

# Memo

Date: March 28, 2003  
To: Bart Hewitt, Program Analyst  
Cooperative State Research, Education, and Extension Service  
From: Dr. Stephen H. Kolison, Director  
Cooperative Agricultural Research Program  
RE: 2002 Annual Report

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Attached is our 2002 Annual Report. We apologize for the delay in you receiving this report. As per the reviewer's suggestions from last year's report, the impact statements have been strengthened and a separate section detailing the Multi State /Joint Activities and Integrated Research and Extension activities has been added.

If you have questions or correspondence pertaining to this report please contact me at [skolison@tnstate.edu](mailto:skolison@tnstate.edu) (615.963.2194) or Dr. Nick Gawel at [gaweln@blomand.net](mailto:gaweln@blomand.net) (931.668.3023).

# **PLAN OF WORK**

## **Annual Report of Accomplishments and Results**

Cooperative Agricultural Research Program  
Tennessee State University

Federal Fiscal Year 2002

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## Programs

### Goal 1: An agricultural system that is highly competitive in the global economy

#### Overview

Food animal production in Tennessee and the nation is diverse with farmers and ranchers raising traditional livestock and considering non-traditional livestock. Research at Tennessee State University is addressing issues concerning the basic physiology, general performance, and marketing of selected livestock types for Tennessee and other states. Research efforts in non-traditional alternative livestock include guinea fowl and meat goats. Beef cattle and chickens are represented in research activities on traditional livestock. Key aims of the animal research are: 1) assessing metabolic indices in cattle exposed to ergot alkaloids of endophytic tall fescue to identify mechanisms of fescue toxicosis, 2) evaluating management practices for improved production efficiency in guinea fowl, and 3) developing a competitive meat goat production system for limited resource farmers in Tennessee as an alternative to cattle, tobacco, and other farming activities where farmers are losing or are likely to lose market shares.

Nursery crop research is focusing on improvement of selected plant genera to broaden their appeal to consumers and thus enhancing the competitiveness of the Tennessee nursery industry, and on improving the efficiency of nursery crop production. We are also developing a system for the introduction of selected alternative, improved plants for small farmers in Tennessee to be utilized as alternatives to tobacco farming and other farming activities for which they are losing or are likely to lose market share. Additionally, our researchers are analyzing the structure of the green industry in Tennessee. Other related activities include the development of hands-on teaching and demonstration areas on the TSU campus. These demonstration areas will strengthen teaching, aid in stimulating interest in the plant sciences among high school students, and transfer new discoveries into the hands of limited resource farmers.

Many small farms face a number of challenges including the reduction of government subsidies for certain crops such as tobacco, the decline in farm-generated incomes, and the loss of markets due to the aggregation of agriculture by major corporations. Our efforts towards this concern have included research aimed at enhancing the viability of small farms. These efforts have included production and marketing studies, and studying and developing non-traditional high value niche-crops such as medicinal plants (botanical supplements) for adoption by small farmers. The increased popularity of medicinal plants as alternative medicine in the U.S. and other countries has led to a revived interest in their growth. Current pharmaceutical research has suggested that extracts derived from various *Hypericum* species have a range of medicinally important qualities, such as antibacterial, antidepressant and anti-inflammatory effects. Consequently, propagation and cultivation studies are being explored to capitalize on the promising nature of this genus.

Forestland ownership among minorities in the southern states is significant. However these lands are not contributing significantly to the income of these owners. Among the reasons that have been attributed to this condition is the lack of sustainable forest management knowledge

among these owners. In view of this, we proposed in our Plan of Work to assess the constraints faced by minority forestland owners in Tennessee, and develop innovative technical assistance programs that will empower them to generate more income from their lands. This effort is in an early stage of development. We are working to build the capacity necessary to address this very important issue.

Global Information Systems (GIS) is another area addressed under this goal. We have implemented a GIS program to add a GIS specialist to the agriculture faculty; establish a GIS laboratory with appropriate hardware and software that can serve as a resource for researchers, faculty, and students involved in GIS related activities, train researchers and faculty in the use of GIS and incorporating GIS into their research and selected courses; and strengthen agricultural research and instruction at TSU through the incorporation of computer assisted decision-making tools such as GIS.

### **Key Theme - Ruminant and Poultry Production Systems**

- a. This program is focused on developing competitive animal production systems for limited resource farmers in Tennessee and in the surrounding states. Research is designed to improve production efficiency in beef cattle enterprises and develop management programs for alternative livestock species (*i.e.*, guinea fowl and meat goats). Three key objectives are: 1) assessing profiles of blood constituents for possible metabolic disruptions in cattle exposed to ergot alkaloids linked to fescue toxicosis, 2) characterizing management techniques for optimal performance of caged guinea fowl, and 3) developing a meat goat management program that would be profitable for limited resource producers. A meat goat research herd is being established at TSU to study various components (*e.g.*, genetics, nutrition, reproduction) of a comprehensive goat production system with the intent of generating management recommendations for participants in Tennessee's growing goat meat industry.
- b. Impacts
  - Guinea fowl (GF) is sold in supermarkets and served as a special delicacy at banquets and club dinners in many restaurants and hotels in large cities within the United States and other parts of the world. There is considerable opportunity for GF to serve as alternative poultry and profitable enterprise. However, there is paucity of information on the genome, management and nutrient requirements of the GF. Genetic resources realized from current work will continue to provide understanding of the GF genome and contribute to the identification of genes of economic importance to the poultry industry. Optimum management practices and nutrient requirements of the GF are being recommended to GF industry. This will ensure efficiency of feed utilization, profit to the GF industry and reduction in environmental pollution from excess nutrients such as nitrogen and phosphorus in poultry manure. It is anticipated that benefits from current work will be realized through reduction in production cost and improved production efficiency

- Heat-tolerant cattle genetics may alter responses to endophyte-infected tall fescue. Hormonal profiles may provide some insight on how endophyte-infected tall fescue lowers cattle growth. Understanding how endocrine regulators of metabolic function are affected by endophytic fescue and how genetic variation in cattle can modify responses to endophytic fescue will help in future endeavors focused on overcoming fescue toxicosis in cattle production systems.
- Awareness of various issues that impact profitable meat goat production has been increased as a result of four outreach activities held in the state.

c. Source of Federal Funds: USDA Evans-Allen

d. Scope of Impact: State Specific

### **Key Theme - Nursery Crop/Green Industry Enhancement**

- a. This is a multi-faceted project designed to enhance the profitability of the regional nursery industry by developing new plants, improving propagation/production practices of existing plants, and improving the ornamental horticulture teaching capacity at TSU by developing teaching and demonstration areas on the TSU Cooperative Agricultural Research Program farm.

Nutrient Use Efficiency: Greenhouse experiments were conducted with a 3-4 month slow release fertilizer on two container-grown ornamental grasses, *Calamagrostis acutiflora* and *Phalaris arundinacea*. Plant growth was greatest at the highest fertility levels. Electrical conductivity of container leachate was more dependant on application rate than application method (topdressed vs. incorporated). EC data suggested that the nutrient charge was depleted after 7 weeks under greenhouse conditions. Three cultivars of poinsettia were grown with 6 clay substrate amendments to test their ability to reduce nutrient discharge from containers. No differences were observed in plant height or quality with the clay amended substrates in comparison with the no-clay controls. This suggests nutrient concentrations provided by slow-release fertilizers were adequate for plant growth. Fuller's earth reduced nutrient discharge up to 39% during crop production. Fuller's earth adsorbed nutrients more so than montmorillinite or attapulgite. Evaluation trials were conducted on 16 cultivars of poinsettia to determine their performance in the South-central US. Most cultivars branched freely and finished plants were of acceptable quality despite low ambient light conditions during much of the vegetative growth period.

Cultivar Improvement: Application of the F-AFLP technique to pulmonarias was used to alleviate confusion in cultivar identification associated with morphological characteristics. This technique was also used to determine the genetic relationships of *Cornus florida* twin-seeds. In tissue culture, cell wall peroxidase can affect survival of calli on media containing accumulation of spent materials or from secondary metabolites synthesized by stressed cells. Research in tissue culture of cherry provided the first evidence that anthocyanin accumulation in callus cultures is accompanied by increased

accumulation of a basic cell wall peroxidase. *Cornus florida* and *Prunus incisa* tissue were transformed with antimicrobial peptide genes that can enhance disease resistance. These tissues were transformed using *Agrobacterium tumefaciens* and have generated calli. Through the use of this technology, diseases resistant woody ornamentals can be produced using foreign genes.

Establishment of Teaching/Demonstration Areas: We are continuing to acquire and install new plant species while maintaining existing plants. The irrigation system installation is complete and ready to operate this growing season. The architects have completed putting on paper the plan for the farm improvement.

Applied research in areas suggested directly by growers included examination of propagation strategies for niche ornamentals, use of alternative substrates of nursery crop growth and expert, unbiased evaluation of nursery production products.

b. Impacts

- By defining and optimizing the growing and propagation regimes for the special interest crops examined here, producers will be able to induce maximum plant quality with minimal risk of ground and surface water contamination. This research defined a technique to reduce nutrient loss by up to 39% in the production of poinsettia. It also defined the length of availability of common slow-release fertilizers in the production of ornamental grasses; this information will allow producers to fine-tune their production practices to prevent the over fertilization of this crop, thus decreasing the amount of excess fertilizer introduced into the environment.
- The use of genetic engineering technologies can greatly speed the development of new disease resistant cultivars of woody ornamentals. Research in tissue culture of cherry provided the first evidence that anthocyanin accumulation in callus cultures is accompanied by increased accumulation of a basic cell wall peroxidase. These research findings will enable a fine-tuning of in vitro growth parameters to enhance the survival of recalcitrant plant tissue cultures. This is a necessary first step in the chain of events necessary to apply the advantages of genetic engineering to woody ornamental plants.
- Additional steps using gene transfer technologies have been accomplished in Dogwood and Cherry. Tissues of these trees were transformed with antimicrobial peptide genes that can enhance disease resistance. Tissue of the transformed trees has been obtained; techniques to regenerate plants from the tissue are under development.
- Poinsettia varieties amenable to production in Tennessee were identified, allowing Tennessee greenhouse owners to participate in the production of this high-value niche crop. the participation
- Strategies were developed allowing commercial nursery producers to reduce the severity of 'Bacteria Shot Hole' disease in a common nursery crop. The employment of these control measures will decrease chemical pesticide use and increase profits for growers.

c. Source of Federal Funds: USDA Evans-Allen, 1890 Capacity Building Grants Program, USDA/ARS

d. Scope of Impact: Multi-State NC, AL.

## Key Theme - Global Information Systems

- a. Geographic Information Systems (GIS) is a computer-based tool with capabilities of inputting, storing, manipulating, and presenting geographically referenced data. At present, it is one of the most useful tools available for analyzing complex geographic data. GIS is fast becoming an indispensable tool for decision-making in the management of natural resources. In the GIS program, a training and research laboratory was established. The laboratory has seven state-of-the-art workstations for use either for training or research activities, a medium-format color printer, a large-format color printer, a server for print management, and a server for instructor management of workshops.

To increase awareness of the importance of GIS in various disciplines offered at the university, we organized two seminars and invited students and faculty. Mr. Jeff Albee, GIS Project Manager for AMEC (an engineering firm), presented the first seminar on July 17, 2002. The second seminar was held on September 25, 2002 and presented by Mr. Mitchell Maddox and Arthur Robinson of the Environmental Systems Research Institute (ESRI).

The goal of this project is to produce a core of agricultural researchers and faculty at Tennessee State University in tune with an advanced approach to presenting and solving agricultural problems.

### b. Impact

- As a result of the two seminars that were presented, there is a greater awareness of GIS applications among the faculty and staff in CARP, and in the School of Agriculture and Family and Consumer Sciences.
- Two faculty have completed training in GIS. Additionally, a Research Associate hired for the project also received training in GIS. One faculty has completed advanced training in GIS theory, application, and programming. These individuals now constitute the project training team.
- To date, eleven faculty and staff have received training in Introduction to ArcGIS I from the laboratory established by the project. The personnel that participated in the training were from three departments at TSU -CARP, Cooperative Extension, and Hospitality and Tourism.
- CARP has established a Memorandum of Understanding (MOU) with the USDA Natural Resource Conservation Service (NRCS) to provide training in the use of ArcView 3x to its employees in Tennessee. Under this MOU, students at TSU will participate in mapping projects provided to CARP by NRCS.
- CARP is hosting a master website for the recently formed 1890/1994 GIS/GPS Integration Team. The site serves as a clearinghouse for information relevant to the development and enhancement of GIS and GPS throughout the nation.

### c. Source of Federal Funds: 1890 Capacity Building Grants Program

### d. Scope of Impact: State Specific



## Key Theme - Small Farm Viability

- a. Exploring, developing and introduction of alternative agronomic crops for small farm operators is considered an approach to keeping small farms viable. During the period under review, CARP scientists were involved in the identification and improvement of selected genera for their pharmaceutical and other values using conventional and biotechnological means. Researchers are developing propagation and production protocols for superior plants.
- b. Impacts
  - Pharmaceutical compounds were quantified and associated molecular markers in selected *Hypericum* species and cultivars were identified. These markers will be used to develop improved *Hypericum* with increased levels of desirable pharmaceutical compounds.
  - A tissue culture protocol for the Tennessee coneflower was developed; this protocol is a first step in using genetic engineering technologies to improve levels of desirable compounds in this genus.
  - Three species of *Echinacea* (*purpurea*, *pallida* and *augustifolia*) were evaluated for growth under field conditions during 2000-2001 season. Results indicated that *E. purpurea* can be grown successfully in Tennessee under field conditions; this information will be used to inform growers of proper cultural practices for this niche crop.
  - Results of a survey project will provide input for the Extension Program in designing education and outreach activities that will better assist small farmers in Tennessee. Other states can also use the framework developed for this project to assess the various issues involving factors affecting success in farming, exit and entry decisions as well as field day attendance. Incorporating some of the project survey questions into the USDA/ERS annual survey of Agricultural Resource Management Survey (ARMS) will enrich the database used to analyze farm sector performance at the national level that provides input for policy making.
- c. Source of Federal Funds: USDA Evans-Allen, 1890 Capacity Building Grants Program
- d. Scope of Impact: State Specific

## Goal 2: A safe and secure food and fiber system

### Overview

The health and well-being of Americans is necessary for a secure, productive nation. A safe food supply is an essential component in the development of human potential. Knowledge of how food is handled, especially how consumers store perishable and ready-to-eat foods to keep them safe, are key areas in which the Cooperative Agricultural Research Program's Food Safety, Nutrition, and Family Well-Being Research Team are focusing their efforts. Projects address concerns about the impact and application of food safety messages, evaluating handling practices, and reducing exposure to food contaminants.

### Key Theme - Bacteria in Refrigerated Foods

- a. To help assess the risk level associated with refrigeration of potentially hazardous foods, the level of bacterial contamination within home refrigerators was evaluated. Swab specimens were taken from refrigerators during in-home visits. The specimens were analyzed in the laboratory by microbial ATP bioluminescence assay and aerobic plate count. Correlations between aerobic plate count and ATP assay were established to facilitate future applications of ATP assay alone for rapid on-site determination of microbial quality of refrigerator practices.
- b. Impacts
  - Data on the microbial contamination of consumers' home refrigerators provide essential information for the assessment of risk associated with potential contamination of foods during storage. Preliminary results from this study have already been requested for potential use as part of a *C. perfringens* risk assessment being conducted by USDA.
- c. Source of Federal Funds: USDA Evans-Allen
- d. Scope of Project: State Specific

### Key Theme - Food Safety for At-risk Mothers and Children

- a. Food safety knowledge and habits of economically disadvantaged pregnant women or mothers of young children were assessed. Over half did not know the recommended refrigerator temperature, did not use a thermometer to check the internal temperature when cooking meat, and thawed foods improperly.
- b. Impact
  - Although millions of dollars have been spent on food safety messages for consumers, it is apparent from this study that those messages are not reaching some of the most at-risk

consumers or their caregivers. Intensive educational programs must be planned and implemented that result in safer food handling practices.

c. Source of Federal Funds: USDA Evans-Allen

d. Scope of Project: State Specific

### **Goal 3: A healthy, well-nourished population**

#### **Overview**

Good dietary practices and adequate food distribution are essential components in the development of human potential. Knowledge of what people eat and how they manage their food, are key areas in which the Cooperative Agricultural Research Program's Food Safety, Nutrition, and Family Well-Being Research Team are focusing their efforts. The team has developed tools that currently are being used in national dietary studies and have established collaborative projects with many government agencies and other private and public entities.

#### **Key Theme - Nutrition Education for Disadvantaged Populations**

- a. This program has focused on assessing the educational needs of economically disadvantaged individuals in Tennessee by evaluating the food security status, food stamp usage, nutrient intake, and nutrition knowledge of food box recipients. It also examines the use of portion-size aids in recommending dietary guidelines for the elderly. The overall goal is to improve the food security status and dietary intake through increased access to knowledge and food sources.
- b. Impacts
  - This research determined that consumers do not appear to be making wise choices with the limited funds that they have at their disposal. No significant relationships were found between receiving federal food assistance and food security status. This suggests the need to provide nutrition education and budget allocation training for federal food assistance recipients. Thus, results indicate that food and money management education is needed for all limited resource individuals. Since the participants in this study receive food assistance from some sources that are not under their control *i.e.* food banks, shelters, churches, it is important for them to use their available funds wisely when making food choices to improve their chances of preventing nutrition-related diseases. Intense nutrition education programs that provide practical experiences are needed.
  - No relationship between food security status and nutrient intake was found (though almost half of the respondents in the study were rated as food insecure, almost everyone in the study met the minimum requirements for most nutrients). Intakes were similar to the general population findings reported in the Continuing Survey of Food Intake by Individuals (USDA) and the Health and Nutrition Examination Survey (DHHS).
  - Based upon this research, standards for non-specific portion sizes used in national nutrient databases may need to be adjusted for the age of the respondent. This finding is important to nutritionists who conduct dietary assessments or teach portion sizes. Although elderly were confident in reporting amounts eaten, they were no more nor less accurate in their reporting than younger persons. They also did not find estimation aids helpful when making their decisions. The findings validate the concept of using descriptive terms to simplify reporting of food intake with this population. However, they also show that older persons consider portions to be larger than do younger persons.

- Results of this research may change the scales that are currently being used in the nationwide studies, and hopefully make the portion size amounts used when assessing nutrient intake more accurate. National dietary surveys currently use a three point scale *i.e.* small, medium, large, for estimating the portion size of some hard-to-report foods. This research found most people did not believe the three word scale was adequate to report the intake of so many different amounts of foods.

c. Source of Federal Funds: USDA Evans-Allen

d. Scope of Project: State Specific

### **Key Theme - Healthier Eating Through Increased Fruit and Vegetable Consumption**

a. This program has focused on assessing fruit and vegetable consumption of Tennesseans, especially limited resource individuals. Methods of reporting amounts consumed, types of fruits and vegetables eaten, and preparation methods were investigated. The overall goal is to increase the number of fruits and vegetables consumed by participants, and to improve the methods used to assess dietary intakes of fruits and vegetables.

b. Impacts

- To establish baseline levels of fruit and vegetable consumption, studies were conducted of eating habits of Tennesseans. Diets were low in fruits, vegetables and dairy products. The majority had no fruits at all. Those who consumed a fruit most frequently consumed orange juice. Vegetable intake was also low and selections were limited. The most frequently consumed vegetables were tomatoes and onions. Mean percent of calories from fat was only 2 percent over that recommended which was a positive finding. However, sodium and sugar intakes were high. Mean fiber intake was low, perhaps because of the low intake of whole grains, vegetables and fruits.

c. Source of Federal Funds: USDA Evans-Allen

d. Scope of Project: State Specific

## **Goal 4: Greater harmony between agriculture and the environment**

### Overview

The invasion of highly destructive pests and diseases into agriculture has required the rapid development of pest and disease control programs, most of which rely on the use of toxic chemicals. Public perception about the safety of these chemicals requires studies of their persistence and movement in soil and surface waters, and studies of alternative pest and disease control methods. CARP's Environmental Protection and Enhancement Researchers are directing their research efforts toward identifying and reducing the effects of hazardous agricultural chemicals on the environment.

Total Expenditures (Section 1445 Funds under NARETPA of 1977) - \$

Full-time Equivalents -

### **Key Theme - Integrated Pest Management; Improving Environmental Quality**

- a. Our research efforts have included the following: (1) the evaluation of Japanese beetle and other potential insect pest control measures in nursery production; (2) the evaluation and development of alternative control measures for plant-parasitic nematodes in nursery crop production, and (3) the evaluation and development of environmentally friendly alternatives to fungicides for powdery mildew disease management in dogwood production.
- b. Impacts
  - Newly identified dogwood cultivars resistant to powdery mildew will result in substantial savings on treatment costs by eliminating the need for fungicides.
  - Biorational compounds used as alternatives to traditional fungicides have been identified for powdery mildew control. Growers who wish to use these compounds along with fungicides can reduce fungicide use by about 56-66%, and growers who wish to abstain from using traditional fungicides can reduce fungicide use to zero.
  - Effective chemical treatments against Japanese beetle and imported fire ant will facilitate the development of new treatment protocols for balled and burlapped nursery stock, enabling the markets for millions of pieces of Tennessee nursery stock to remain open.
  - Establishment of new biological controls in Tennessee against Japanese beetle and imported fire ants will reduce reliance on chemical management and provide self-sustaining area-wide pest management.
  - New and effective trapping methods for buprestid borers will allow monitoring of wood-boring beetle activity and development of degree-day prediction models, and will enable the survey of new invasive buprestids, enabling reductions in production costs for growers.
  - Triclopyr soil activity monitoring showed that it is safe to overseed fescue after 17 days at the recommended rate of 2 lb/A.

c. Source of Federal Funds: USDA Evans-Allen; CSREES 1890 Capacity Building Grants

Other Sources of funding: Tennessee State University/State of Tennessee

d. Scope of Impact: Multi-State, KY, FL, MS, MI, OH

### **Key Theme - Sustainable Agriculture**

- a. Adsorption and desorption of five widely used pesticides will be studied utilizing both batch technique and column of soil materials. Soils from various nursery sites ranging widely in pH, organic matter and soil texture, as well as various soil mixes and soil separates will be included. Soil mixes and commercially obtained soil separates will also be included. In batch studies, the factors affecting pesticide adsorption-desorption will include time, temperature, soil type, organic matter, pesticide concentration, temperature, pH, and inorganic electrolytes. Column studies with the above soils/soil materials and all the pesticides will be conducted at various pesticide concentrations, and different water fluxes. Applicability of a mathematical model, based on chromatographic theory to predict pesticide movement, will be tested.
- b. Impacts
  - Improved methods of measuring the movement of potential ground and surface water contaminants will result for these investigations. Improvements are in the form of reductions of time and resources needed for analysis.

c. Source of Federal Funds: USDA Evans-Allen

d. Scope of Impact: State Specific

### **Key Theme - Water Quality**

- a. The overall goal of this research is to explore the potential use of wood fibers as a best management practice for the production of nursery crops. This study will characterize (physically and chemically) three types of wood fibers and determine their adsorption capacities for two pesticides. The transport of these pesticides in columns of the selected wood fibers will be determined. Breakthrough curves will be used to determine flow parameters. A total mass balance for the applied pesticides will be performed. Additionally, the fractions of pesticides sampled from each column will be predicted using a convective-dispersive type equation.
- b. Impact
  - Reduced surface water run-off will be accomplished when the results of this research are implemented in the nursery industry. Due to the relatively high organic carbon content, wood fibers can be used as a sorbent to prevent herbicides or other pesticides from leaching into groundwater or contaminate surface waters.

c. Source of Federal Funds: USDA Evans-Allen

d. Scope of Impact: State Specific



## **Goal 5: Enhanced economic opportunity and quality of life for Americans**

### Overview

The nursery crop sector of the green industry is one of the most profitable and important economic sectors in Tennessee. As an agricultural crop, soybeans and tobacco surpass nursery crop production in the state. Conspicuously absent from the overall ownership of this lucrative sector are minorities. A study conducted by Tennessee State University in 1996 found that most minorities in the green industry occupied or had ownership in the less lucrative landscaping or lawn care sector of the industry. As minority or limited resource farmers are forced out of farming traditional agronomic crops such as tobacco, they will need viable alternative crops.

In addition to studies dealing specifically with enhancing opportunities for minorities in nursery sector, our team is working on several projects on involving the nursery industry in Tennessee, small farms, rural development, welfare reform, food assistance and food security. Team members are collaborating with government agencies at the federal, state and local levels, land grant universities, stakeholders, agribusinesses, and nonprofit organizations. The overall objective of research performed under this goal is to conduct economic and policy analyses of issues that affect the well being of local, state, regional, national, and global communities. Results from this research will be useful for policy making and thus contribute the economic enhancement of communities in our state and in other regions.

Research is also being conducted in the area of social acceptability of agricultural biotechnology, specifically, genetically modified crops. Data will be gathered on the attitudes of US consumers and producers towards genetically modified organisms in the food system.

### **Key Theme - Economic Opportunity Enhancement**

- a. Information on structure and performance of the industry, impacts generated by the industry, and prospects for long-term growth of the industry will be collected from the study. The project will collect and disseminate information that may be used in facilitating economically sound decisions by industry participants in the state of Tennessee. Issues facing minority and other producers interested in participating in the industry will also be examined.

The overall goals of proposed project are to analyze current structure of the green industry in Tennessee, and examine current marketing channels used by wholesalers and retailers of nursery products and services in addition to assessing opportunities for minority, small and limited resource farmer participation in the nursery. Finally, the project will examine risks faced by participants in the industry. Specific objectives of this study include: (1) describing and analyzing the current structure and problems of the green industry in Tennessee, (2) assessing the size of selected segments of the green industry and determining the economic impacts of the nursery industry on selected local communities and the economy of the state; (3) determining factors affecting consumer demand for nursery products and landscape services in the state and assessing the short,

medium and long-term growth prospects of the industry; (4) identifying, and evaluating marketing channels, marketing and merchandising practices, and investigating presence of barriers to development of domestic and international markets for nursery and greenhouse products; (5) assessing opportunities for minorities, small, and limited resource farmers to participate in the state's nursery and greenhouse industry, and (6) examining risks that face new, minority, small and limited resource farmers desiring to diversify into the industry.

During the period covered in this report, two bulletins that discuss the structure and the economic contributions of the industry to the economy of the state have been prepared. A questionnaire to be used in collecting data from businesses selected to participate in the survey has been pilot tested for use in collecting data. Temporary data collectors have been hired and trained on how to administer the questionnaires developed for the project. Student workers needed for the project have been recruited. They have assisted in developing profile for the industry in Tennessee and generating the random samples of businesses to be surveyed for the study. They are also assisting in preparing the mail survey to be conducted.

b. Impacts

- Students working with researchers have improved their research, computer, writing and oral communication skills. These students are currently preparing papers for oral and poster presentations at regional and national meetings.
- Copies of findings to date have been distributed to nurserymen and other producers of nursery products via the TSU Nursery Crop Research Station in McMinnville, Tennessee. This bulletin provides very useful information to the producers and will help them understand more about the structure of this complicated industry and improve their marketing skills.

c. Source of Federal Funds: USDA Evans-Allen

d. Scope of Impact: Multi-State AL, MS

### **Key Theme - Economic Opportunity Enhancement**

- a. The overall goal of this grant is to assess the contributions of the agricultural and manufacturing sectors to the economy of rural areas in Alabama, Mississippi, and Tennessee. During the period January 2002 to December 2002, the U.S. Forest Service (USFS) offered a mini-IMPLAN training to project researchers from Tennessee State University. The small workshop was given by Dr. Rodney Busby of the Research Station in New Orleans, Louisiana. The USFS also assisted with the updating of the IMPLAN data file to be used in estimating impacts of manufacturing and agriculture to rural economies of the states previously identified in the project. Contacts were made with Middle Tennessee State University and Tuskegee University, collaborators on the project. Middle Tennessee State and Tennessee State Universities acquired databases to be used in selecting businesses to be surveyed. These databases will be used in conjunction with

other selection tools to ensure that participants targeted are representative of the businesses actually selected for the survey. Participating states are continuing their work with identifying the specific companies to be surveyed and the extent to which face-to-face interviews may be used to supplement information collected from mailed questionnaires. The Southern Rural Development Center, the Mississippi Rural Development Council, the Economic Research service, and the US Forest Service continued with their advisory role in the project.

b. Impact

- Grant funds made available to Tennessee State University, Tuskegee University, and Middle Tennessee State University have helped in expanding the skills of researchers from the Universities and strengthened collaborations among the Economic Research Service, the US Forest Service and collaborating institutions. The IMPLAN skills for researchers, which have continued to improve, will build capacity for Tennessee State University researchers and faculty working on the project. Also, students at Tennessee State University have improved their computer skills from working on the project through learning how to search for data, conducting qualitative/quantitative analyses and other important components of research. This project will provide useful information on the relative importance of agriculture and manufacturing to the economies of rural areas in Tennessee, Alabama, and Mississippi. The project will lead to research-based recommendations with useful policy implications for rural development in the south.

c. Source of Federal Funds: 1890 Capacity Building Grants Program

d. Scope of Impact: Multi State Research AL ,MS

**Key Theme - Economic Opportunity Enhancement**

- a. The goal of this research is to evaluate the social acceptability of agricultural biotechnology, specifically, genetically modified crops. Data will be gathered on the attitudes of consumers and producers towards genetically modified organisms in the food system. Three meetings of collaborators were held at the University of Arkansas, Fayetteville, the University of Arkansas, Pine Bluff, and North Carolina A&T State University. Tennessee State University took the lead in developing the producer and consumer materials needed for the focus group meetings. During this period, extension professionals and researchers jointly developed the materials needed to implement the focus group meetings. In all institutions, extension was very helpful in identifying potential contacts in counties selected for the meetings. Focus group meetings (consisting of producers and consumers, separately) were conducted in all states; the focus group meetings were used in developing a survey questionnaire. This survey will be formally pilot-tested for use in collecting data in a nation-wide survey. In addition to project group meetings, conference calls of project collaborators were used in finalizing the language of the survey and clarifying any issues that were unresolved during the previous group meeting(s). A timeline for completion of

tasks assigned to all universities was developed and agreed upon by all institutions involved in the project.

b. Impact

- The relationship between the 1890 and 1862 schools involved in the project has been strengthened through interactions by different researchers and faculty on the project. Extension's involvement with the project from the early stages of this project will ensure that relevant stakeholders have their share in the conduct and outcome of this research. Links between extension and research has been strengthened because of this project. This strengthened linkage will allow the research team to develop a strong dissemination plan for the findings of the research project.

c. Source of Funding: USDA/CSREES

d. Scope of Impact: State-specific

### **Key Theme - Economic Opportunity Enhancement**

a. To prepare for potential future funding opportunities, a collaborative project has been undertaken to gather data and establish collaborations with other researchers. These data and collaborative contacts will be utilized to prepare grant applications should the opportunity arise. A survey of extension agents was conducted in the collaborating states using a series of questions including their assessment of the current situation. The agents indicated the importance of the following issues: financial stress, weak commodity prices, declining importance of tobacco, aging farm population, high price of farm land, labor cost, and production cost. They maintain that the land grant institutions can help address the above and other issues through research that includes a study of factors that enhance success in farming, provide education, information, assess production technology, increase networking, assist in developing marketing plan, evaluate viable alternative enterprises, conduct field trials and demonstrations, provide technical assistance, and disseminate research findings. Through this project a range of potential alternative enterprises are identified. Local government and non-government organizations that can assist in carrying out a larger project in the future are also noted. A survey instrument has also been pre-tested to get feedback from farmers.

b. Impact

The project provided an opportunity to obtain input from key stakeholders-namely, extension agents, and farmers. This will lay the foundation for undertaking detailed studies using the pre-tested survey instrument and assistance from local stakeholders to conduct research and disseminate results on critical issues pertaining to small and medium-sized farmers.

c. Source of Funding: USDA/CSREES

d. Scope of Impact: Multi state Integrated Research and Extension with AR and NC.

## **B. Stakeholder Input Process**

Various actions were taken to seek stakeholder input and incorporate this input into research plans. These actions were tailored to fit individual goals and stakeholder groups. For example in Goal 1 (An agricultural system that is highly competitive in the global economy) the Cooperative Agricultural Research Program has maintained a standing Nursery Advisory Group since 1995. The group is composed of small, medium and large nursery producers from across the state and meets annually to review the methods and outcomes of applicable research conducted in the department. Comments from the group are used in formulation of research plans and methodologies.

In Goals 2 and 3 (A safe and secure food and fiber system; A healthy well-nourished population), an Advisory Council was formed that includes persons who work with disadvantaged populations, including the Nashville Davidson County Health Department, Second Harvest Food Bank, Metropolitan Davidson County Health Department, Cooperative Extension Program Agents, Davidson County Sheriff's Department, and the Hispanic Coalition. This advisory council participates in a review process of targeted research areas.

Research conducted under the 'Greater harmony between agriculture and the environment' goal (Goal 4) sought stakeholder input through professional meetings, field days, demonstrations, consultations, and informal contacts. This input was discussed by the research team and used to identify and assess insect and nematode pests, plant diseases, species of experimental plants, pesticides, and cultural practices included as part of the overall research projects. Agricultural statistics published by the Tennessee Department of Agriculture, the National Agricultural Statistics Service, and the Tennessee Agricultural Statistics Service were consulted to determine the economic importance of crops, pests, and diseases.

In the case of Goal 5, 'Enhanced economic opportunity and quality of life for Americans', information provided in identified areas of research will be of significant value to stakeholders, who are identified through: (1) the participation of Non-Governmental Organizations (NGOs) and private organizations in our projects, (2) the inclusion of farmers as cooperators, collaborators, or advisors on projects, and (3) publication and distribution of research bulletins, industry magazines, and leaflets that are widely circulated among growers, producers and extension workers. The involvement of extension colleagues (formally and informally) has extended our outreach efforts to more stakeholders. Through attendance at nursery industry trade shows, farmer field days, farmer meetings, and workshops, we have been able to identify growers who have stakes in our research. Also we are able to identify stakeholders through our interactions with other researchers, and extension personnel, we have identified stakeholders with interest in our programs.

## **C. Program Review Process**

There have been no significant changes in our program review process since submission of our 5-Year Plan of Work.

#### **D. Multi State and Joint Activities / Integrated Research and Extension Activities**

Although not discussed in great detail in the individual reports and impact statements, the research activities outlined in this report involve a fair amount of multi state and joint activities.

In Goal 1, Nursery Crop Green Industry Enhancement, the nutrient use efficiency research is being conducted as part of a multi-state project involving scientists from North Carolina, Georgia and Alabama. Also under Goal 1, the Small Farm Viability research has as a direct output defined crop growth and culture parameters for the Extension Service to incorporate into their outreach programs targeting small farm operators. Additionally, researchers have conducted outreach efforts via workshops and symposia presented in the important cattle and goat production areas of the state.

Researchers from Kansas State University are significantly involved in the portion aid research described in Goal 3, Nutrition Education for Disadvantaged Populations. The Kansas researchers are performing portions of the research as well as providing consultation on methodological approaches.

The research conducted as part of the Integrated Pest Management theme (Goal 4) utilizes collaborative arrangement with scientists from the University of Kentucky and North Carolina State University to evaluate putative resistant dogwood varieties under their respective growing conditions. The fire ant and Japanese beetle research utilizes collaborators from USDA/ARS Biocontrol and Mass Rearing Research Lab (MS), USDA/APHIS Gulfport Plant Protection Station (MS), USDA/ARS Center for Medical, Agricultural and Veterinary Entomology (Gainesville, FL), USDA/ARS Horticultural Insect Research Laboratory (Wooster, OH), USDA/APHIS Niles Biological Control Laboratory (MI), and the USDA/APHIS Otis Pest Survey, Detection, and Exclusion Laboratory (MA). These locations are performing integral parts of the analysis of the insect research and/or providing labor to gather data on experiments conducted in Tennessee.

A large number of multi state collaborations take (takes or took) place in the activities described in Goal 5, Enhanced Economic Activity and Quality of Life for Americans. Scientists and extension personnel from Alabama A&M, Kentucky State University, North Carolina A&T, Alcorn State University, and the University of Tennessee work jointly with TSU scientists to gather data and formulate contacts to be used in future research proposals dealing with economic opportunity in the Southern US. Other activities described under this goal involve collaborators with research and extension personnel from Florida A&M University, Fort Valley State University, Langston University, Middle Tennessee State University, Prairie View A&M University, Southern University, South Dakota State University, Tuskegee University, University of Arkansas (Fayetteville), University of Arkansas (Pine Bluff) and the University of California at Davis.

## E. Other Output

### GOAL 1: An Agricultural Production System that is highly Competitive in the Global Economy

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- Kahtz, A. W. 2002. *Hemerocallis*: A rainbow of colors with minimal care. Tennessee Green Times. 3(1):30-32.
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#### **Goal 2: A Safe and Secure Food and Fiber System**

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#### **Goal 3: A Healthier, More Well-Nourished Population**

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#### **Goal 4: Greater Harmony Between Agriculture and the Environment**

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#### **Goal 5: Enhanced Economic Opportunities and Quality of Life for Americans**

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## F. Fiscal and Human Resources Allocated

### GOAL 1: An Agricultural Production System that is highly Competitive in the Global Economy

Program	Description	FTE	Budget
Program 1	Alternative Livestock and Poultry	6.5	865,371
Program 2	Nursery Crop/Green Industry Enhancement	8.1	681,450
Program 3	Small Farms Viability	0.5	---
Program 4	Forest Management for Minority Landowners	2.8	364,480
<b>Total</b>		<b>17.9</b>	<b>1,911,301</b>

### Goal 2: A Safe and Secure Food and Fiber System

Program	Description	FTE	Budget
Program 5.	Bacteria in Refrigerated Foods	2.2	136,596
Program 6.	Food Safety for At-risk Mothers and Children	0.0	68,616
<b>Total</b>		<b>2.2</b>	<b>205,212</b>

### Goal 3: A Healthier, More Well-Nourished Population

Program	Description	FTE	Budget
Program 7.	Nutrition Education for Disadvantaged Populations	2.1	133,273
Program 8.	Healthier Eating	0.0	274,462
<b>Total</b>		<b>2.1</b>	<b>407,735</b>

### Goal 4: Greater Harmony Between Agriculture and the Environment

Program	Description	FTE	Budget
Program 9.	Integrated Pest Mgt.; Improving Environ. Quality	7.7	626,068
Program 10.	Sustainable Agriculture	1.0	161,537
Program 11.	Water Quality	1.0	161,537
<b>Total</b>		<b>9.8</b>	<b>949,142</b>

### Goal 5: Enhanced Economic Opportunities and Quality of Life for Americans

Program	Description	FTE	Budget
Program 13.	Economic Opportunity Enhancement	5.3	557,685
<b>Total</b>		<b>5.3</b>	<b>557,685</b>

### All Goals

Program	Description	FTE	Budget
<b>Grand Total</b>		<b>37.3</b>	<b>\$4,031,074</b>