output #1**

**Output Measure**

- Number of techniques to improve productivity and longevity of meat goat does.

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 0             | 1             |

**Output #2**

**Output Measure**

- Publications to inform producers and researchers of the effects of breed and age on lifetime productivity and longevity of meat goat does managed under Southeastern pastures

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 2             |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>   |
|--------------|---|
| 1            | Percentage of Tennessee meat goat producers participating in doe record keeping |
| 2            | Average increase per herd of doe retention rate                                 |

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

Percentage of Tennessee meat goat producers participating in doe record keeping

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 10                  | 13     |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

With increasing input costs, producers are seeking ways to improve profit margins by identifying breeding stock that perform efficiently with limited inputs.

**What has been done**

A system of on-farm performance testing has been designed for meat goat producers to objectively assess doe performance based on reproductive output.

**Results**

Across the commercial meat goat industry, on-farm testing of doe herd performance has increased as more breeders are using performance data to make selection decisions and for marketing of replacement breeding stock.

**4. Associated Knowledge Areas**

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

**Outcome #2****1. Outcome Measures**

Average increase per herd of doe retention rate

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Replacing mature herd does with young developing females can represent an economic and biological liability to producers due to limited production in young does coupled with significant resource requirements with no guarantee of immediate return on the inputs used to develop replacement does.

**What has been done**

A meat goat breeding herd with diverse genetic lines has been established with different lines demonstrating significantly levels of doe fitness and annual herd retention.

**Results**

Producers have been informed of the differences among genetic lines for doe fitness and annual retention under commercial management conditions and that genetic selection is key to doe retention so that expensive doe replacement can be minimized for overall herd management.

**4. Associated Knowledge Areas**

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

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Appropriations changes

**Brief Explanation**

{No Data Entered}

**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

- Retrospective (post program)
- During (during program)
- Time series (multiple points before and after program)

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #12****V(A). Planned Program (Summary)****1. Name of the Planned Program**

Functional studies on cold and heat-regulated genes using tomato as a model plant

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

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 2.1  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 2.1  |

**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              | 69214          |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 28500          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 36149          |

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

Conduct gene expression research experiments, provide training for graduate students, develop products and services.

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

Plant breeders, seed companies, scientific colleagues, Extension service.

**V(E). Planned Program (Outputs)****1. Standard output measures**

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

|      | Direct Contacts<br>Adults | Indirect Contacts<br>Adults | Direct Contacts<br>Youth | Indirect Contacts<br>Youth |
|------|---------------------------|-----------------------------|--------------------------|----------------------------|
| Year | Target                    | Target                      | Target                   | Target                     |
| Plan | 0                         | 0                           | 0                        | 0                          |
| 2008 | 0                         | 0                           | 0                        | 0                          |

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

| Year   | Target |
|--------|--------|
| Plan:  | 1      |
| 2008 : | 0      |

**Patents listed****3. Publications (Standard General Output Measure)****Number of Peer Reviewed Publications**

|      | Extension | Research | Total |
|------|-----------|----------|-------|
| Plan | 0         | 1        |       |
| 2008 | 0         | 1        | 1     |

**V(F). State Defined Outputs****Output Target****Output #1****Output Measure**

- Scientific publications pertaining to expression of temperature stress genes in plants

| Year | Target | Actual |
|------|--------|--------|
| 2008 | 1      | 1      |

**Output #2****Output Measure**

- Patents for temperature stress genes

| Year | Target | Actual |
|------|--------|--------|
| 2008 | 1      | 0      |

**Output #3****Output Measure**

- Temperature stress tolerant plant cultivars

| Year | Target | Actual |
|------|--------|--------|
| 2008 | 1      | 0      |

**Output #4****Output Measure**

- Techniques to quantify heat and chilling stress tolerance in plants

*Not reporting on this Output for this Annual Report*

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>                                   |
|--------------|---|
| 1            | Temperature stress tolerant genes identified          |
| 2            | Temperature stress tolerant plant cultivars developed |

**Outcome #1**

**1. Outcome Measures**

Temperature stress tolerant genes identified

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

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

**Issue (Who cares and Why)**

Both the scientific community and plant breeders want information concerning the genes that are associated with temperature stress. Improved tolerance to temperature stress will greatly enhance crop yields.

**What has been done**

The complete sequence for some of the identified heat-inducible genes from turf grass are being cloned and will be prepared into constructs to transform tomatoes.

**Results**

The technical procedure for transformation of tomato and evaluation of transgenic plants have been developed and presented at professional meetings. One undergraduate student and one graduate student have been trained on transformation technologies.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                                 |
|---------|--|
| 201     | Plant Genome, Genetics, and Genetic Mechanisms |

**Outcome #2**

**1. Outcome Measures**

Temperature stress tolerant plant cultivars developed

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

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

**Issue (Who cares and Why)**

The availability of temperature stress tolerant cultivars is critical to ensure crop production in years with abnormal temperatures, and expand the regions in which the plants can be successfully grown. This is important for growers, breeders, and consumers.

**What has been done**

Transgenic plants have been produced and are under evaluation. Selection of homozygous transgenic lines is underway.

**Results**

No results to report until appropriate plants are identified.

**4. Associated Knowledge Areas**

| <b>KA Code</b> | <b>Knowledge Area</b>                          |
|----------------|--|
| 201            | Plant Genome, Genetics, and Genetic Mechanisms |

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

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Programmatic Challenges

**Brief Explanation**

{No Data Entered}

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

**1. Evaluation Studies Planned**

- During (during program)
- Time series (multiple points before and after program)

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #13****V(A). Planned Program (Summary)****1. Name of the Planned Program**

Germplasm collection and evaluation of Goldenseal clones with superior properties

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

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 2.3  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 2.3  |

**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              | 75805          |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 31214          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 39592          |

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

Germplasm evaluation, DNA analysis, cultivation method development.

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

Medicinal plant industry, small farmers, plant breeders, woodland garden designers, homeowners.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 1               |              |
| 2008        | 0                | 0               | 0            |

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

**Output Target**

**Output #1**

**Output Measure**

- Scientific articles pertaining to the identification and improved production practices of Goldenseal.

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 0             |

**Output #2**

**Output Measure**

- Development of new Goldenseal cultivars

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 0             | 0             |

**Output #3**

**Output Measure**

- Development of micropropagation techniques for high berberine/hydrastine yielding cultivars

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 0             |

**Output #4**

**Output Measure**

- Establishment of demonstration areas for improved cultural practices of Goldenseal

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 0             | 0             |

**Output #5**

**Output Measure**

- Cost analysis for Goldenseal production

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 0             | 0             |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>  |
|--------------|--|
| 1            | Number of improved Goldenseal cultivars released                                       |
| 2            | Number of techniques defined for improved Goldenseal production                        |
| 3            | Number of demonstration areas for improved Goldenseal production practices established |

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

Number of improved Goldenseal cultivars released

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Small producers in agroforestry need a source of income while trees are growing and maturing. Goldenseal is one possible companion crop.

**What has been done**

Evaluation of germplasm has begun, including plants obtained from stakeholders.

**Results**

Plants were evaluated for flower size and plant size.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area          |
|---------|-------------------------|
| 202     | Plant Genetic Resources |

**Outcome #2****1. Outcome Measures**

Number of techniques defined for improved Goldenseal production

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Small producers in agroforestry need a source of income while trees are growing and maturing. Goldenseal is one possible companion crop.

**What has been done**

Plants have been collected from seven different locations and are being propagated in nursery containers with standard container growing media (soilless media).

**Results**

Preliminary techniques for growing plants in soilless media have been attempted.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area          |
|---------|-------------------------|
| 202     | Plant Genetic Resources |

**Outcome #3**

**1. Outcome Measures**

Number of demonstration areas for improved Goldenseal production practices established

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

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

**Issue (Who cares and Why)**

Small producers in agroforestry need a source of income while trees are growing and maturing. Goldenseal is one possible companion crop.

**What has been done**

Germplasm collection is completed; planting in an oak stand has been completed, survival will be determined in late spring of 2009.

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area          |
|---------|-------------------------|
| 202     | Plant Genetic Resources |

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

**External factors which affected outcomes**

- Natural Disasters (drought,weather extremes,etc.)
- Appropriations changes
- Public Policy changes
- Government Regulations

**Brief Explanation**

{No Data Entered}

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

**1. Evaluation Studies Planned**

- During (during program)

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #14**

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

**1. Name of the Planned Program**

Improving families through improved nutrition and well-being of limited resource households

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

**1. Program Knowledge Areas and Percentage**

| KA Code | Knowledge Area                            | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|---|-----------------|-----------------|----------------|----------------|
| 703     | Nutrition Education and Behavior          |                 |                 |                | 25%            |
| 704     | Nutrition and Hunger in the Population    |                 |                 |                | 25%            |
| 724     | Healthy Lifestyle                         |                 |                 |                | 25%            |
| 801     | Individual and Family Resource Management |                 |                 |                | 25%            |
|         | <b>Total</b>                              |                 |                 |                | 100%           |

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

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

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 3.4  |
| <b>Actual</b> | 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              | 112060         |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 46142          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 58527          |

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

**1. Brief description of the Activity**

A program will be developed and activities will be designed to educate adults and children in a long-term healthy living lifestyle. Participants will be pre-and post-tested on behavioral changes after participation in the program. The participants will exhibit improved parameters such as healthier weight, lower blood pressure, more desirable percent body fat, better school attendance, and improved family well-being. Targeted stakeholder agencies will benefit from increased parental participation in their programs.

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

Limited resource families in Nashville with children ages 3-8.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 2               |              |
| 2008        | 0                | 0               | 0            |

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

**Output Target**

**Output #1**

**Output Measure**

- Scientific publications concerning the challenges of limited resource households in meeting dietary guidelines and food purchasing practices of economically disadvantaged families.

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 2             | 0             |

**Output #2**

**Output Measure**

- Development of complete set of games for project use

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 1             |

**Output #3**

**Output Measure**

- Development of healthy mini-camp curricula  
*Not reporting on this Output for this Annual Report*

**Output #4**

**Output Measure**

- Development of complete set of online lessons for parents  
*Not reporting on this Output for this Annual Report*

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>   |
|--------------|---|
| 1            | Percentage of participants with increased nutrition knowledge |
| 2            | Percentage of participants with improved reported behaviors   |
| 3            | Quarterly percent increase in participation points            |
| 4            | Annual percent increase in number of males participating      |
| 5            | Percentage decrease in school absenteeism                     |

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

Percentage of participants with increased nutrition knowledge

*Not reporting on this Outcome for this Annual Report*

**Outcome #2****1. Outcome Measures**

Percentage of participants with improved reported behaviors

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 10                  | 75     |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Improving access to healthy foods is needed if these foods are to be consumed.

**What has been done**

34 tons of fresh produce was delivered to limited resource consumers. Food purchasing behaviors were assessed.

**Results**

Recipients were pleased to receive foods, but did not always plan to buy the same foods with their own funds.

**4. Associated Knowledge Areas**

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

**Outcome #3****1. Outcome Measures**

Quarterly percent increase in participation points

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 10                  | 0      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Research has shown that families that plan meals together, eat together and do physical activities together are healthier and children in those families have better school attendance.

**What has been done**

Activities were sent home that required parent-child involvement. The child was to return a verification form to receive a prize.

**Results**

Unfortunately, only one child completed the activities. Thus, only one child earned the incentive. Participation was low.

**4. Associated Knowledge Areas**

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

**Outcome #4**

**1. Outcome Measures**

Annual percent increase in number of males participating

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 10                  | 10     |

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

**Issue (Who cares and Why)**

Males generally do not participate in nutrition education, yet they influence food purchases.

**What has been done**

A general information session was held for parents.

**Results**

Twenty percent of those in attendance were males who indicated they wanted to participate further.

**4. Associated Knowledge Areas**

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

**Outcome #5**

**1. Outcome Measures**

Percentage decrease in school absenteeism

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Children with health and weight problems tend to have a higher absentee rate.

**What has been done**

We attempted to get attendance records and weight data from Head Start.

**Results**

No results to date.

**4. Associated Knowledge Areas**

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

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Competition for time of participants.)

**Brief Explanation****V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

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

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #15**

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

**1. Name of the Planned Program**

Impact of the tobacco buyout program and strategies to promote economic viability of small farmers

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

**1. Program Knowledge Areas and Percentage**

| KA Code | Knowledge Area                       | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|--------------------------------------|-----------------|-----------------|----------------|----------------|
| 604     | Marketing and Distribution Practices |                 |                 |                | 80%            |
| 610     | Domestic Policy Analysis             |                 |                 |                | 20%            |
|         | <b>Total</b>                         |                 |                 |                | 100%           |

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

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

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 2.2  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 2.2  |

**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              | 72509          |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 29857          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 37870          |

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

**1. Brief description of the Activity**

Focus group meetings will be used to develop a comprehensive survey instrument to be used for collecting data on the current situation and future prospects on various issues in small farm operations. Enterprise budget forms will also be developed to collect data necessary to conduct economic analysis. Results derived from analyses will be made available to farmers to assist them to be economically viable. Brochures, fact sheets and other publications containing project results will be developed and distributed to stakeholders.

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

Small farmers, extension educators, and policy makers.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 2               |              |
| 2008        | 0                | 1               | 1            |

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

**Output Target**

**Output #1**

**Output Measure**

- Scientific publications pertaining to the impact of the tobacco buyout program and strategies to promote economic viability of small farmers

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 2             | 1             |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>  |
|--------------|--|
| 1            | Percentage of program participants with increased awareness about alternative crops              |
| 2            | Percentage of program participants with improved record keeping, management and marketing skills |
| 3            | Percentage of program participants adopting alternative crop production                          |
| 4            | Percentage of program participants with increased farm income                                    |
| 5            | Percentage of program participants with increased farm diversification                           |

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

Percentage of program participants with increased awareness about alternative crops

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 100                 | 100    |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Small farmers have been facing a number of challenges over the years in different areas. The key challenge for small farmers has been maintaining adequate level of income. Changing policies, development of new technologies, globalization and increasing concentration in agriculture have compounded the challenge. Given that small farmers account for over 93 percent of all farms in the United States, the issue is concern at community, regional and national levels as well. One recent policy change involves tobacco which no longer receives government support. This calls for increased awareness about alternative enterprises to secure a source of income replacing tobacco.

**What has been done**

A comprehensive mail survey is used to gather data on various issues. Farmers were selected from a data base provided by the Farm Service Agency. This provides insights that can be used to enhance the viability of small farmers.

**Results**

Over two-third of the farmers indicated business climate is getting worse with challenges in the areas of finance, farm labor availability and marketing. Survey results show very few responses to the issue of awareness about alternative enterprises. A significant number of the respondents indicated that they have not participated in any training workshops.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                       |
|---------|--------------------------------------|
| 604     | Marketing and Distribution Practices |

**Outcome #2****1. Outcome Measures**

Percentage of program participants with improved record keeping, management and marketing skills

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 75                  | 100    |

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

**Issue (Who cares and Why)**

This project is aimed at assessing the impact of the tobacco buyout on the farm operations as well as considers the adoption of alternatives if the farms are to remain economically viable. Given that small farms make up a very large share (about 93%) of all U.S farms, they represent a key element of rural communities. The percentage of program participants with improved record keeping, management and marketing skills is essential to run the farm operations efficiently and in a profitable manner.

**What has been done**

A comprehensive survey instrument has been developed and sent out to selected tobacco farmers from a large database from the Farm Service Agency. The survey is used to acquire data to answer the research questions, derive implications for policy making and developing appropriate strategies that would enhance viability of small farmers.

**Results**

A section of the mail survey mentioned above asked questions on management of land previously used for tobacco production and use of money received from the tobacco buyout. Approximately half of the farmers surveyed responded that land formerly used for tobacco production is to be used for growing another crop or hay. In terms of the tobacco buyout check usage, 93 percent of the farmers stated that it is used for debt repayment and investment on the existing farm business.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                       |
|---------|--------------------------------------|
| 610     | Domestic Policy Analysis             |
| 604     | Marketing and Distribution Practices |

**Outcome #3**

**1. Outcome Measures**

Percentage of program participants adopting alternative crop production

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 50                  | 15     |

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

**Issue (Who cares and Why)**

Adopting alternative enterprises by small farmers has become critical with the changing policies and conditions in the market place characterized by competition. This is the case both in the domestic and global markets. Farmers should be familiar with measures that will reduce cost and enhance their return.

**What has been done**

As part of the comprehensive mail survey mentioned earlier, farmers were asked two questions pertaining to adoption of alternative enterprises. First, whether or not they have adopted any alternatives enterprise and second how profitable the products are in comparison to profit that they used to get from tobacco. This is aimed at understanding what options farmers are pursuing and the associated level of profitability.

**Results**

Ninety-one percent of the respondents indicated that they did not raise tobacco since the buyout in 2005. Despite this response, adoption of alternative enterprises has not yet taken root. It requires demonstrating economic viability of alternatives to farmers. This suggests that adoption of alternative enterprises will take effort and time to implement. To more accurately reflect the accomplishments of this outcome measure it will be 'Number of additional producers adopting alternative crop production' in future reports.

**4. Associated Knowledge Areas**

| <b>KA Code</b> | <b>Knowledge Area</b>                |
|----------------|--------------------------------------|
| 604            | Marketing and Distribution Practices |

**Outcome #4****1. Outcome Measures**

Percentage of program participants with increased farm income

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| <b>Year</b> | <b>Quantitative Target</b> | <b>Actual</b> |
|-------------|----------------------------|---------------|
| 2008        | 20                         | 5             |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

There are two possible sources of income for farmers. These are income from farming and off-farm employment. The former indicates that farming is a full time job while the later implies part-time farming. It is generally the case that farmers largely derive income from both sources. Availability of off-farm jobs depend on the prevailing local economic conditions. The increase in farm income depends on a number of issues including competitiveness of the farm business, level and frequency of one-to-one assistance provided by the extension service, availability and cost of inputs and the level of price for the product.

**What has been done**

In the comprehensive mail survey mentioned earlier, farmers were asked if their income from farming has increased to assess its magnitude and design strategies to enhance their viability.

**Results**

About 60 percent of the respondents indicated that they work off farm. They stated that they did not work more hours off farm after the tobacco buyout. Change in household net income and gross agricultural receipt from total farm operations between 2005 and 2007 showed a decline. This may be due to a number of reasons including loss of tobacco income, high input costs and low product prices.

**4. Associated Knowledge Areas**

| <b>KA Code</b> | <b>Knowledge Area</b>                |
|----------------|--------------------------------------|
| 604            | Marketing and Distribution Practices |

**Outcome #5****1. Outcome Measures**

Percentage of program participants with increased farm diversification

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 50                  | 10     |

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

**Issue (Who cares and Why)**

Farm diversification is an important risk management tool that can reduce volatility in income. Farmers need stable income to support themselves, their families as well as continue their farm operations.

**What has been done**

Small farmers are being introduced to two enterprises. The first is pigeonpea, a legume niche crop, which has substantial domestic and global demand due to its high protein content. It can be grown for human consumption as well as for animal feed. Initial field trial and demonstration was conducted on the Tennessee State University (TSU) farm in the past two years. Results from the trials have been presented at the annual TSU small farm expo and joint meeting of the Association of Extension Administrators and the Association of Research Directors. These meetings are attended by small farmers, extension agents and policy makers. The second is switch grass that is also being introduced to selected farmers. It can grow on less fertile soil and is an input for bio-fuel.

**Results**

Assessment of local demand for pigeonpea shows that it can be sold at a premium price. Some farmers have previously grown the crop on their fields. Additional farmers will receive seed to grow it and will serve as demonstration for other farmers.

To more accurately reflect the accomplishments of this outcome measure it will be 'Number of additional producers adopting alternative crop production' in future reports.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                       |
|---------|--------------------------------------|
| 604     | Marketing and Distribution Practices |

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

**External factors which affected outcomes**

- Economy
- Public Policy changes
- Government Regulations

**Brief Explanation**

{No Data Entered}

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

**1. Evaluation Studies Planned**

- Before-After (before and after program)
- During (during program)
- Case Study
- Comparisons between program participants (individuals,group,organizations) and non-participants

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #16****V(A). Planned Program (Summary)****1. Name of the Planned Program**

Management strategies to improve meat goat and guinea fowl production

**V(B). Program Knowledge Area(s)****1. Program Knowledge Areas and Percentage**

| KA Code | Knowledge Area                  | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|---------------------------------|-----------------|-----------------|----------------|----------------|
| 302     | Nutrient Utilization in Animals |                 |                 |                | 20%            |
| 303     | Genetic Improvement of Animals  |                 |                 |                | 20%            |
| 304     | Animal Genome                   |                 |                 |                | 60%            |
|         | <b>Total</b>                    |                 |                 |                | 100%           |

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 3.9  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 3.8  |

**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              | 125244         |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 51571          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 65412          |

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

Generate a cDNA library for the guinea fowl. Develop chicken, guinea fowl and meat goat genetic resource populations. Use microArray to identify adipose specific transcriptome. Evaluate concentrate supplementation options for meat goat performance.

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

Meat goat industry, poultry industry, small farmers, scientific community, Extension specialists.

**V(E). Planned Program (Outputs)****1. Standard output measures**

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

|      | Direct Contacts<br>Adults | Indirect Contacts<br>Adults | Direct Contacts<br>Youth | Indirect Contacts<br>Youth |
|------|---------------------------|-----------------------------|--------------------------|----------------------------|
| Year | Target                    | Target                      | Target                   | Target                     |
| Plan | 0                         | 0                           | 0                        | 0                          |
| 2008 | 0                         | 0                           | 0                        | 0                          |

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

| Year   | Target |
|--------|--------|
| Plan:  | 0      |
| 2008 : | 0      |

**Patents listed****3. Publications (Standard General Output Measure)****Number of Peer Reviewed Publications**

|      | Extension | Research | Total |
|------|-----------|----------|-------|
| Plan | 0         | 2        |       |
| 2008 | 0         | 2        | 2     |

**V(F). State Defined Outputs****Output Target****Output #1****Output Measure**

- Evaluation of livestock management techniques for economic feasibility

| Year | Target | Actual |
|------|--------|--------|
| 2008 | 1      | 1      |

**Output #2****Output Measure**

- Development of chicken, Guinea fowl and meat goat genetic resource populations

| Year | Target | Actual |
|------|--------|--------|
| 2008 | 1      | 0      |

**Output #3****Output Measure**

- Construction of cDNA library for Guinea fowl

| Year | Target | Actual |
|------|--------|--------|
| 2008 | 1      | 1      |

**Output #4****Output Measure**

- Scientific publications relating to management strategies to improve meat goat and guinea fowl production

| Year | Target | Actual |
|------|--------|--------|
| 2008 | 2      | 1      |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>                                     |
|--------------|---|
| 1            | Number of adipose-specific genes identified             |
| 2            | Percentage of overall reduction in fat deposition       |
| 3            | Number of birds examined in genetic resource population |
| 4            | Number of meat goats screened for genetic markers       |

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

Number of adipose-specific genes identified

*Not reporting on this Outcome for this Annual Report***Outcome #2****1. Outcome Measures**

Percentage of overall reduction in fat deposition

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Excessive fat deposition in poultry is a liability to the consumer and producer.

**What has been done**

Two pureline populations of chicken divergent in fat deposition have been established These purelines will be used to generate the reference population

**Results**

This research is in progress, results will not be realized until the populations analysis is complete and new lines are established, according to research plan.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                  |
|---------|---------------------------------|
| 302     | Nutrient Utilization in Animals |
| 303     | Genetic Improvement of Animals  |

**Outcome #3****1. Outcome Measures**

Number of birds examined in genetic resource population

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 20     |

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

**Issue (Who cares and Why)**

Excessive fat deposition is liability to the poultry industry.

**What has been done**

Pureline populations were evaluated for body weight gain and fat deposition.

**Results**

No finalized results yet.

**4. Associated Knowledge Areas**

| <b>KA Code</b> | <b>Knowledge Area</b> |
|----------------|-----------------------|
| 304            | Animal Genome         |

**Outcome #4**

**1. Outcome Measures**

Number of meat goats screened for genetic markers

*Not reporting on this Outcome for this Annual Report*

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

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Appropriations changes

**Brief Explanation**

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

**1. Evaluation Studies Planned**

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

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #17**

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

**1. Name of the Planned Program**

Molecular approaches for the study of leaf surface microorganisms in ornamental crops

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

**1. Program Knowledge Areas and Percentage**

| KA Code | Knowledge Area                           | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|--|-----------------|-----------------|----------------|----------------|
| 212     | Pathogens and Nematodes Affecting Plants |                 |                 |                | 100%           |
|         | <b>Total</b>                             |                 |                 |                | 100%           |

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

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

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 2.5  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 2.5  |

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

| Extension           |                | Research       |                |
|---------------------|----------------|----------------|----------------|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch          | Evans-Allen    |
| 0                   | 0              | 0              | 82397          |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 33928          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 43034          |

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

**1. Brief description of the Activity**

Development of a pathosystem between Pseudomonas and ornamental/nursery crops. Optimize the parameters important for the pathogenicity process. Characterize the diversity and community structure of leaf surface microorganisms in the natural environments under diseased and healthy conditions. Characterize the interactions between epiphytic populations of Pseudomonas. Make comparisons between epiphytic microbial populations in diseased and healthy plants. Make comparisons between epiphytic microbial populations on different hosts. Make comparisons between epiphytic microbial populations in plants grown under different conditions. Generate a list of microbial organisms which cohabit the phyllosphere with the Pseudomonas bacteria. Assess the possible use of any of these epiphytic organism as a biocontrol agent to be armed with anti-pathogen activities. Provide experiential learning to TSU students on agricultural biotechnology.

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

The immediate primary audience is the agricultural research community interested in understanding plant disease at the molecular level and using this understanding to design alternative disease management strategies. Regulatory agencies will also use the knowledge generated for policy formulation and growers will benefit from improved disease management strategies developed.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 1               |              |
| 2008        | 0                | 0               | 0            |

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

**Output Target**

**Output #1**

**Output Measure**

- Scientific publications relating to plant/leaf microbe interactions

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 1             |

**Output #2**

**Output Measure**

- Number of techniques to evaluate host/leaf surface microbe interactions

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 2             |

**Output #3**

**Output Measure**

- Number of pertinent bacterial strains identified

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 2             | 10            |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>  |
|--------------|--|
| 1            | Number of host/Pseudomonas pathosystems elucidated               |
| 2            | Number of potential biocontrol candidates identified             |
| 3            | Number of crops with blocked epiphyte-pathogen switch identified |

**Outcome #1**

**1. Outcome Measures**

Number of host/Pseudomonas pathosystems elucidated

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 1                   | 1      |

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

**Issue (Who cares and Why)**

Plant diseases caused by Pseudomonas species result in high crop losses and cost of disease control. A good understanding of these diseases could reduce these losses.

**What has been done**

An experiment was performed to find a suitable experimental host to study Pseudomonas diseases in ornamental crop using four cultivars of Periwinkle and four strains of Pseudomonas syringae pathovars.

**Results**

There were significant differences among the cultivars, bacterial strains and interactions of both. One host-pathogen combination was identified to produce the most compatible reaction.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                           |
|---------|--|
| 212     | Pathogens and Nematodes Affecting Plants |

**Outcome #2**

**1. Outcome Measures**

Number of potential biocontrol candidates identified

*Not reporting on this Outcome for this Annual Report*

**Outcome #3**

**1. Outcome Measures**

Number of crops with blocked epiphyte-pathogen switch identified

*Not reporting on this Outcome for this Annual Report*

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

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Appropriations changes
- Public Policy changes
- Government Regulations

**Brief Explanation**

{No Data Entered}

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

**1. Evaluation Studies Planned**

- During (during program)
- Time series (multiple points before and after program)

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #18****V(A). Planned Program (Summary)****1. Name of the Planned Program**

Nutritional and management strategies to improve growth and production performance of guinea fowl

**V(B). Program Knowledge Area(s)****1. Program Knowledge Areas and Percentage**

| KA Code | Knowledge Area                  | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|---------------------------------|-----------------|-----------------|----------------|----------------|
| 302     | Nutrient Utilization in Animals |                 |                 |                | 50%            |
| 307     | Animal Management Systems       |                 |                 |                | 50%            |
|         | <b>Total</b>                    |                 |                 |                | 100%           |

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 3.3  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 3.3  |

**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              | 108764         |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 44785          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 56805          |

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

To enhance performance and adoption of guinea fowl as alternative livestock for small scale farmers the following activities will be carried out:

- Determine optimum floor space allowance for guinea fowl;
- Determine optimum requirement for dietary calcium and phosphorus by guinea fowl; and
- Determine optimum dietary requirement for methionine and lysine by guinea fowl.

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

Guinea fowl and poultry industries, small farmers, scientific community, Extension specialists.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 1               |              |
| 2008        | 0                | 1               | 1            |

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

**Output Target**

**Output #1**

**Output Measure**

- Scientific publications concerning the optimization of parameters for guinea fowl production

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 1             |

**Output #2**

**Output Measure**

- Dietary recommendations to guinea fowl producers for optimal production

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 1             |

**Output #3**

**Output Measure**

- Technique to determine optimal nutrient composition of guinea fowl diet

*Not reporting on this Output for this Annual Report*

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>  |
|--------------|--|
| 1            | Dietary recommendations for amino acid and mineral nutrition of guinea fowl              |
| 2            | Percentage of producers realizing savings in feeding costs                               |
| 3            | Percentage of producers aware of recommendations for floor space, calcium and phosphorus |
| 4            | Percentage of producers implementing recommendations                                     |
| 5            | Percentage of producers realizing profitability after adoption of recommendations        |

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

Dietary recommendations for amino acid and mineral nutrition of guinea fowl

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 1                   | 1      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

There are currently no guidelines for optimum amino acid and mineral nutrition requirements for Guinea fowl. As commercial production of this species increases, such requirements must be known to optimize producer efficiency.

**What has been done**

Ongoing experiments in optimizing amino acid and mineral nutrition levels.

**Results**

Dietary recommendation has been determined and communicated to the Guinea fowl production community.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                  |
|---------|---------------------------------|
| 302     | Nutrient Utilization in Animals |
| 307     | Animal Management Systems       |

**Outcome #2****1. Outcome Measures**

Percentage of producers realizing savings in feeding costs

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

The costs associated with the production of Guinea fowl need to be minimized for producers to realize maximum profit as this species becomes more accepted in American diets.

**What has been done**

As optimized nutrition parameters are developed they will be communicated to stakeholders via scientific, popular, and grower-target publications and presentations.

**Results****4. Associated Knowledge Areas**

| KA Code | Knowledge Area            |
|---------|---------------------------|
| 307     | Animal Management Systems |

**Outcome #3****1. Outcome Measures**

Percentage of producers aware of recommendations for floor space, calcium and phosphorus

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 80                  | 35     |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Optimum floor space utilization can minimize production costs and increase profitability of Guinea fowl production.

**What has been done**

Optimum floor space requirement for Guinea fowl (French) was determined and the findings will be presented to the Guinea Fowl Breeders Association.

**Results**

Producers can now increase the efficiency of their operations. Percentage of producers reached was less than planned due to limited attendance at appropriate meetings.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                  |
|---------|---------------------------------|
| 307     | Animal Management Systems       |
| 302     | Nutrient Utilization in Animals |

**Outcome #4****1. Outcome Measures**

Percentage of producers implementing recommendations

*Not reporting on this Outcome for this Annual Report*

**Outcome #5****1. Outcome Measures**

Percentage of producers realizing profitability after adoption of recommendations

*Not reporting on this Outcome for this Annual Report*

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Natural Disasters (drought,weather extremes,etc.)
- Appropriations changes
- Competing Programmatic Challenges

**Brief Explanation**

{No Data Entered}

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

**1. Evaluation Studies Planned**

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

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #19**

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

**1. Name of the Planned Program**

Pathology research to benefit the Tennessee nursery industry

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

**1. Program Knowledge Areas and Percentage**

| KA Code | Knowledge Area                               | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|--|-----------------|-----------------|----------------|----------------|
| 212     | Pathogens and Nematodes Affecting Plants     |                 |                 |                | 50%            |
| 215     | Biological Control of Pests Affecting Plants |                 |                 |                | 50%            |
|         | <b>Total</b>                                 |                 |                 |                | 100%           |

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

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

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 4.5  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 3.8  |

**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              | 125244         |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 51571          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 65412          |

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

**1. Brief description of the Activity**

Research to identify powdery mildew resistance, resistance to cercospora leafspot/blight. Research to identify and catalog soil-borne pathogens prevalent in the Tennessee nursery industry.

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

Nursery producers, landscape industry, home owners, pathology scientists.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 2                | 1               |              |
| 2008        | 2                | 1               | 3            |

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

**Output Target**

**Output #1**

**Output Measure**

- Scientific publication concerning disease resistance/susceptibility in hydrangea and identification of soil borne diseases

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 2             |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>   |
|--------------|---|
| 1            | Increase in number of growers aware of resistant cultivars                                  |
| 2            | Increase in number of growers aware of causes of pathogens and their survival               |
| 3            | Increase in number of growers aware of soil-borne disease prevention methods                |
| 4            | Percentage of growers with reduced plant mortality by exercising preventative measures      |
| 5            | Compendium of soil borne pathogens of economic importance to the Tennessee nursery industry |
| 6            | Percentage of Tennessee growers aware of disease resistant hydrangea cultivars              |

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

Increase in number of growers aware of resistant cultivars

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 75                  | 75     |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Information will reduce fungicide use in the nursery industry, thus reducing the amount of pesticides entering the environment. This information will also reduce production costs for nursery producers, resulting in a net increase in income.

**What has been done**

Presented preliminary data in a poster presentations at regional nursery production trade show (Southern Nursery Association) and published two research conference proceeding describing the results.

**Results**

Conference attendees have now increased knowledge of resistant hydrangea cultivars.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                               |
|---------|--|
| 212     | Pathogens and Nematodes Affecting Plants     |
| 215     | Biological Control of Pests Affecting Plants |

**Outcome #2****1. Outcome Measures**

Increase in number of growers aware of causes of pathogens and their survival

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 75                  | 75     |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Information will reduce fungicide use in the nursery industry, thus reducing the amount of pesticides entering the environment. This information will also reduce production costs for nursery producers, resulting in a net increase in income.

**What has been done**

Information was communicated to producers at the Southern Nursery Association Research Conference and Trade Show via a poster presentation.

**Results**

More people are aware that plant mortality may not necessarily be caused by Phytophthora.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                               |
|---------|--|
| 215     | Biological Control of Pests Affecting Plants |
| 212     | Pathogens and Nematodes Affecting Plants     |

**Outcome #3****1. Outcome Measures**

Increase in number of growers aware of soil-borne disease prevention methods

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 75                  | 75     |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Growers need to know diseases causing plant death or declining plant health.

**What has been done**

Surveys of commercial nurseries were conducted to identify pathogens that are associated with plant death or declining plant health.

**Results**

Different species of Phytophthora were isolated from plant tissue, soil and irrigation water. Heterobasidium, Fusarium and Pestalotiopsis were also isolated.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                               |
|---------|--|
| 215     | Biological Control of Pests Affecting Plants |
| 212     | Pathogens and Nematodes Affecting Plants     |

**Outcome #4****1. Outcome Measures**

Percentage of growers with reduced plant mortality by exercising preventative measures

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Growers need information about appropriate techniques concerning preventative measures for plant diseases so they can make informed decisions on disease management.

**What has been done**

Pathogens have been isolated and identified.

**Results**

Phytophthora and other pathogenic fungi have been identified.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                               |
|---------|--|
| 215     | Biological Control of Pests Affecting Plants |
| 212     | Pathogens and Nematodes Affecting Plants     |

**Outcome #5****1. Outcome Measures**

Compendium of soil borne pathogens of economic importance to the Tennessee nursery industry

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

This information is important to nursery growers in the south and southeast US.

**What has been done**

Information was presented to nursery producers in the form of a poster display at the Southern Nursery Association Trade Show.

**Results**

Incidence of Phytophthora and other pathogens was communicated.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                           |
|---------|--|
| 212     | Pathogens and Nematodes Affecting Plants |

**Outcome #6**

**1. Outcome Measures**

Percentage of Tennessee growers aware of disease resistant hydrangea cultivars

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 1      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Commercial nurseries that produce Hydrangea will use these cultivars to decrease pesticide needs and improve profits.

**What has been done**

Disease resistant cultivars have been identified.

**Results**

Cultivars resistant to powdery mildew and other foliar diseases were identified; information communicated to producers.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area                               |
|---------|--|
| 215     | Biological Control of Pests Affecting Plants |
| 212     | Pathogens and Nematodes Affecting Plants     |

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)

**Brief Explanation**

{No Data Entered}

**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

- Before-After (before and after program)

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #20**

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

**1. Name of the Planned Program**

Reducing the costs of food borne illnesses to small producers, selected food handlers and consumers

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

**1. Program Knowledge Areas and Percentage**

| KA Code      | Knowledge Area  | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|--------------|---|-----------------|-----------------|----------------|----------------|
| 504          | Home and Commercial Food Service  |                 |                 |                | 10%            |
| 602          | Business Management, Finance, and Taxation  |                 |                 |                | 40%            |
| 712          | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |                 |                 |                | 50%            |
| <b>Total</b> |   |                 |                 |                | 100%           |

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

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

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 2.0  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 2.0  |

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

| Extension           |                | Research       |                |
|---------------------|----------------|----------------|----------------|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch          | Evans-Allen    |
| 0                   | 0              | 0              | 65918          |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 27143          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 34427          |

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

**1. Brief description of the Activity**

Collect secondary information from existing databases. Design a survey for collecting primary information from consumers, small producers and selected food handlers. Design training/education strategies and materials. Construct and review sound experimental design for the study and explore analytical and statistical method(s) for analyzing data to be collected. Analyze collected data and draw conclusions. Develop policy implication and recommendation. Develop strategies for communicating findings to stakeholders and policy makers.

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

Food scientists, economists, extension personnel, small farmers and food handlers.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 1               |              |
| 2008        | 0                | 0               | 0            |

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

**Output Target**

**Output #1**

**Output Measure**

- Scientific publications relating to the present and future causes and costs of food borne illnesses in Tennessee

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 0             |

**Output #2**

**Output Measure**

- Bulletin publication concerning the current and future status of food safety in Tennessee

*Not reporting on this Output for this Annual Report*

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>  |
|--------------|--|
| 1            | Number of people with increase knowledge of sources, estimated cost, and recommendations concerning foodborne illnesses in Tennessee |
| 2            | Number of persons receiving training and education in foodborne illnesses and prevention   |
| 3            | Number of consumers applying knowledge from education and training   |
| 4            | Number of small producers applying knowledge from education and training   |

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

Number of people with increase knowledge of sources, estimated cost, and recommendations concerning foodborne illnesses in Tennessee

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 50                  | 0      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Food borne illness costs are real and need to be estimated. Deaths associated with illnesses also need to be reduced.

**What has been done**

Collaborators for the research were identified.

**Results****4. Associated Knowledge Areas**

| KA Code | Knowledge Area  |
|---------|---|
| 712     | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |
| 504     | Home and Commercial Food Service  |

**Outcome #2****1. Outcome Measures**

Number of persons receiving training and education in foodborne illnesses and prevention

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 60                  | 20     |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Deaths associated with food borne illness need to be reduced.

**What has been done**

Internet and library research is continuing. Recruitment of an advisory group proceeds

**Results**

**4. Associated Knowledge Areas**

| <b>KA Code</b> | <b>Knowledge Area</b>   |
|----------------|---|
| 712            | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |
| 504            | Home and Commercial Food Service  |
| 602            | Business Management, Finance, and Taxation  |

**Outcome #3****1. Outcome Measures**

Number of consumers applying knowledge from education and training

*Not reporting on this Outcome for this Annual Report*

**Outcome #4****1. Outcome Measures**

Number of small producers applying knowledge from education and training

*Not reporting on this Outcome for this Annual Report*

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Economy
- Populations changes (immigration,new cultural groupings,etc.)
- Other (Status of investigator on project.)

**Brief Explanation**

This relatively small project suffered from the inability of the primary scientist being incapacitated for much of the year with health issues.The status of this project is unclear for future years.

**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

- Before-After (before and after program)
- During (during program)
- Case Study
- Comparisons between program participants (individuals,group,organizations) and non-participants

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #21****V(A). Planned Program (Summary)****1. Name of the Planned Program**

Reducing risk of food borne illness by characterizing food pathogens and risky consumer practices

**V(B). Program Knowledge Area(s)****1. Program Knowledge Areas and Percentage**

| KA Code | Knowledge Area  | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|---|-----------------|-----------------|----------------|----------------|
| 504     | Home and Commercial Food Service  |                 |                 |                | 10%            |
| 712     | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |                 |                 |                | 90%            |
|         | <b>Total</b>  |                 |                 |                | 100%           |

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   | 0.0       | 0.0  | 0.0      | 2.4  |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 2.4  |

**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              | 79101          |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 32571          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 41313          |

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

Analyze survey data on consumer transportation, usage and storage of foods to identify risky behaviors and assess potential for cross contamination. Perform microbial analysis of samples collected from meat, poultry, food samples, packages and home refrigerators. Develop strategies to minimize potential for food borne illness originating from improper food handling and animal management practices.

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

Alternative meat and poultry producers, consumers, risk assessment agencies.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | 0                                 | 0                                   | 0                                | 0                                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> | 0             |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> | 0                | 2               |              |
| 2008        | 0                | 1               | 1            |

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

**Output Target**

**Output #1****Output Measure**

- Scientific publications concerning parameters for food borne illness transmission and mitigation

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 2             | 1             |

**Output #2****Output Measure**

- Consumer education materials in food handling practices

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 0             | 1             |

**Output #3****Output Measure**

- Complete microbial profile of home refrigerators

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 1             |

**Output #4****Output Measure**

- Microbial profile of meat goat carcasses

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 1             |

**Output #5****Output Measure**

- Microbial profile of guinea fowl carcasses

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 1             | 1             |

**Output #6****Output Measure**

- Strategies for improved management practices

| <b>Year</b> | <b>Target</b> | <b>Actual</b> |
|-------------|---------------|---------------|
| 2008        | 0             | 0             |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>  |
|--------------|--|
| 1            | Additional percentage of consumers who will change their knowledge of best cleanliness practices                       |
| 2            | Percentage of targeted consumers that will be following best management practices for reducing microbial contamination |
| 3            | Production practices to reduce contamination of meat goat and guinea fowl  |

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

Additional percentage of consumers who will change their knowledge of best cleanliness practices

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 10                  | 15     |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Improper heating of foods and lack of temperature control increases the likelihood that the consumer will get a food-borne illness.

**What has been done**

Educational materials were distributed to 400 consumers.

**Results**

Twenty percent of consumers used a refrigerator thermostat after the study. 10 percent reported throwing away leftovers and cleaning their refrigerator more often.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area  |
|---------|---|
| 504     | Home and Commercial Food Service  |
| 712     | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |

**Outcome #2****1. Outcome Measures**

Percentage of targeted consumers that will be following best management practices for reducing microbial contamination

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 10     |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Eating fresh fruits and vegetables that have not been properly cleaned before eating increases the chances of an individual getting sick from eating that food.

**What has been done**

One thousand fruit and vegetable booklets were distributed to recipients of fresh fruits and vegetables, and to participants in nutrition education events.

**Results**

In a follow up survey, 10% of those who received the booklets said they were following the recommended cleaning methods.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area  |
|---------|---|
| 504     | Home and Commercial Food Service  |
| 712     | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |

**Outcome #3****1. Outcome Measures**

Production practices to reduce contamination of meat goat and guinea fowl

**2. Associated Institution Types**

•1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|------|---------------------|--------|
| 2008 | 0                   | 0      |

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Using unsafe sanitary practices while processing meat and poultry increases the likelihood that the resulting products may be contaminated procedures

**What has been done**

Producer education has not yet begun.

**Results****4. Associated Knowledge Areas**

| KA Code | Knowledge Area  |
|---------|---|
| 712     | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Competing Public priorities
- Other (Possible bird flu outbreak)

**Brief Explanation**

{No Data Entered}

**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

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

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**Program #22**

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

**1. Name of the Planned Program**

Characterization of antibiotic resistant food borne pathogens in fresh produce

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

**1. Program Knowledge Areas and Percentage**

| KA Code      | Knowledge Area  | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|--------------|---|-----------------|-----------------|----------------|----------------|
| 712          | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |                 |                 |                | 100%           |
| <b>Total</b> |   |                 |                 |                | 100%           |

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

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

| Year: 2008    | Extension |      | Research |      |
|---------------|-----------|------|----------|------|
|               | 1862      | 1890 | 1862     | 1890 |
| <b>Plan</b>   |           |      |          |      |
| <b>Actual</b> | 0.0       | 0.0  | 0.0      | 2.2  |

**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              | 72509          |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 0              | 29857          |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 0              | 37870          |

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

**1. Brief description of the Activity**

Data on the prevalence and types of antibiotic resistant microorganisms isolated from fresh produce will be obtained and may help explicate the role of foods in the transmission of antibiotic-resistant strains to human populations.

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

Agricultural producers and consumers in Middle Tennessee.

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

**1. Standard output measures**

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

|             | <b>Direct Contacts<br/>Adults</b> | <b>Indirect Contacts<br/>Adults</b> | <b>Direct Contacts<br/>Youth</b> | <b>Indirect Contacts<br/>Youth</b> |
|-------------|-----------------------------------|-------------------------------------|----------------------------------|------------------------------------|
| <b>Year</b> | <b>Target</b>                     | <b>Target</b>                       | <b>Target</b>                    | <b>Target</b>                      |
| <b>Plan</b> | {NO DATA ENTERED}                 | {NO DATA ENTERED}                   | {NO DATA ENTERED}                | {NO DATA ENTERED}                  |
| 2008        | 0                                 | 0                                   | 0                                | 0                                  |

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

**Patent Applications Submitted**

| <b>Year</b>  | <b>Target</b> |
|--------------|---------------|
| <b>Plan:</b> |               |
| 2008 :       | 0             |

**Patents listed**

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

**Number of Peer Reviewed Publications**

|             | <b>Extension</b> | <b>Research</b> | <b>Total</b> |
|-------------|------------------|-----------------|--------------|
| <b>Plan</b> |                  |                 |              |
| 2008        | 0                | 0               | 0            |

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

**Output Target**

**Output #1**

**Output Measure**

- Creation of a database which can be used in risk assessment exercises to elucidate the role of raw produce in the dissemination of antibiotic resistance to human populations.

| <b>Year</b> | <b>Target</b>     | <b>Actual</b> |
|-------------|-------------------|---------------|
| 2008        | {No Data Entered} | 0             |

**Output #2**

**Output Measure**

- Hygienic handling practices identified and developed for communication to target producers and consumers.

| <b>Year</b> | <b>Target</b>     | <b>Actual</b> |
|-------------|-------------------|---------------|
| 2008        | {No Data Entered} | 1             |

**Output #3**

**Output Measure**

- Profiles of antibiotic resistance in fresh produce determined.

| <b>Year</b> | <b>Target</b>     | <b>Actual</b> |
|-------------|-------------------|---------------|
| 2008        | {No Data Entered} | 0             |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| <b>O No.</b> | <b>OUTCOME NAME</b>  |
|--------------|--|
| 1            | Total percentage of target consumers educated on safer ways of handling fresh produce                          |
| 2            | Percentage of target producers using safe agricultural practices (wise use of antibiotics in farm) production. |

**Outcome #1**

**1. Outcome Measures**

Total percentage of target consumers educated on safer ways of handling fresh produce

*Not reporting on this Outcome for this Annual Report*

**Outcome #2**

**1. Outcome Measures**

Percentage of target producers using safe agricultural practices (wise use of antibiotics in farm) production.

*Not reporting on this Outcome for this Annual Report*

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

**External factors which affected outcomes**

- Appropriations changes
- Public Policy changes

**Brief Explanation**

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

**1. Evaluation Studies Planned**

- 

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}