Annual Report of Accomplishments
FY 2000-2004

The University of Georgia
College of Agricultural and Environmental Sciences
Cooperative Extension Service
Agricultural Experiment Stations

and

Fort Valley State University
College of Agriculture, Home Economics and Allied Programs
Cooperative Extension Program
Agricultural Research Station

March 1, 2001

Signed certification form to follow by USPS.

PLANNED PROGRAMS

Impact statements for the 1862 Institution may be found in a searchable data base at

http://oit.caes.uga.edu/impactstmt/search/search_form.cfm

Goal 1. An agricultural production system that is highly competitive in the global economy

Performance Goal 1-1: To increase the quantity and quality of value added products produced by farmers for local or regional markets.

Plant Pathology

Statement of Issue:

The Department of Plant Pathology facilitates the development and adaptation of new cultivars that are more tolerant to abiotic and biotic stresses affecting plants, cultural systems that improve production efficiency, promote sustainability, and improve crop utilization. New cultivars and production practices are evaluated under Georgia environmental conditions to keep the industry competitive. New and developing technologies are integrated into effective management strategies such as rapid diagnostic and predictive tools for pest and disease problems to lessen the need for crisis management.

Program Components:

1. To develop and/or evaluate new commodities that meet critical needs or niche markets adapted to local conditions.
2. Increase new crop cultivars and genetic improvements.
3. To adapt new technologies in diagnosis to mitigate the effects of plant diseases

Output Indicators:

18-Number of exhibits, handouts, flyers, etc. distributed.
86-Number of meetings/training/programs/workshops held.
6-Number of tours, demonstrations, field days, and research station open houses held.
13-Number of news articles written, radio and television news productions.
51-Number of companies represented at workshops.

In-State Outcome Indicators:

1. Distance Diagnostics through Digital Imaging has been deployed in 100% of all county Extension offices in Georgia. Full stations include microscopes, video and digital cameras, computers and printers and have been distributed in 94 counties throughout Georgia and Athens, Tifton and Griffin CAES campuses. All county Agricultural and Natural Resources faculty have been trained in the use of these diagnostic and educational resources. The equipment is shared with other county faculty with the primary use as agricultural. The equipment is used to help the grass roots county Extension faculty diagnose and confirm diagnosis with academic Extension faculty in Georgia. Diagnosis has been reduced from 2 -4 days to 1 day using this technology. Plant Pathology, Horticulture, Entomology and Crop and Soil Science Departments were receiving samples during all of 2000. All new county Extension faculty has been trained as well as the support of additional disciplines of Aquiculture (Forestry), Biological and Agricultural Engineering, Animal Science and their faculty. These are all resources that can now be available to county Extension faculty at the grass roots levels to facilitate educational programs. A

survey conducted in the spring of 2000 indicated that over 2500 samples had been submitted for diagnosis since February 1998, the first deployment. Data from this survey indicate the grass roots impact of over $17.7 million dollars has been contributed directly to this project. This is a direct savings to growers in crop savings and reduced pesticide applications based on expediting diagnosis of problems and being able to initiate pest control education programs targeted at the cause. County faculty also learn from this immediate diagnostic response so they will be able to distribut e this management information to other growers in their counties. The percent of physical samples that are diagnosable is 60% while the digital samples can be diagnosed at a level of 80%. The result is a coordinated effort by county faculty to be on the le ading edge of knowing the problems when they first appear and not a week later after pests has caused significant damage. The physical Plant Disease Clinics (PDC) are now better equipped to handle those problems that need isolation and sample manipulation to diagnose new and emerging problems. The PDC are also better positioned to support the applied research of the Extension plant pathologists' programs and to be supportive of pro-active disease management and not defensive.

2. The Distance Diagnostics through Digital Imaging program in Georgia has had a significant impact on Georgia's grass roots agriculture and growers. There are some crops that are very perishable and could benefit from increased levels of diagnosis. Wireless transmission of diagnosti c data and images could reduce diagnostic time for very perishable commodities and be a further asset to county Extension faculty to serve their constituents. Hardware is being evaluated for use with wireless technology. A similar application is being deve loped for this wireless system to support Distance Diagnostics from the field. Assistantships have been filled to provide a workforce to help with the development as well as a training ground for future agricultural oriented plant pathologists. Hardware a nd software programs are being evaluated and developed to assist in the deployment of 20 remote county wireless systems. Three graduate student assisitantships funded at the masters level were funded through this project to train applied diagnostic plant p athologists. These students are working in the Plant Disease Clinic and learning the benefits and limitations of the Distance Diagnostics technology.

Multi-State Outcome Indicators:

1. The UGA Peach Team along with Clemson University has provided leaders hip in developing a virus testing program that the peach and nursery industries have supported financially. These efforts insure that all Georgia budwood material is tested for the presence of PPV and three other critical viruses of peach, prior to its use by the nursery industry. During the spring of 2000, the South Carolina and Georgia industries had 720 potential mother trees tested for PPV as well as three other peach tree viruses. Those trees potentially could have produced 720,000 buds for the nursery industry. Due to these efforts, ~50 trees were eliminated from the budwood program due to infection by another peach tree virus, Prunus necrotic ringspot virus. Ultimately, all peach seedlings that enter Georgia will be derived from virus tested budwood. Tennessee tree nurseries produce many of the peach trees (> 2 million) planted in the eastern United States and Canada. These nurseries use budwood sources from Georgia and South Carolina. PPV has been a catalyst for the initiation of cooperative ef forts between the University of Georgia, Clemson University, the University of Tennessee, and their State Departments of Agriculture, to develop virus-testing programs for the southeastern industry.

2. Distance Diagnostics through Digital Imaging is a sig nificant part of Georgia Cooperative Extension Service Programing. Other states have seen the benefit of this type of educational programming and have contracted with Georgia to provide assistance in their Distance Diagnostics programs. University of Illinois Urbana Champaign became an integral part of Distance Diagnostics through Digital Imaging in 1999. We supported their deployment with the development of the software web-based program and trained 63 faculty for 16 sites. This provides us, as agricultural scientists, an opportunity to communicate and consult with other discipline faculty with universities and establish some continuity between our programs. Louisiana through Louisiana State University contracted with the University of Georgia to help them develop customized applications for their Extension diagnostic programs. We were instrumental in the development of their program and training and deploying 10 stations in Louisiana in the fall of 1999. The University of Georgia College of Agricultural an d Environmental Sciences has taken the lead to help other Land Grant Universities develop their Distance Diagnostics Systems. We are customizing the code for the WEB based Distance Diagnostics program to help states that do not have the resources to do their own programing. In return the states are helping with support at a lower level than would take to develop their own systems. This is a WIN WIN system that shares intellectual information and makes it available to the grass-roots agricultural producers and plant growers. University of Illinois expanded the Distance Diagnostics through Distance Diagnostics program state wide. All 100 counties in Illinois are now able to access and send samples through the WEB based system. Suzanne Bissonnette and Dennis Bowman have won Extension Awards of Excellence for initiating and being the driving forces to deploy this technology in Illinois. Louisiana State University has continued to use and develop their program with the help of the University of Georgia. Auburn University contracted with the University of Georgia to develop a customized Distance Diagnostics through Digital Imaging program. This program was deployed spring of 2000 and is supporting their Extension delivery program in Alabama. Texas A&M has also cont racted with Georgia to help develop their Distance Diagnostics through Digital Imaging program. Image submission forms were developed and a customized diagnostic delivery system was built into the program. Texas was the first state to include Veterinary Medicine in their diagnostic system. These efforts put The University of Georgia College of Agricultural and Environmental Sciences in the lead in this technology as well as demonstrates the sharing of common programs with other states. This is truly a multi-state effort that has demonstrated success in Extension programing.

Food Science and Technology

Output indicators:

Number of meetings/training/programs/workshops held: 29
Number of media events (articles, radio, TV): 2
Number of refereed journal articles: 5
Number of companies represented at workshops: 125
Number of companies requesting technical assistance by telephone or on site: 451
Number of companies reached by extension education materials: 150
Number of companies considered feasibility of incor porating value-added products: 128
Number of companies that will adopt value-added producing: 111

Outcome indicators:
Number of new and value-added products: 132
Number of producers adopting or marketing value-added products: 66
Dollar value of new value-added products produced and marketed: $30-40 million.

Significant value-added projects included (new products only):

1. Production of segmented carrots — approximately $3,000,000 value
2. Production of hot pepper products utilizing products not marketable as fresh: $145,000
3. Value-added Vidalia onion products including salad dressings, relishes, and sauces: $5,000,000
   - The onion products utilize onions not marketable as fresh.

Related Impact Statement:
Supporting Small Producers

New government pathogen regulations must be followed by both large, small and very small meat and poultry processors and the deadlines to comply were growing near. Large processors often have the adequate personnel, resources and technology needed to comply with new guidelines, while small processors do not. To help small processors adjust and prepare, UGA Extension Service food specialists asked the government for help through a $175,000 grant from the Governor's Development Commission Traditional Industries Program. The specialists then provided training and in-plant technical assistance for interested small and very small Georgia meat and poultry processors. Of the 195 small and very small processors in Georgia, some 84 plants have already taken advantage of the in-plant assistance and 75 very small processors have attended the workshops. Processors attending the training and workshops gave the program a 100 percent recommendation rating.

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Horticulture
Executive Summary: Many horticultural crops in Georgia are rapidly expanding in importance. Research and outreach programs have to a large degree fed these expansions. For example, blueberry research on plant growth regulators has greatly increased fruit set and profitability of the crop. Extension efforts have assisted the development of the emerging vinifera wine grape industry, and the number of wineries in the state increased from two to five last year. Research at the Coastal Plain Experiment Station directly resulted in the development of a carrot industry in South Georgia, valued at over $15 million in 2000.

Key Theme -- Ornamental/Green Agriculture
Outputs:

Extension specialists from UGA and UF combined efforts to increase nursery and landscape educational efficiency. Three full-day seminars were implemented in 2000.

Impact

Over 420 nursery and landscape professionals attended the meetings. Georgia nursery attenders represented about 80% of the wholesale value of nursery production in the state. Post-program surveys indicated that over 78% received information during the session that will result in a change in their current practices and will lead to increased profitability in their businesses.

Source of Federal Funds -- Smith-Lever 3b

Scope of Impact - Multi-state Extension, GA and FL

Key Theme -- Diversified/Alternative Agriculture

Outputs:

Many of Georgia's traditional row crops have suffered from declining profits over the last few years, and this has led to growers seeking alternative crops such as vegetables as a diversification strategy to increase farm income. UGA extension specialists developed basic and advanced training materials and held over 12 county production meetings targeting farmers seeking information on alternative crops. In addition, a 3-day statewide vegetable and fruit production conference coordinated and conducted through UGA attracted over 2000 participants in January of 2000.

. **Impact**

More than 150 farmers attended county training meetings; follow-up farm visits and correspondence indicates that many opted to diversify into vegetable production during 2000. Statewide, an estimated $10 to $20 million in gross receipts were generated by the integration of alternative crops such as pepper, squash, cucumber, carrot, and eggplant into traditional row crop farms. The profitability and survival of these farms were enhanced by the educational programming provided.

Source of Federal Funds -- Smith-Lever 3b

Scope of Impact - State specific

Key Theme -- Urban Gardening

Outputs:

As the population in Georgia continues to expand, especially in the urban and transitional counties, there is a tremendous demand for correct and environmentally safe horticulture information. Pesticide sensitivity, water shortages, and total environment protection are a few of the issues concerning today's public. The Southern Regional Consumer Horticulture Committee had three multi-state meetings in different locations of the Southeast to discuss collaborative ideas. They created a southern regional list serve and coordinators list to be used for rapid communication; developed a list of consumer horticultural resources; and are in the process of developing a Southern Regional Consumer Horticulture Web page.

Impact

This project is early in its development. Impacts during 2000 included a report of time saved thr ough sharing of resources and adopting horticultural materials between states (by participants), and the development of an efficient system of communication between states.

Source of Federal Funds -- Smith-Lever 3b

Scope of Impact - **Multi-State Extension**, AL, AR, FL, GA, LA, MS, NC, OK, SC, TN, TX, and VA.

Animal and Dairy Science

Key Themes - Adding Value to New and Old Agricultural Products
Agricultural Competitiveness

Issue Statement:

The Georgia Beef Challenge is an educational program designed to (1) provide performance and carcass data to Georgia cattle producers; and to (2) improve marketability of Georgia beef cattle. This program is a collaborative effort including cattle produce rs, the Georgia Cattlemen's Association the Tri-County Steer Carcass Futurity, the USDA Market News Service, The University of Georgia Animal and Dairy Science Department and the Cooperative Extension Services of both The University of Georgia and Iowa State University.

Output Indicators:

Number of publications, newsletters produced, shortcourse presentations, tours

- Two articles in the Georgia Cattleman magazine
- Two articles in the UGA Livestock Newsletter
- Presentation at the Tifton Beef Cattle Shortcourse
- Presentation at the Ga. Cattlemen's Assn. Convention
- Annual Meeting of consignors
- Reports to consignors and other interested persons (26 reports)
- Tour of cooperators in Iowa

Impact Statement:

Georgia Calves Not Inferior

Primarily sold at weaning, the price of Georgia calves is traditionally discounted because they have the reputation of being inferior in quality and health status. These discounts can be as high $5 per hundred pounds. Considering the 500,000 calves produced in 2000 weighed 500 pounds at the time of marketing, the discounts amounts to as much as $12.5 million. The Georgia Beef Challenge was organized to allow Georgia cattle producers to gain information on the health, performance and carcass merit of their cattle. In 1999-2000, 2,319 calves were consigned to the program. The performance of

the cattle was excellent with an average daily gain of 3.42 pounds per day. Carcass quality met or exceeded the targets set by the National Cattlemen's Beef Quality Audit. Health was excellent. Death loss at 0.8 percent was far below the industry average of 2 percent. This data disputes the reputation that Georgia calves are inferior. In addition, the average net return was $75.90 per calf for a total added value of $174,570 for the consignors of this program.

Performance Goal 1-2: To increase the efficiency of GA agricultural production, agribusiness and natural resource management

Plant Pathology

Program Components:

Ways to enhance management methods in agricu lture are by developing management systems that integrate pest- and disease-resistant cultivars and breeds, developing plant germplasm with resistance to pests and diseases, developing monitoring systems to detect pest and disease outbreaks, and developing improved methods for extending information on comprehensive management systems that focus on plant health.

1. Evaluate the efficiency of new chemicals, application systems, etc.
2. Increase the efficiency of cultural practices, pest control and post-harvest handling.
3. Improve health of plants.

Output Indicators:

121-Number of meetings/training/programs/workshops held.
6-Number of tours, demonstrations, field days, and research station open houses held.
18-Number of newsletter articles, publicatio n articles dealing with ag production practices.
13-Number of news articles written, radio and television news productions.

In-State Outcome Indicators:

1. Peach production in Georgia represents in excess of 24 million dollars annually without consider ation of the retail sales in the state of Georgia and impact on jobs and peripheral industries. The University of Georgia, Peach Team works to protect and improve peach production in the state of Georgia. Plum pox virus (PPV) is a devastating disease of peaches. Although, fruit from PPV infected trees is unattractive, it is not harmful to humans. However where PPV is found, trees are rendered useless for fruit production and must be destroyed to limit spread of the disease. In the fall of 1999, PPV was identified in Pennsylvania - the first account of the virus in North America. More recently, the virus was identified in Canada. When detected in US orchards, the orchards are being destroyed as part of a massive eradication program. As of Nov. 1, 2000, 1100 acres in Pennsylvania were destroyed or had received orders to do so. The virus can be spread long distances through movement of propagative material -- grafted seedlings and budwood. Subsequent local spread is through a small insect, the aphid. Georgia and South Carolina peach orchards serve as a source of propagative material for commercial and homeowner trees for the Southeast and most of eastern North America. It is important to all US peach production to know whether the virus is present in Ge orgia and South Carolina orchards. If not present, it is an imperative that the virus be excluded from the state. Over the last year,

the UGA Peach Team, comprised of horticulturists, plant pathologists, and entomologists with the help of county extension agents conducted tests for the detection of PPV and initiated efforts for the prevention of PPV entry. Surveys of 32,336 peach trees were conducted throughout 14 Georgia counties, and the virus was not detected during this survey; additional surveys wil l be conducted in coming years to insure that PPV is absent.

2. According to the 1999 Georgia Plant Disease Estimates, diseases reduced the value of peanut, cotton, tobacco, pecan, corn, and vegetables by a total value of just over $187 million. An additional $121 million was spent on disease control, putting the total loss at around $308 million. A rapid diagnosis of diseases of these crops would allow growers to implement control measures that could reduce losses. A plant disease clinic designed to handle samples of field crops and vegetables provides quick, accurate diagnosis and also aids in the education of the county faculty. The clinic services the entire state of Georgia. Plant diseases are diagnosed and extension plant pathologists use the information to make control recommendations. From January 01, 2000 through November 20, 2000, the clinic in Tifton handled 463 physical samples. A fast, accurate diagnosis of a problem not only helps reduce a loss in yield, but also allows for selective treatments that can reduce or eliminate unneeded chemical applications. Increased yields and savings will be beneficial for both the grower and consumer. An additional benefit is the education received by county faculty. Dialog over specific samples and disease diagnoses enables the county faculty to make certain diagnoses at the county level, thus increasing the benefits to the growers.

3. Leyland cypress trees have been declining in nurseries, Christmas tree farms, and landscapes in recent years. The cause of the decline was unknown. The only previously reported major disease problem associated with the trees was Bot canker, caused by *Botryosphaeria dothidea*. However, the decline was not due to this disease. Several "new" diseases have been identif ied on Leyland cypress and field and greenhouse tests have been conducted to identify the disease-causing organisms and factors that contribute to disease spread and development. An evaluation of Atlantic white cedar varieties, which are trees with simila r growth habits to Leyland cypress and may serve as alternative tree selections, has also been conducted in field and greenhouse experiments. In addition to Bot canker caused by the fungus, *Botryosphaeria dothidea*, two more diseases were identified from Leyland cypress trees across the State and region; Seiridium canker caused by the fungus, *Seiridium unicorne*, and a new disease on Leyland cypress, Asperisporium needle blight caused by the fungus, *Asperisporium sequoiae*. Greenhouse tests showed that drought stress increases Leyland cypress susceptibility to the canker diseases with cankers expanding approximately three times faster on drought-stressed trees than non-stressed trees. In addition, all Atlantic white cedar varieties evaluated are as susceptible to Seiridium and Bot canker diseases as Leyland cypress when drought-stressed. An expanded evaluation of alternative tree selections, as well as different Leyland cypress varieties, is currently being conducted. A fungicide spray tria l to control needle blight disease of Leyland cypress showed that the disease could be controlled when fungicides were applied in the fall and early spring. Identification of the new diseases on Leyland cypress and identifying possible plant resistance an d factors contributing to disease spread has aided growers in managing the diseases in nurseries, Christmas tree farms and landscapes.

Biological and Agricultural Engineering
Output Indicators:

- 18 presentations to professional and industry groups,
- 2 classes taught,
- 2400 handouts distributed at exhibits,
- 12 refereed journal articles published,
- 22 presentations at extension meetings,
- 3 lesson plans and handouts,
- 34 trainings/meetings/workshops,
- 1 educational resource developed
- 1 field day
- 6 newsletters
- 1 news article
- 50 companies represented at workshops
- 75 companies requested technical assistance
- 100 companies reached by extension educational materials
- 3 popular press publications

Outcome Indicators:

- 75 swine farmers received training which would allow them to obtain permits to operate their facilities,
- At least 25 energy saving, variable speed vacuum pumps installed in demonstration programs,
- Approximately 130 people were trained and would be certified to write comprehensive nutrient management plans for Georgia farms,
- Program participants will be able to economically and efficiently modify existing practices,
- Program participants will adopt the use of proper practices and recommended methods,
- Program participants will use improved technologies and methods.

Performance Goal: 1.3: Develop and evaluate meat and milk products; fruits and vegetables; agronomic and forestry products that protect the soil resources, improve environmental quality and enhance biological diversity through emerging plant and animal systems.

Key Theme: Animal Health/Animal Production Efficiency

Research/Extension Specialists developed Herd Health Management Programs for goats to help goat producers improve animal health and minimize production losses in their herds. The program consisted of herd vaccinations and disease prevention protocol, as well as parasite control measures. Disease surveillance data are updated and several disease outbreaks have been investigated for treatment,

prevention and control measures. Programs aimed at producers were presented through Georgia Extension Service; presentation at local, state, and regional field days; expositions and fairs; publication of extension publications and newsletter; presentations aimed at veterinarians at state, nati onal and international professional meetings/conferences; and number of other locations and direct producer inquiries. Cooperating Institution/Organizations: GA, AL, and FL Meat and Dairy Goat Associations; American Boar Goat Associations; American Kiko Goat Associations; University of Georgia Veterinary Diagnostic and Investigation Laboratories; USDA-APHIS-VS; GA Department of Agriculture; Livestock Market News; GA Veterinary Medical Association; North American Veterinary Conference; and American Association of Small Ruminant Practitioners.

Accomplishments and results. Several kinds of accomplishments resulted in direct contact primarily with county extension agents, agricultural teachers, market owners and processors, regulatory authorities, and producers. The activities that generated these results included:

- Information transfer and updates through print media, oral presentations, and site availability provided during in-service training, conferences and symposiums, field days, producer meetings.
  - Two issues of the small ruminant newsletter. Distribution of 1000 copies each.
  - Twenty-four producer meetings. Attended by an average of 20 participants.
  - Five field days. Attended by an average of 300 people.
  - Three conferences, expositions and symposiums. Direct contact with a total of over 3,000 people.
  - Three in-service training opportunities. Contact with 45 agents and agriculture teachers.

- Technical problem-solving and identification of new opportunities for production increases.
  - Phone inquiries of over 25 per month.
  - E-mail and snail mail contacts of 15 per month.

- Genetic evaluations resulting in more productive market animals.
  - Organized and supervised meat goat buck performance test. Four breeders and 12 bucks in 2000 in addition to the six breeders and 21 bucks participating in 2000.

- Genetic resource evaluation of Dorper and Katahdin hair sheep breeds. Maintained flock and developed linkages with 10 on-farm resource persons.

- Skills development demonstrations for more effective animal care and management. In-service training provided agents and teachers with the tools to pass along to clients. Field day demonstrations allowed producers to practice and learn proper techniques.

- Served as superintendent of Georgia National Fair and Georgia Spring Stock Show market goat show and breeding ewe show. Addition of carcass contest to market goat show provided linkage to the final product and provided educational opportunities on product characteristics and value points. Educated producers make the sector more competitive.

- A series of displays and exhibits were set up at the Georgia National Fair, AG Showcase, and Sunbelt Exposition to inform 395 farmers and consumers on trends and practices related to production, marketing and consumption of goat meat. 1080 leaflets were distributed and 32 educational classes were conducted across the state.

- Organized and conducted a performance buck meat goat evaluation trial with 10 producers and 33 animals competing. One hundred thirteen farmers and agents received training and technical assistance needed to keep farmers and other landowners productive and competitive.

- Extension faculty and staff broadened Internet Web site capabilities through Fort Valley State University and the Georgia National Fair to provide information on goat products, health problems, timely tips and market listings and locations across the state and to draw a parallel between live show activities and carcass component evaluations. Over 100,000 hits were recorded during this reporting period.

- Published proceeding document form symposiums attended by 100 Meat Goat producers in Georgia and the South East.

- Published two small ruminant newsletters including articles impacting meat and milk production.

- Established small ruminant advisory group to guide small ruminant extension programming including assessment, testing and release of new or modified meat and milk products.

- Response/What Has Been Done? Herd Health Management Programs has been developed for goats which included herd vaccinations and disease prevention protocol, as well as parasite control measures. These recommendations has helped numerous goat producers to minimize production losses in their herds. Disease surveillance data is being produced and several disease outbreaks has been investigated for treatment, prevention and control measures.

Outcome Impact:

Scope of Impact: (**multi-state** - Georgia, Florida and Alabama)

- Research and Extension findings has been disseminated through Georgia Extension Service; presentations at local, state, regional, national and international professional meetings/conferences; state and national field days and fairs; publications of findings in referred journals and electronic media. The management recommendations has been adopted by several producers which resulted in reduction in herd production losses. Numerous clientele attended exhibits, demonstrations, field days and requested information. More than 4600 people attended these meetings and requested additional information. The Herd Health Management recommendations have been adopted by several producers resulting in reduction in herd

production losses. Overall evaluation of the value of these programs by participants was 9.5 on a 10 point scale. Nearly 75 percent of those developed after the meetings indicated they had implemented changes or were planning changes in their operations as a result of attending these meetings.

- 3000 people received newsletters through the mail or by hand on goat products
- 4000 people attended demonstrations, symposiums, informational/production meetings or looked at materials at exhibits at the Georgia National Fair, Sunbelt Expo, or Ag Showcase related to meat and milk products from goats.
- Hosted HACCP workshop for small processing plants for 25 participants.
- Provided workshop for 25 farmers and 9 extension agents in production, processing and marketing of value-added products.
- Organized and conducted eleven (11) grower meetings for agents training and 125 farmers on technical assistance needed to keep farmers and landowners productive and competitive.

Funding Sources: Evans-Allen, Federal Extension

Cooperative Institutions:
The following groups are cooperative partners: The Fort Valley State University Teaching, Research and Extension; University of Georgia Veterinary Diagnostic and Investigations Laboratories; Cornell University; Florida A&M University; Tuskegee University; Alabama A&M University; Langston University; Jordan University of Science and Technology; USDA - APHIS-VS; Georgia Department of Agriculture and Private Entities, and Heifer Project International.

Program Duration:
The competitive agriculture program in small and part-time farmers will be long term, 1999-2003

Stakeholder Input: Small Ruminant Advisory Board composed of representatives from universities, associations, extension agents, specialists, vocational agricultural teachers and farmers.

Allocated Resources:

Fiscal	Evans-Allen, Heifer Project International - $	15,000
	2000 Federal Extension	$ 105,000
Human	Professional FTE's - 2.1	
	Paraprofessional FTE's - 1.25	
	Volunteer FTE's - 0.5	

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Performance goal 1-4: To enhance the competitiveness of Georgia's agricultural products.

Entomology
Key Theme: Apiculture
Output:
Faculty developed a comprehensive apiculture program that includes teaching, research and extension activities. This program includes the development of undergraduate/graduate level course in apiculture, publication of a book on crop pollination by bees, research projects that confirmed the utility of honey bees as pollinators or rabbiteye blueberries and extension activities that have regional, national and international impact. Collaborative research activities resulted in the development of treatment thresholds for *Varroa* mites was a significant milestone in pest management programs in bee production systems. Cooperating Institutions/Organizations: Clemson University, Department of Entomology.

Impact:
Eleven workshops/in-service trainings resulted in 326 individuals being trained in management of bees. One book on crop pollination in bees was published and one book on mites of the honey bee was edited. Three publications were printed in referred journal articles. State funding for technical assistance and new lab/teaching facilities was secured. Six invited presentations were made at national/international locations.

Source of Federal Funds: Smith-Lever, Hatch Funds

Scope of Impact : State, National, International; **Multi-State Research** -with South Carolina.

Key Theme: Invasive Species
Insects that are accidentally introduced into the United States often become serious pests. It is critical that entomologists monitor the distribution and develop management programs for these insects.

Impact: Extension specialists and research faculty continue to monitor the distribution of several introduced species of insects in Georgia including the Varrora mite, red imported fire ant and the Formosan termite. In addition, these scientists continue to monitor for the presence of the small hive beetle, the gypsy moth, Asian long horned beetle, and pink hibiscus mealybug. Two workshops trained over 50 county agents on the recognition of these insects. In addition information on the identification of these pests was made available to all agents and the general public via educational materials provided via the bugwood web site. Over 1200 people attended programs on the management of red imported fire ants. A regional publication that covers fire ant management in urban areas was distributed to all counties in the state and is also available via the department web site. One hundred-twenty county agents and pest control operators have attended workshops addressing the identify Formosan termites. In cooperation with USDA, researchers released two biological control organisms for control of the red imported fire ant in Georgia in 2000. Research activities also include monitoring for the establishment of the biological control agents in Georgia and monitoring the distribution of IFA species and hybrids.

Source of Federal Funds: Smith-Lever, Hatch Funds
Scope of Impact : State and Regional; **Multi-State Research** – With Florida and South Carolina.

Key Theme: Ornamental/Green Agriculture
Extension specialists continue to expand entomological research and Extension programs that relate to the ornamental plant and green industries in Georgia. Research programs focus on the identification of pest resistant plant species for use in the landscape. In addition, Extension specialists provide educational materials on the use in integrated pest management in nurseries and landscapes for professional ground maintenance firms, nurserymen and home gardeners. Researchers continue to develop greenhouse and landscape IPM plans for ornamental plant production systems, greenhouse producers and consumers.

Impact:
Pest resistant or pest tolerant plant varieties of rhododendrons, buddleia, hollies and various turfgrasses have been identified through our research programs. Over 400 landscape professionals received training on IPM in the landscape during 2000. Information on pest recognition and control was compiled in to an updated version of the Landscape IPM Training Manual and distributed to participants in these workshops. Over 500 master gardeners were training on the various concepts on

IPM in the landscape during master gardener training programs during the year.

Source of Federal Funds: Smith-Lever, Hatch

Scope of Impact : State and Regional; **Multi-State Research** - with Florida, Alabama.

Performance Goal 1-5: To Improve Management Practices Of Small And Part-time Farmers

Overview:

Economics uncertainty is one of the major problems facing small and part-time farmers in Georgia. The reduction of quota crops such as tobacco, peanuts and other high income cash crops have had a profound impact on farm income. Other crops and livestock enterprises also have faced record low prices. As a result of income loss, instability and declining purchasing power, it has become difficult for many small part-time farmers to make wise decisions in the market place. If small and part-time farmers are to become competitive, agricultural programs must improve the capacity of farm operators to realistically plan, manage and evaluate agricultural opportunities. Secondly, agricultural programs must deliver to the small and part-time farmer the most recent knowledge, information, and technological innovation relative to the specific farm enterprise. Nontraditional agricultural pursuits rest largely with alternative agricultural enterprise development especially those targeted for small and part-time producers. Alternative enterprises, designed to supplement on farm income or to replace less economically feasible products, have greatly enhanced the small and part-time farm operator in the quest for an agricultural niche. As small and part-time farmers solidify their niches they must have access technologies, technical assistance and knowledge that enhance their competitiveness.

Key Theme:

Adding value to new and old agricultural products, diversified/alternative agriculture, innovative farming techniques, niche market, organic agriculture, risk management, small farm viability, managing change in agriculture.

Output:

- Demonstrated lamb production systems that are based on easy-care, low-labor requirements.
  a. Used breeds that do not require shearing, may be more tolerant of internal parasite challenge, having more genetic tolerance of hot, humid climatic challenge, and which work as part of multiple species grazing strategy
  b. Maintained demonstration flock on FVSU campus
  c. Identified flocks around the state of Georgia where producers can observe working productions systems

- Provided information on basic care of goats and sheep

d. Produced 1500 copies of pamphlet on basic care of goats

d. Distributed 200 copies of pamphlet on web sites for goat and sheep information

d. Provided in-service training on basic skills in small ruminant production to 20 agents

- Made three presentations on the value-added concept and factors impacting on product quality

- Provided technical input and organizational insight as Washington County Meat Goat Association develops processing and marketing initiative based on new generation cooperative.
- Forty eight (48) small part-time farmers receive technical assistance in completing farm plans. Twenty-seven (27) or 56 percent small part-time farmer overall farm operations increased as a direct response to technical assistance

- 1600 small farmers/landowners were mailed or handed out newsletters

- 200 small part-time farmers attended 11 educational meetings in ten counties of southeast and southeast Georgia

Outcome:

- Forty-eight small part-time farmers posted a net 10 percent profit in their operations as a result of their technical assistance support

- Thirty-eight small part-time farmers posted a net 10 percent profit in their operations. as a result of their technical assistance support

- Thirty-eight small part-time farmers indicated an evaluation response that they had made changes in their farm operations as a result of attending one or more educational meetings

- The Small Farm Program has held several meetings throughout the year that included county extension agents, producers, Farm Service Agency, Natural Resource Conservation Service, Risk Management Agency, and private industry representatives. Announcements were included in monthly and quarterly newsletters and posted in USDA Service Centers throughout the State. Over 800 publications and fact sheets were distributed

- The Small Farm Program also has a representative that serves on Team Agriculture Georgia (TAG). This organization serves as a partnership that is made up of leaders from governmental agencies, academic institutions, and community-based organizations collaborating to identify and implement strategies that result in broader and easier access to agricultural-related programs and services in the State of Georgia.

- Twenty-three demonstrations including organic raise beds, strawberries, home grafting, and

wrens youth garden club. Over 1,700 youth and adults have gained proficiency in income saving tips

Funding Sources: CSREES

Cooperating Institutions: Farm Service Agency, Natural Resource Conservation Service, Risk Management Agency, Team Agriculture Georgia (TAG) and Georgia Farm Bureau

Program Duration:
This program is long term 2000-2004

Allocated Resources:

Fiscal 2000 Federal Extension - $75,000.00

Human Professional FTE's - 1.5
Paraprofessional FTE's - .75
Volunteer FTE's - 0.6

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Total Contacts for Goal 1:
White Male - 7,210
White Female - 4,086
Black Male - 6,368

Black Female - 3,559
American Indian Male - 19
American Indian Female - 9
Hispanic Male - 13
Hispanic Female - 74
Asian Male - 0
Asian Female 96
Total - 21,434

Performance Goal 1-6: To have Georgia poultry producers remain competitive by utilizing best management programs to minimize energy usage while achieving maximum bird performance.

Performance Goal 1-7: To improve breeder flock performances and hatchery operations.

Overview

Georgia currently has over 10,000 poultry houses in operation. To be competitive in the U.S. poultry industry, poultry producers in Georgia must utilize the best available technologies and management programs to achieve production and energy efficiencies and to provide optimum environments for maximum bird growth and performance. The proper operation of ventilation, cooling, and brooding systems is critical in Georgia due to severe seasonal elements. It is imperative that broiler, breeder, and egg flock producers develop and apply best management programs for maintaining production performances. In addition, the proper management and operation of hatcheries is essential for the support of these production facilities.

Key Theme - Poultry Production Efficiency

Outputs:

Poultry scientists have developed and conducted comprehensive workshops and seminars to assure poultry production efficiencies in Georgia. The poultry ventilation and heating workshops, the hatchery/breeder workshops, the Georgia Poultry Conference, the Deep South Poultry Conference, and the Southeastern Egg Producers Forum seminar programs have provided information to poultry company personnel throughout Georgia and surrounding states. County Extension Grower Meetings have provided information to poultry growers across the state. Cooperating Institutions/Organizations: The Georgia Poultry Federation, the Georgia Egg Association, and Georgia Poultry Companies.

Impact

Over 1,000 poultry company personnel have attended specialized workshop and seminar programs in Georgia related to production efficiencies. Evaluations of these programs have ranged from 4.0 to 4.5 on a 5 point scale. Participation by poultry specialists in county extension programs reach over 1,000 growers annually. As a result of these programs, poultry integrators and growers are utilizing state of the art ventilation, cooling, and heating systems in their production facilities. In addition, integrators and

growers are adopting and utilizing best management practices for breeder flocks including feeding, lighting, and breeder male management programs. Poultry hatchery operators have implemented new sanitation methods to improve hatchability and reduce chick contamination.

Source of Federal Funds - Smith-Lever.

Scope of Impact

Multi-State Extension with Alabama, Tennessee, and Florida: Workshops related to poultry house ventilation, hatchery operation, and breeder flock management have been conducted cooperatively with Alabama. Educational conferences and seminar programs relating to broiler and commercial egg production have been conducted cooperatively with Tennessee and Florida. The Deep South Poultry Conference and the Southeastern Egg Producers Forum programs have developed strategic educational alliances with Florida. Approximately .3 scientist EFT and .2 clerical EFT were required.

1862 Research

Plant Pathology

Performance Goal 1-11: Enhance specific genetic traits and germplasm resources through traditional breeding and transgenic research to improve crop resistance to pests and other environmental stresses, to increase plant performance, to provide public and private breeding programs a greater array of germplasm for cultivar development, and to insure increased profitability for Georgia growers.

Key Program Components:

Develop improved peanut germplasm with resistance to disease, insects, and environmental stresses using classical and molecular breeding methodologies.

Enhance soybean germplasm for development of cultivars adapted to southern U.S. growing conditions.

Enhance small grain yield, grain quality, and resistance to diseases, insects, and environmental stresses through traditional breeding integrated with molecular techniques.

Output indicators:

Integrated Output indicators:

1. Canola is an emerging crop that has been shown, through grower experience as well as research, to be an excellent alternative crop to wheat in a doublecropping system. A disease called blackleg has been a limiting factor in canola production in all areas of the world with winter cli mates similar to Georgia. Blackleg caused extensive damage in Georgia canola for the first time in 1994. Scientists at the Griffin Campus initiated a program to develop resistant cultivars of canola that were specifically adapted to Georgia growing conditi ons. By using disease nurseries in Georgia and off-season nurseries in Australia, progeny from the breeding program could be selected for disease resistance and agronomic

characters twice each year. This greatly reduced the time necessary to develop new cultivars. The first blackleg resistant cultivar from this program, ‘‘ Flint,' was released in 1998 and has the highest level of blackleg resistance of any canola cultivar ever released in North America. Several other cultivars with equal or higher levels of resistance will be released soon. Development of these cultivars removes a major factor limiting expansion of canola production in the southeastern U.S.

2. Very few soybean cultivars contain all of the resistance genes needed to fully protect the yield potential and reduce the risk of disease losses to the grower. Maintenance of working pathogen collections and distribution to those who need them is vital to the continued progress of soybean cultivar development. A committee of soybean breeders and pathologists decided to organize a Soybean Pathogen Germplasm Conservation System that would provide long-term maintenance and distribution of all pathogens. The work is in the early stages but the committee is moving forward with a funding proposal to begin some of the work in phase one of the conservation system. This conservation system will assure the future disease and nematode resistant soybean cultivars that growers need.

3. Several crops in Georgia can be contaminated by mycotoxins. Corn may contain aflatoxins and fumonisins, pearl millet may contain aflatoxins and other mycotoxins and peanut may contain aflatoxin. So UGA plant pathologists randomly collected corn samples before harvest from up to 43 counties in south Georgia from 1996 to 1999. After analysis for fumonisins and aflatoxins, they found 86 percent of samples contained fumonisins in 1996, 63 percent in 1997, 91 percent in 1998 and 67 percent in 1999. The 1998 crop year was the worst year for aflatoxin contamination but aflatoxin contamination was seen in all years. Pearl millet (*Pennisetum glaucum*) samples from the 1996,1997 and 1998 crop years were kept in experimental storage conditions to analyze fungal succession and mycotoxin development. Cooperative studies with the U.S. Department of Agriculture on peanuts have resulted in the identification of potentially useful resistance to aflatoxin contamination in some genotypes. The study indicates that crop management approaches may help minimize the impact of mycotoxin contamination in Georgia corn. This is the first study that has demonstrated the co-occurrence of these mycotoxins in corn. The studies on Pearl millet demonstrated that storage systems are important and that Pearl millet is susceptible to mycotoxin contamination under adverse storage conditions. Some peanut genotypes may be useful in developing resistance to aflatoxin contamination of corn and peanut.

Multi-State Outcome indicators:

1. Tomato spotted wilt virus (TSWV), and early (*Cercospora arachidicola*) and late (*Cercosporidium personatum)* leaf spot diseases of peanut are major yield-limiting constraints in peanut. Losses to TSWV increased from 1986 to 1997, when losses to spotted wilt were ca. $40 million in Georgia peanuts alone. Although no single control strategy is adequate, a resistant cultivar is the single most important factor a grower can use to manage spotted wilt. The moderately resistant cultivar Georgia Green, used in combination with various cultural practices, has had tremendous impact on spotted wilt. However, cultivars with greater resistance to TSWV are needed to reduce further the impact of spotted wilt. Over the past five years, leaf spot diseases cost Georgia peanut growers between $45 and 55 million per year in direct losses and costs of control. Currently, leaf spot control is

dependent upon intensive fungicide programs, with 6 to 7 applications required on most cultivars. Deployment of resistance to leaf spot pathogens represents a potentially economical and environmentally sound means of reducing dependence upon fungicides. The combination of resistance to leaf spot diseases and TSWV in a cultivar could be of great benefit to peanut growers in Georgia and the southeastern U.S. Collaborative multi-year, interdisciplinary research between the University of Georgia and the University of Florida on the new peanut cultivar C-99R, developed by Dr. Dan Gorbet at the University of Florida, was conducted to characterize its effect on spotted wilt and early and late leaf spot diseases of peanut. Tests were conducted to determine the response of this cultivar to other cultural and chemical treatments that might complement the disease resistance for use in management spotted wilt. Trials were conducted at Marianna, FL and Tifton, GA to determine the fungicide requirements for leaf spot control for production of this cultivar, in comparison to Georgia Green, the current industry standard. Particular emphasis was placed on reducing applications of fungicides targeted primarily at control of leaf spot diseases in treatment regimes where fungicides targeting control of important soilborne diseases (White mold and Rhizoctonia limb rot) were not eliminated. Collaborative experiments showed that C-99R has greater resistance to Tomato spotted wilt virus than any available cultivar, and that use of this cultivar can help further reduce the losses to spotted wilt in peanut. Subsequently, C-99R is classified in currently the lowest risk category for cultivars in the Tomato Spotted Wilt Risk Assessment Index. Collaborative University of Georgia-University of Florida studies found that C-99R has partial resistance to the fungal pathogens that cause both early leaf spot and late leaf spot diseases. Typically, 6-7 fungicide applications are needed to control these diseases in Georgia Green, the predominant cultivar grown in Georgia, and most other available cultivars. Leaf spot resistance in C-99R is sufficient to allow production of this cultivar with 2-3 fewer fungicide applications per year for leaf spot control than needed for Georgia Green without sacrificing yield. This represents a potential saving of $8 or more per acre in fungicide costs for each fungicide application eliminated. Limited amounts of C-99R seed were available in 2000, but C-99R shows potential to reduce losses to TSWV and costs of control of both leaf spot diseases in peanut production in the southeastern U.S.

2. Wheat contributes more than $6 million annually to the Georgia economy. It is an important rotational crop grown for grain, winter forage and cover, and straw. Powdery mildew, leaf rust, and leaf and glume blotch are diseases that attack the leaves and heads each year. They have the potential to reduce grain yield 50% or more each year. Because of changes in the population of the fungi causing these diseases, an ongoing program is needed to develop new varieties that are resistant. Wheat varieties and breeding lines from the U.S., Europe, and South America are evaluated each year at several field locations to determine their resistance to disease and adaptation to the southeastern U.S. The best lines are selected and retested and the best of these are used as parents to create new disease-resistant varieties. Continuing selection of breeding lines with disease resistance dur ing the past 10 years has resulted in release of ten wheat varieties adapted to the southeastern and southern U.S. Four highly resistant breeding lines have also been released for use by breeders worldwide for use as parents in developing future varieties. Disease-resistant wheat varieties have contributed to a 25% increase in the average statewide wheat yield in Georgia during the past ten years. Disease-resistant varieties also reduce the need for fungicides at a cost of $15 per acre to control leaf diseases.

Performance Goal 1-16: Develop enhanced pest management systems that are efficacious, environmentally compatible, and economically rewarding for Georgia producers.

Statement of Issue:

Pests limit crop growth, reduce crop yields, damage stored products, and destroy aesthetic beauty. Many pests are at sufficient levels to require control actions to suppress or avoid negative impacts.

Key Program Components:

Development of more biologi cally-based pest management technologies to control diseases.
Development of effective cultural management strategies, including crop rotation, multi - cropping, tillage, sanitation, and similar methods, to control diseases.
Evaluation of the utility of saf er chemically-based pesticides for management of diseases.
Development and evaluation of improved application methods for biologically -based and chemically-based pesticides to improve efficacy, minimize residues and off -target effects.
Development of improved monitoring and predictive tools and decision criteria for use in management decisions to control pests while assuring environmental quality and profitability.

Output indicators:

Measures of:
Increased pest resistance in crop plants
Improved control of pest populations
Reduced chemical inputs in control strategies
Increased profitability of plant production systems.

Outcome indicators:

Integrated Outcome indicators:

1. Tomato spotted wilt virus (TSWV) has become the major source disease loss for Georgia tobacco growers. Since 1995 losses have ranged from 0.5 - 18%. In 1999, Experiment Station trials showed a new product to be marketed as Actigard had considerable promise for TSWV management. Actigard was schedule for registration during 2000. In an effort to gain as much data as soon as possible 15 farm trials were set up to evaluate Actigard for TSWV management. Data from all 15 trials showed Actigard would suppress tomato spotted wilt. The best results were achieved when Actigard was sprayed on transplants 5-7 days before planting in concert with an application of Admire 2F either drenched into plant house trays or combined with transplant water. This program resulted in 45 -60% reductions in tomato spotted wilt. Field sprays of Actigard or insecticide applied after transplanting were of little or no benefit. Actigard/Admire combination treatments provide a way to significantly reduce losses from TSWV.

2. Cylindrocladium black rot (CBR) of peanut has gotten progressively worse in Georgia and causes severe losses for some growers. Miller County has been particularly hard hit. Most of their peanut acreage is irrigated with high inputs and high yields which makes the losses even worse. The pathogen can survive for years in the soil and cause problems whenever a susceptible crop like peanut is grown. Trials were designed to evaluate the effects of a preplant fumigation treatment with metam sodium. The test was first conducted in 1999 and peanut yields were increased by 571 lb/A. The treatment cost the grower approximately $50/A and increased his crop value by $189/A. Due to this response, the test was repeated in 2000 and the response was even more dramatic. The yield advantage in treated plots was 886 lb/A which increased crop value by $321/A. Subtracting the cost of the treatment, the grower received an additional net income of $271/A. Based on the favorable trial of 1999, the grower treated nearly 100 acres in 2000. This treatment alone resulted in actual additi onal farm income of $27,100 in 2000.

3. Losses due to bacterial streak and bulb rot of onion, caused by *Pseudomonas viridiflava*, can be reduced with the use of an integrated pest management strategy. Developed from our research, our recommendations include: a.) use crop rotation [a minimum of two years between onion crops], b.) plant the most resistant cultivars available, c.) proper amount and timing of nitrogen through fertility management, d.) well-timed application of copper sprays [for copper-tolerant strains, the copper compound should be mixed with an EBDC fungicide], e.) weed control with postemergence herbicides to lower levels of initial inoculum as weeds harbor the bacterium, f.) control insects, particularly thrips, to minimize wounds that se rve as infection sites, and g.) allow a minimum of 48 hours of curing onions in the field prior to clipping leaves and roots to prevent mechanical inoculation before storing or shipping onions to market. We also developed a PCR (polymerase chain reaction) protcol that amplifies the ITS region (intertransgenic segment of DNA between the 16S and 23S rRNA genes) of *Pantoea ananatis*, causal agent of center rot of onion. This is a new disease of onion that we first described in 1997. We have demonstrated that the pathogen is both endemic to Georgia and can be seedborne. To date, we have detected the bacterium on over 22 weed species including some that occur quite commonly (Carolina geranium, carpetweed, crabgrass, common cocklebur, common ragweed, cudweed, cur ly dock, Florida beggarweed, Florida pusley, sicklepod, spiny Amaranth, tall Verbena, Texas Panicum, Vasey grass, wild radish, and yellow nutsedge). The bacterium also was detected on the following crop plants: Bermuda grass, soybean, and peach (two of whi ch are used in rotation with onion). Furthermore, we have detected the bacterium on weeds up to 150 miles from the Vidalia onion-growing region. The technique has had an impact by providing a faster and more accurate diagnostic service for our growers and county agents, and by bringing recognition to our lab as the leading center for diagnosing and verifying the identity of the bacterium, *P. ananatis*. Second, the reduction of initial inoculum is a basic control principle, but in order to develop an eradi cation tactic, one has to be aware of where the pathogen resides. Hence, the discovery of the bacterium surviving on weeds and in seed by the PCR technique gives us a starting point to evaluate control tactics.

4. Vegetable growers and other producers working with crops grown on relatively few acres (minor use crops) are at a disadvantage when it comes to pesticide registrations. This is due to the fact that most companies that produce agricultural chemicals target large acreage crops, such as cotton, c orn and soybeans, as the primary markets for their compounds. High value crops produced on low acreage

(fruits and vegetables) generally are treated as secondary markets for agricultural chemicals. Also, fruit and vegetable crops have greater food safety concerns and are under higher scrutiny concerning pesticide residues. Diseases of vegetables were responsible for nearly $54,990,000 lost due to direct disease losses and cost of control. This is about 10% of the total farmgate value of vegetables in the state of Georgia for 1999. Much of this loss is due to the inadequacy of fungicides currently labeled for use on vegetables to control major pathogens. Quadris (azoxystrobin), a new broadspectrum strobilurin fungicide, and the sterol inhibitor Nova (my clobutanil) are two fungicides that are used on agronomic crops and tree fruit crops that have great potential for reducing losses to diseases if used on vegetables. In 1999 and 2000, Section 18 Emergency Exemption labels were granted for the use of Quadris for control of leaf spot diseases of turnip tops, mustard, kale and collards. Also in 2000, Quadris received a full federal Section 3 label for several vegetable crop groupings which covers onions, carrots, sweet corn, leafy vegetables (lettuce, spinach, etc.), vegetable root and tuber crops and leaves of root and tuber crops (carrots, radish, turnip tops and roots, sweet potatoes, etc.). Nova also received a label for cucurbits and snap beans in 2000. The IR-4 (Interregional Research Project No. 4) program provided information and aided in submission of the Section 18 and the labeling of these compounds. IR-4 specifically provided much of the information required for the spinach label and was instrumental in obtaining a 30 day plant-back restriction on Nova that would allow for many crops to be planted within 30 days of those crops to which Nova was used. The University of Georgia IR-4 committee works with IR-4 to prioritize these fungicide projects and to identify specific state needs. University field trials are conducted to determine the efficacy and use patterns for specific fungicides through IR-4 grants. Using yield and price data from the most recent budget for leafy greens, the total economic loss to these diseases would be near $31,500,000 (20,000 acres × 350 cartons/acre × $4.50/carton) if weather conditions and inoculum pressure were uniformly favorable for disease across the state. The use of Quadris has greatly reduced these losses by about 50 - 75%. Nova has also filled a void for powdery mildew control on cucurbits. Nova is less expensive than other fungicides of similar efficacy and gives cucurbit growers another choice of fungicide mode of action to preserve the activity of all labeled powdery mildew fungicides. Nova will also be instrumental in curtailing losses caused by the recent epidemics of powdery mildew on watermelons, a disease that has potential to cause millions of dollars in loss to Georgia's largest vegetable crop.

Performance Goal 1-17: Develop improved machines, processes, diagnostic devices, and decision support tools to enhance production, economic value, and profitability of Georgia's agricultural products.

Statement of Issue:

Agricultural and environmental enterprises are increasingly dependent on sensors, monitors and control devices to increase profitability and effectiveness. Intelligent monitoring and control systems determine product quality, sense plant health and other inputs. Continued advances in sensing, monitoring, and control systems will yield increased profitability, more effective processing systems, and improved sustainability of natural resources.

Key Program Components:

Development of monitoring systems for production, processing, storage systems, and decision

support systems.

Output indicators:

Measures of:

Improved sensing, monitoring, and control devices.

Integrated Outcome indicators:

1. The recent documentation of health benefits of blueberries, particularly their high levels of beneficial antioxidants, has fueled consumers' interest in this economically important small fruit. Depending on the year, Georgia ranks from third to sixth nationwide in total utilized production of blueberries. Statewide production covers more than 4,400 harvested acres valued at $10.1 million in 1999. Most of the blueberry acreage in the state is planted to rabbiteye cultivars, the fruit of which are harvested mechanically and freeze-dried for use in packaged snack foods and cooking products such as blueberry raisins. Mummy berry disease, caused by the fungus *Monilinia vaccinii-corymbosi*, is a near zero-tolerance fruit pathogen in blueberries intended for processing. Infected fruit harden during the freeze-drying process, thus products made with frozen Georgia blueberries are not marketable if infected by the pathogen. Economic losses associated with fruit loads exceeding the mummy berry threshold can be significant, thus a reliable method needed to be developed to detect the disease and quantify its incidence in the packinghouse. Faculty in the Department of Plant Pathology first evaluated two detection methods for mummy berries in the laboratory and in the packinghouse. The first method, which had been used previously by graders in Georgia, involved destructive processing of the samples in a blender; the resulting blueberry puree was passed through a series of screens and the number of 'hard objects' (infected fruit) determined and counted. The second method consisted of visual symptom assessment in a fruit sample with a newly developed pictorial key. In a second step, a sequential sampling plan was developed based on a large number of fruit loads assessed in commercial packinghouses to calculate the minimum number of fruit samples needed to determine the incidence of infected fruit with defined statistical properties. The visual detection method for infected fruit was considerably more accurate and more precise than the previously used blender method. It is therefore recommended that the visual assessment method be used to determine incidence of mummy berry disease in the packinghouse. Statistical analysis and sampling plan development showed that most fruit loads could be classified reliably as being below or above the mummy berry threshold with <10 samples per load; in rare cases, for loads with a disease incidence very close to the allowable threshold, up to 50 samples may be needed to classify the load accurately. Because of the economic importance of mummy berry disease to growers, packinghouse operators, commodity buyers, and processors alike, a statistically reliable procedure to quantify disease incidence under commercial conditions is critical. The improved disease detection protocol and the sequential sampling strategy derived in this study address this need. The resulting assessment strategy is inexpensive and feasible logistically while at the same time satisfying strict statistical standards.

Multi-State Outcome indicators:

1. Many of Georgia's agricultural commodities are propagated through seed, which, in many cases are

produced outside the state. Unfortunately, seed can support the prolonged survival of phytopathogens and serve as dissemination vectors and primary inoculum sources for disease epidemics. In addition, infection by certain plant pathogens can lead to reduced seed quality, and poor crop establishment. Several of Georgia's major crops are threatened by potentially devastating plant pathogens for which seed are important inoculum sources. These include bacterial fruit blotch (BFB) of cucurbits (*A. avenae* subsp. *citrulli* (*Aac*)), Cylindrocladium black rot (CBR) of peanut (*Cylindrocladium parasiticum*), and neck rot of onion (*Botrytis allii*). Management of these diseases is of major concern to Georgia's growers. Because seed may play important roles in pathogen survival and disease initiation, disease management may be significantly improved through the treatment or exclusion of infested seedlots. Hence, great benefits could be gained by managing the seed aspect of plant diseases. Several main objectives have been established to address the issues of seedborne pathogens and their impact on Georgia's agriculture. Efforts will be directed at 1) determining the roles of the above-mentioned seedborne pathogens on their respective systems 2) developing efficient and reliable procedures for detecting and excluding infested seedlots 3) investigating chemical and non-chemical seed treatments and 4) elucidating the processes of seed infection, seed transmission and pathogen survival on seed. Seed health testing has proven to be the most significant method to manage BFB and has saved the watermelon industry millions of dollars in potential losses. Despite these savings, there is still a great need to improve seed testing efficiency. These improvements can be achieved with the aid of the polymerase chain reaction (PCR) which is more sensitive and specific than other assays. One problem with PCR however, is that it is inhibited by compounds found in many seeds, and elaborate DNA preparation steps are required to circumvent inhibition. This makes the assay unfit for routine application. Our work has shown that immunomagnetic separation and PCR (IMS-PCR) improves both the sensitivity and the ease of application of the PCR assay making it more applicable to routine seed testing. IMS-PCR appears to be the key to unlocking the potential of PCR for detecting low populations of bacteria in seedlots. Several seed testing agencies are interested in this technique to improve the efficiency and accuracy of their assays for BFB as well as other important seed borne bacteria. While *Aac* has been observed in Georgia since 1969, the disease was not a problem until 1992. Our studies of the genetic diversity of *Aac* using DNA fingerprinting demonstrated that strains causing BFB on watermelon today vary significantly from the original isolate and were probably introduced with hybrid seedlots produced in Asia. We have also reported the first natural occurrence of BFB on commercially grown cantaloupes in Georgia, and this has alerted cantaloupe seed producers to start testing their seed sources to reduce the risks of seed transmission. Incidentally, we have found that the strains of the bacterium that causes disease in cantaloupe can be distinguished from the strains that affect watermelon. Despite this, all strains observed so far can cause disease on cantaloupe, watermelon, squash and pumpkin seedlings and should be excluded. We suspect that all cucurbits may be at risk from this disease. This information is vital for the management of BFB in seed, transplant and fruit production and has been incorporated into a set of management guidelines to assist cucurbit seed, transplant and fruit producers nationally. We have also embarked on surveys of commercially available peanut and onion seedlots to determine the prevalence and potential threats of Cylindrocladium black rot and neck rot of onion in Georgia. Finally, using a molecular approach we have demonstrated that onion seed can be infected by *Pantoea ananatis*, a new bacterial pathogen which has recently emerged as a significant threat to onion production.

Performance Goal 1-18: Enhance the efficiency, profitability and competitiveness of agricultural enterprises by reducing risks, selecting profitable investments and enterprises, adopting improved or alternative production and management techniques, selecting appropriate marketing strategies, and identifying economic development opportunities for rural communities.

Statement of Issue:

Agriculture is Georgia's largest industry, but it currently faces many economic, social and policy concerns including low farm income, production adversities from drought and pests, and depressed foreign export markets. In order to be competitive, Georgia producers and processors must improve business efficiency, employ effective risk management strate gies, and select appropriate marketing strategies.

Key Program Components:

Determine barriers to adoption of improved or alternative agricultural technologies that will increase efficiency and profitability.

Output indicators:

Measures of increased effectiveness in assessing benefits and risks associated with agribusiness investment, management and marketing

Assessments of impacts of technology and management systems on profitability and environmental quality.

Outcome indicators:

Integrated Outcome indicators

1. Approximately 30% of the peanut acreage in Georgia is infested with peanut root-knot nematode and about 30% of the cotton acreage is infested with southern root-knot nematode. This results in an estimated $14,500,000 reduction in peanut crop value every year, even though $8,000,000 worth of nematicides are applied to Georgia peanuts and a reduction of $12,000,000-$25,000,000 in cotton value even though $10,000,000 is spent on nematicides. A cooperative University o f Georgia and USDA project determined that all corn hybrids grown in Georgia were poor hosts for the peanut root-knot nematode, but some hybrids allowed significantly less nematode reproduction than others. All hybrids screened were excellent hosts for th e southern root-knot nematode. Based on information from this project, we can confidently recommend that peanut be planted following corn to minimize root -knot nematode damage in peanut. The incidence and severity of soilborne diseases in peanut also wil l be significantly reduced by rotation with corn. This project has significantly improved the non -chemical

nematode management recommendations for peanut in the Southeast. If only 25% of affected peanut acreage were rotated to corn (especially the most resistant hybrids) thereby reducing damage in a subsequent peanut crop by 50% (a conservative estimate), the potential economic impact is to reduce losses due to nematode damage by up to $2,000,000 annually and to reduce the need for nematicide applications in peanut. Additionally, we now know that corn will likely increase southern root-knot nematode damage in a subsequent cotton crop. Root-knot juveniles found in samples from corn are almost always southern root-knot, and this knowledge can help growers predict and then minimize southern root-knot damage in cotton.

2. According to Georgia Cooperative Extension Service estimates, plant-parasitic nematodes account for 23% of all disease losses on cotton, and account for 30% of the cost of pesticides used for disease control. A survey in Georgia showed that 31% of the cotton fields were infested with root-knot nematodes, and an additional 14% had reniform nematodes. Several species of nematodes are responsible for losses on cotton, including the Southern root-knot nematode, the reniform nematode, and the Columbia lance nematode. Our research on cotton in Georgia has indicated that cotton yield losses due to nematodes may be as high as 60-70% in fields infested with root-knot or reniform, whereas losses are typically 10-30% from Columbia lance nematodes. Total crop failures are possible with extreme pest pressures. Populations of all three of these parasitic nematodes may increase 200-300% per year under cotton. There is a critical need to develop alternative management practices. Promising sustainable practices for nematode control in cotton include applications of soil amendments, such as chicken manures and litters. Recent field and greenhouse studies in our cotton research program have demonstrated that treatment of soil with poultry manures may reduce nematode numbers, and limit subsequent crop losses. The suppression of nematodes obtained by treatment with poultry manures may be increased significantly by inoculation the litter or manures with specific fungi that act as biocontrol agents for plant-parasitic nematodes. Georgia is a leading poultry-producing state, and the industry is expanding rapidly in the southern parts of the state. Removal and disposal of chicken-house waste is a long-term, and increasing problem for poultry producers. The use of this waste as an organic amendment on nematode-infested fields has considerable benefit both to poultry and cotton producers. We have isolated and identified a number of promising biocontrol fungi that will colonize poultry waste efficiently, and these fungi need to be tested for specific activity in a cotton-nematode management system. Several crop rotations have been recommended for nematode control, but selection of the most appropriate rotations for a given nematode/crop combination can be a difficult and time-consuming task. Selection of winter crops could also impact nematode population levels on the subsequent cotton crop. For example, some cultivars of wheat may serve as a host for root-knot and reniform nematodes, but rye is not a host for either species. Effective use of cultural and biological management practices can reduce much of the economic damage due to nematodes incurred year after year in Georgia. When combined with limited use of nematicides and future releases of nematode-resistant cultivars, cultural practices will add long-term sustainability to these otherwise short-lived control tactics, resulting in better cropping systems for cotton. Our long-term research plots serves as a framework for determining the most successful management tactics to control nematode on cotton in Georgia.

1890 Research

Performance Goal 1-19
Key Theme – Global Agricultural Competitiveness
Outputs:
A national telephone survey is in progress to assess consumer perceptions of consequences of globalized agriculture on natural resource systems and the restructuring of rural areas. One of the major goals will be consumer perception and knowledge of nutritionally improved foods and their assessment of the value of food labeling.

Impact
This study will lead to the identification of attributes of food products that are important to consumers within niche markets. Results will assist farmers and the marketing system by supplying profitably the desired products.

Performance Goal 1-20
Key Theme – Nontraditional Enterprises for Georgia's Economic Enhancement

Outputs:
Meat goat enterprises and the number of meat goats in the South and Georgia have experienced substantial growth. This growth resulted from changes in the composition of the population and the desire of farmers to find profitable alternative enterprises. The demand for goat meat is met largely through nontraditional marketing channels. Little is k nown about the demand for specific goat meat products or the specific production and management problems experienced by producers. Consumer and producer surveys show that race, gender, educational attainment, age, and the information on availability and preparation methods influence the consumption of goat meat. A telephone survey of the Hispanic niche market is planned to assist with the identification and measurement of product attributes influencing demand. A mail survey of producers from the Southern region will assist with the identification and assessment of impediments to enhanced production.

Impact
The producer survey has resulted in increased communication between producers and representatives of the livestock marketing channels. These i nteractions have the potential to further increase efficiency in the industry.

Performance Goal 1-21
Key Theme – Animal Nutrition– Nutrition and Forage Utilization

Outputs:
Nutritional imbalances are a result of periodic variation in nutrient supply and increase in physiological

requirements (growth, pregnancy or lactation). Changes in glucose, blood urea nitrogen and non-esterified fatty acids are good indicators of the state of energy and protein balance. These changes usually result from systemic hormones (glucocorticoids, thyroid and pancreatic hormones etc), however, these are not well characterized in goats. The objective of this study was to assess changes in blood metabolites and hormones due to feeding levels as animals go from non-pregnant through different stages of pregnancy.

Impact

Results from this study indicate that low feed intake and changes in physiological status affected cortisol levels. Feeding twice the maintenance level increased blood urea nitrogen and non-esterified fatty acid. Pregnant goats had increased use of non-esterified fatty acids and blood urea nitrogen in all treatments. The demand for energy and protein is critical during late pregnancy. These results were presented at an international conference of the American Society of Animal Science in Baltimore in July 2000. This meeting is attended by various clientele consisting of scientists, farmers, students and general public.

Performance Goal 1-22

Key Theme – Physiology and Cell Biology – Endocrinology

Outputs: The key to improving productivity in small ruminants is by increasing the number and total weight of their offspring per year. This could be achieved by breeding does/ewes out-of-season within 60 days postpartum to ensure a twice-yearly kidding program. However, these animals are seasonal and they breed and produce offspring once a year. To enhance productivity of small ruminants, it is important to understand the neuroendocrine basis of their reproduction. Preliminary studies to explain the inactive breeding seasons in these animals have suggested that neurotransmitters within the brain seem to be involved.

Impact

Hormonal control by the brain mediated through photoperiod exposure influences breeding activities. On-going studies will lead to the development of efficient and feasible methods to be used to control breeding and thus improve productivity and reproductive efficiency of small ruminants. Research findings have been disseminated through regional, national and international professional meetings/conferences and through their publications. Also, dissemination has occurred through our widely distributed newsletters and local and state workshops.

Performance Goal 1-23

Key Theme – Physiology and Cell Biology – Gamete and Cell Physiology

Outputs:

The recent advances made in procedures for *in vitro* fertilization, gene mapping, and transformation have made it possible to transfer economic traits into the livestock genome. As such, gene transfer serves as a potentially useful supplementary approach to classical breeding methods for animal improvement. This will have tremendous implications on goat products like cashmere, mohair, morocco

skins, lean meat and less allergy causing dairy products. It can also be useful for importing and preserving useful germplasm.

Impact

Currently, experiments are under way for the establishment of somatic cell lines. These cell lines will be used to introduce genes of specific interest into the genome of goats to increase the quantity and quality of value-added products. This technology will help develop methods to secure and preserve germplasm, and propagate important economic traits. It will also increase farmers' income through better marketability of their agricultural products, improve the overall production management systems by developing value-added products through year-round breeding programs.

Performance Goal 1-24

Key Theme – Physiology and Cell Biology – Reproductive Biology

Outputs:

Seasonal breeding, the major reproductive constraint in goat industry, is associated with photoperiodism. This reduces sperm production and fertility in males. There is inadequate information on goat reproduction at cellular level. Ongoing research is aimed at refining technology and scientific procedures to preserve genetic material of both sexes to implement year-round breeding system utilizing preserved semen and oocytes.

Impact

Research findings indicate that the use of hormones, photoperiodic manipulation, and other environmental cues will enable the male to be fertile during non-breeding season. This will lead to improved reproductive performance and efficiency – a year-round breeding system and an increased kid crop production.

Performance Goal 1-25

Key Theme – Production Systems – Small Ruminant Herd Health Management

Outputs:

Over the last twenty years, the goat industry experienced unprecedented growth in the United States. This growth was initially confined to the dairy goat sector but there has been a recent surge of interests in the meat goat industry in the Southeast. This has increased the need for scientific information and recommendations for herd health management, vaccinations and disease prevention, parasite control, disease surveillance and investigations. Research and extension specialists have developed herd health management programs for goats. The program consists of herd vaccinations and disease prevention protocols, as well as parasite control measures.

Impact

Disease surveillance data are updated and several disease outbreaks are investigated for treatment, prevention and control measures. Programs aimed at producers were presented through Georgia

Extension Service; presentation at local, state, and regional field days; expositions and fairs; publication of extension publications and newsletter; presentations aimed at veterinarians at state, national and international professional meetings/conferences; and number of other locations and direct producer inquiries. More than 4600 people attended these meetings. The Herd Health Management recommendations have been adopted by several producers resulting in reduction in herd production losses.

Performance Goal 1-26
Key Theme – Production Systems– Small Ruminant Production Systems for Goat

Outputs:
Production efficiency and genetic merit are two key themes that determine level of productivity. Improvements in these factors will make small ruminant production systems more highly competitive on a global basis. Georgia is in the top five state in the nation in goat numbers. Selection of bucks is critical since they will influence the growth and feed utilization of half the herd. Until recently there was no central location where bucks could be evaluated for their breeding potential. The test station program provides an opportunity to evaluate animals breeding potential.

Impact
Evaluation process was effective in identifying individual differences and providing stock material for selection. Producers who use bucks or their offspring from this program are likely to be more competitive in marketing animals rapidly and economically. By monitoring reproductive soundness, it is possible to reduce the incidence of infertility in the herd. The producers are educated on the concepts of genetic improvement and efficient production systems.

Performance Goal 1-27
Key Theme – Production Systems– Small Ruminant Production Systems for Sheep

Outputs:
Production efficiency and genetic merit are two key themes that determine level of productivity. Improvements in these factors will make animal produc tion system competitive in global market. Rural producers continue to seek profitable enterprises to diversify household income. There is an increasing demand for lamb among ethnic and other groups. Sheep in mixed grazing situations compliment other livestock enterprises and can make use of many crop residues and grain by-products. Furthermore, the climatic conditions and year-round growing season favor production of lamb in Georgia and the Southeast.

Impact
Special relationships have been established with several cooperator flocks about the state. The preliminary findings from initial lamb crop indicate that hair sheep breeds can adapt to the warm and humid Southeast similar to traditional breeds. These results will help e stablish the economic impact of using various breeds. The forage systems being used will determine the impact on reproductive

efficiency which is much related to profitability. Involvement of cooperator flocks will verify the results demonstrated on campus.

Performance Goal 1-28
Key Theme – Products Technology– Meat Technology

Outputs:
Studies were conducted to determine the influence of refrigerated display time on shelf stability of fresh chevon. Further studies were conducted to determine the effects of postmortem aging time and conditions on tenderization and changes in intramuscular connective tissue (IMCT) strength of chevon. The results suggested that IMCT may be a major factor interfering with postmortem tenderization of chevon. Preslaughter factors that could affect muscle metabolism and meat quality in goats have also been examined. Short-term transportation stress significantly influenced the stress responses and reduced muscle glycogen levels, with potential implications for meat quality in goats. Preliminary data on the activity of calpain proteolytic system in goat muscle have also been collected. These data will help determine appropriate pre- and post-mortem methodologies in producing superior quality chevon.

Impact
Characterization of postmortem behavior of goat muscle will identify appropriate pre - and post-mortem handling practices that would improve palatability of fresh and processed goat meat. This will improve public perception and developing market in the US.

Performance Goal 1-29
Key Theme – Agronomy-Agro-Forestry– Sustainable Production of Crops and **Trees**

Outputs:
The objectives are to determine the effects of three tillage systems, four types of cover crops, and three levels of nitrogen fertilizer treatments on soil carbon -nitrogen status and cotton yield and finally to develop best management practice for the cotton production system that sustains yield without seriously degrading soil and water quality.

Impact
Preliminary results show that no-till with rye cover crop and 53 lb nitrogen/acre can produce sustainable cotton yield and reduce potentials for soil erosion and nitrogen leaching similar to strip -till or chisel plowing with hairy vetch cover crop and 106 lb N/acre.

Performance Goal 1-30
Key Theme – Agronomy– Field Crops – Soybean

Outputs:

Soy foods as a source of vegetable protein in human diet are currently gaining popularity around the world and also fetch premium price in the international market. To sustain the demand for soy foods and remain competitive in a changing domestic and glob al markets, farmers must take advantage of new opportunities through adoption of new technologies, specialty food crops, and the emerging niche markets. Several food-grade soybean genotypes including cultivars from Japan, and Korea were evaluated for devel opment, seed yield and yield components. The soybean seed will be analyzed for nutritional quality parameters such as total protein, protein quality, oil, lipid profile, and phytate.

Impact

The high-yielding food-grade soybean genotypes adapted to Georgia conditions identified in this study will be available for commercial production on small family farms. Thus, these farmers can supply food - grade soybean for tofu production to the tofu manufacturing plant proposed for middle Georgia. This is likely to promote local soy food industry and improve small farm economy. Several farmers and general public have been made aware of food-grade soybean through poster presentations at Ag Showcase, Sunbelt Ag-Expo, brochures, and professional society meetings. Sever al organic growers interested in growing organic soybean have been identified.

Key Theme – Agronomy– Field Crops – Soybean

Outputs:

Soybean is currently gaining popularity around the globe as a source of vegetable protein in human diet. Organic food-grade soybean and vegetable soybean fetch premium prices in domestic and international markets. Therefore, organic production of soybean suitable for soyfoods for direct sale for export or urban markets to health conscious Americans willing to pay premium prices is another opportunity for the small family farmer. Several vegetable soybean genotypes with potential for high yields and adaptation to Georgia conditions were grown on a certified organic farm, Glover organic Farms, Douglasville, GA. The harvested fresh green pods were sold by the bunch at the Morningside Market in Atlanta and were also demonstrated as a nutritious salad mix through well known upscale restaurant Chefs.

Impact

Several organic small family farmers visited the farm and became aware of this high value cash crop that could benefit them through sale in niche markets. Health conscious American consumers were introduced to vegetable soybeans as a nutritious vegetable that can be cooked like peas and beans and roasted like peanuts. The vegetable soybean crop at the organic farm was one of the farm exhibits at the annual farm tours and several farmers were apprised of organic production of vegetable soybean. This has laid a strong basis for introducing vegetable soybean as a new vegetab le crop in Georgia, particularly under organic production system to enable small farmers to benefit from limited but high value niche markets. The demand is growing for vegetable soybean, especially among Asian immigrants in metropolitan areas.

Performance Goal 1-31
Key Theme – Bioactive/Medicinal Plants – Cultivation and Postharvest Handling

Outputs:
Attitudes over the last two decades toward herbal medicine here and to a greater extent in Europe have dramatically changed. This explosive demand for plant base medicines have developed strong markets for well known medicinal crops, with new species being regularly added to the list. Knowledge of specialized cultural and postharvest handling techniques to optimize and preserve medicinal crop bioactive qualities is necessary to develop a niche market for small acreage farmers.

Impact
Contacts with farmers and other interested clientele have been established. Valuable information on medicinal plants has been collected and shared at Ag-Showcase and Ag-Expo. An infrastructure for medicinal plants research is being developed.

Performance Goal 1-32
Key Theme – Bioactive/Medicinal Plants – Microculture and Genetic Improvement

Outputs:
Plant medicines play a major role in the primary health care of 80% population of the world. In America there is not much effort devoted to plants as source of drugs. Thus, we need to conduct research on native wild plants and introduce exotic germplasm. The activities in the medicinal plant area planned, will provide an innovative niche market for small farmers. We developed a medicinal plants proposal for 401 IFAFS program in collaboration with three 1890 HBCU.

Impact
Basic information was collected on medicinal plants through participation in an international Training Program on Medicinal and Aromatic plants during 2000. A consortium consisting of nine national and three overseas universities has been formed with the aim of developing a comprehensive project proposal on medicinal plants for submitting to the 401 IFAFS grants program 2001. Through leadership role in this consortium, we have developed collaborative linkages with over 55 university professionals and 15 family farmers which will assist in fulfilling tasks and activities of this consortium.

Performance Goal 1-33
Key Theme – Bioactive/Medicinal Plants Research

Outputs:
American farming is rapidly turning into a capital intensive and technology based, corporate style farming system. Accordingly, many small family farmers find themselves in a situation today where one or more of the household must seek employment off the farm in order to survive. This change is causing great harm to the very fabric of agriculture and agricultural profession related service providers in rural communities. Recent studies indicate alternative crops, such as medicinals, are feasible but require information not readily available. The 1994 approval of medicinal herb extracts as dietary supplem ents by the FDA has resulted in a rapid growth of medicinal herb industry. Lack of production technology and adapted cultivars are major factors limiting production of medicinal herbs.

Impact
Contacts with farmers and other interested clientele have been established. Valuable information on medicinal plants has been collected and shared at Ag-Showcase and Ag-Expo. An infrastructure for medicinal plants research is being developed.

Performance Goal 1-34
Key Theme – Horticulture– Fruit Crops – Exotic Fruits Adaptation and Feasibility

Outputs:
The increased interest in exotic fruits in the USA has resulted from growing ethnic population, advancing consumer curiousness, and changing food habits. These commodities are nutritionally rich and benef it human health. Consequently, domestic production to meet increasing demands necessitates technology development for growing exotic fruits locally in the warmer Southeast. Since they come from warm climates, innovative production technology, efficient pla nt regeneration, and crop improvement for cold tolerance must be addressed.

Work on guava biotechnology was combined with a new research project ($270,000) funded in 2000 by the USDA to employ *in vitro* culture and genetic transformation to enhance cold hardiness. A Post-Doctoral Research Associate has been employed and 2 graduate students for MS program will recruited. All available guava germplasm has been established and maintained in the greenhouse. Trials were conducted to devise efficient *in vitro* plant regeneration protocols for genetic transformation. Lethal doses of four antibiotics on nodal and internodal explants of guava were identified. MS and WPM basal media were superior to others for explant health and shoot vigor. WPM supplemented with 500 mg L^{-1} casein hydrolysate improved explant growth better than other levels. In another test, greenhouse plants were infected with *Agrobacterium tumefciens* strain EHA 101 to investigate if *in vivo* transformation could be comparable to *in vitro* transformation. For somatic embryogenesis 2,4-D

at 2 mg L^{-1} was identified as the best auxin concentration for guava callus proliferation. These experiments provide hands-on experience to students through work studies.

Impact

Research on developing *in vitro* protocols for exotic fruits especially guava plant regeneration progressed well. Efforts steered to develop a proposal on guava biotechnology were successful as it was funded ($270,000) by the USDA to facilitate further research. Results were disseminated through presentations at scientific conferences and internet response to incoming inquiries. Provided hands -on experience and trained students, the future professionals.

Performance Goal 1-35

Key Theme – Horticulture– Fruit Crops – Papaya Biotechnology for Cold Hardiness

Outputs:

The niche market for exotics necessitates a genuine demand for the supply of exotic fruits including papaya. Domestic production to meet increasing demands call for technology development to papaya and other exotic fruits locally. Papaya, despite its popularity and ease of cultivation in warmer climates, cannot be grown in areas with frost. Also, dioecy has been a problem in papaya. Biotechnology becoming a force in agricultural improvement. Engaging plant biotechnology via tissue culture to multiply desirable female plants and developing frost hardy papaya genotypes can solve above problems. Our research is aimed to develop cold hardy lines of papaya for growing in Georgia without frost protection. Our current research emphasized on cold hardiness testing, micropropagation, genetic transformation, and germplasm preservation activities. A Post-Doctoral Research Associate was employed to execute the intended research and a graduate student for Ph.D. program was placed at the University of Florida, Gainesville, through a papaya biotechnology project funded ($269,986) in 1998 by the USDA. In order to initiate studies to develop cold hardy papaya new seedling plants were generated for biotechnology uses. Leaf and petiole explants were used to initiate *in vitro* culture on half strength MS medium supplemented with 1mg L^{-1} 2,4-D and 0.1mg L^{-1} kinetin.

Impact

Experiments are in progress to produce papaya germplasm in culture needed for genetic transformation. Three cold hardy genes (CBF1, 2, 3), and *E. coli* and *Agrobacterium* strains were obtained along with necessary chemicals and instruments. Student training was emphasized and they were provided hands-on research experience in plant biotechnology procedures. A research poster was presented at an international conference. We have further strengthened our collaborations with FVSU research and extension experts, and 1862 LGU.

Performance Goal 1-36

Key Theme – Horticulture– Fruit Crops – Peach Regeneration and Improvement

Outputs:

Peach is a leading cash crops in Central Georgia but it faces a problem called peach tree short life (PTSL) syndrome, which kills trees prematurely. Such unprofitable peach orchards need frequent replanting that unnecessarily burdens growers. Conventional peach improvement methods are limited by the narrow peach germplasm. Plant biotechnology is lending help for an efficient improvem ent of perennial plants like peach. Groundwork has been laid for using plant molecular approaches to improve tree longevity; however, peach transformation has been limited. Successful genetic transformation of peach will rely on plant regeneration from mat ure tissues using microculture of shoot tips and cotyledons, and somatic embryogenesis from nucellar and other vegetative tissues. Our ultimate goal is to develop peach cultivars having beneficial traits to resist PTSL stress to improve tree survival and orchard longevity.

Impact

Plant biotechnology protocols for peach *in vitro* preservation, regeneration through organogenesis and somatic embryogenesis and genetic transformation were initiated. Apprenticeship students were provided hands-on research experience in peach biotechnology procedures. Collaborations were established with Fort Valley State University agricultural research and extension experts, as well as other 1862 LGUs, and the USDA-ARS Research Laboratories at Byron, GA and Beltsville, MD.

Performance Goal 1-37

Key Theme – Horticulture - Ornamentals – Micropropagation of Ornamental Species

Outputs:

Studies are in progress to investigate the use of micropropagation techniques to produce *Amaryllis* species and daylilies (*Hemerocallis*). These two popular perennial species are slow to multiply using conventional means. The time between developing and marketing a new cultivar is too long. This research proposes to employ micropropagation to rapidly produce tetraploid Amaryllis and Dayl ilies to speed up commercial release of new cultivars. Trials are in progress to determine optimum microculture conditions.

Impact

Information from these studies will be disseminated to growers and producers of Amaryllis and Daylilies species on local, national, and international levels. It is anticipated that growers and producers will benefit greatly through the rapid availability of new cultivars which will result in increased profitability.

Performance Goal 1-38

Key Theme – Horticulture– Vegetables- Asparagus

Outputs:

The response of plant growth regulators such as promalin in stimulating asparagus (*Asparagus officinalis*) shoot emergence is being investigated. Asparagus plants were drenched with three different concentrations of promalin (0, 250, and 500 ppm) using variety Mary Washington. Plants (ferns) were

counted and recorded to obtain the initial number of ferns before and after drenching. The response to the chemical was measured in two ways: weekly stimulation of emergence of new-shoots and percent increase in final number of shoots over the initial number.

Impact

There was no differences found for the plants in terms of cumulative number of ferns on weeks 1, 2, and 3. The use of promalin as a plant growth regulator shows promise in increasing the number of ferns for asparagus plants. This finding is significant in the sense that the increased fern number followed by increased spear production in a short period of time will benefit growers in using mechanical harvesting. The mechanical harvester already available for asparagus are presently not cost effective because of the long inconsistent harvest periods.

Performance Goal 1-39

Key Theme – Horticulture– Vegetables - Asian Vegetables Adaptation and Production

Outputs:

An increasing ethnic population and curious consumers seek nutritionally high value exotic vegetables. Most of these vegetables are imported into Georgia from other states or countries. Since markets for exotic vegetables exist, there is an opportunity to strengthen Georgia's agricultural industry and improve farmer income by introducing, adapting and establishing environmentally safe practices for production of these vegetables. Asian vegetables such as parwal, karela, torayi and loki are high value vegetables sold at targeted markets in Georgia.

Impact

The exotic vegetables are evaluated for adaptability, propagation methods, leaf gas exchange and seed increase. After several years of testing, these vegetables are ready for commercial production. Several growers have shown interest in producing these vegetables. Information from this program has been disseminated at Ag-Showcase and Ag-Expo, and professional meetings.

Key Theme – Horticulture– Vegetables – Asian Vegetables Adaptation and Production

Outputs:

New crop establishment using environmentally safe practices that produced high quality nourishing commodities is an avenue to improve Georgia's agricultural industry and satisfy consumers. Production of new and nourishing commodities through avenues that Georgia farmers can accept will lead to better income and increased competitiveness in regional, national and global markets. Asian vegetables such as parwal, karela, torayi, and loki are in high demand in specialty produce metropolitan markets in Atlanta. Some of these commodities like karela are in high demand due to perceived medicinal value. These speciality vegetables are also good source of carbohydrates, vitamins A and C and minerals. These tropical vegetables are being evaluated for adaptability, propagation, leaf gas exchange and seed production.

Impact
After several years of testing, these vegetables are ready for commercial production. Parwal, a tropical perennial crop, survives Georgia's mild temperate climate through rejuvenation in spring from fleshy roots. Several growers have shown interest in producing these vegetables. Information from this program has been disseminated at Ag-Showcase and Ag-Expo, and professional meetings.

Performance Goal 1-40
Key Theme – Horticulture– Vegetables – Sweet Potato

Outputs:
Sweet potato is a low-input, high calorie producer per unit area and may be an important source of raw material for industries, animal feed, and renewable energy in the future. Sweet potato is not amenable to conventional breeding because it is a perennial polyploid and vegetatively propagated crop. Sweet potato improvement can be accelerated with the application of recombinant DNA technology for starch/dry matter enhancement and sweet potato weevil resistance. Reliable *in-vitro* plant regeneration system applicable across wide germplasm and development and availability of techniques for delivering DNA are the pre-requisites for producing transgenic plants.

Impact
The effects of explant type and growth regulators were investigated on somatic embryogenesis and plant regeneration in sweet potato selection 75-96-1. The frequency of embryogenic calli forming somatic embryos was almost 33%. *In-vitro* regeneration protocols for five economically important genotypes have been developed. Procedures for plant regeneration from mesophyll protoplast has been developed for several genotypes. Optimum sucrose concentration and culture duration requirements for sweet potato organogenesis and embryogenesis have been determined.

Key Theme – Horticulture– Vegetables – Sweet Potato

a. There is a growing demand for vegetable proteins. Amino acids containing sulphur are low in sweetpotato, otherwise this crop is considered very nutritious. Currently, some transgenic sweetpotato lines with protein content three times that of in conventional elite cultivars have been developed and are available for testing. We plan to introduce these high-cash-value protein rich transgenic sweetpotato lines and test them in the greenhouse and field according to the guidelines developed by USDA for genetically modified plants.

b. **Impact** – The introduction of transgenic high-protein sweetpotato will not only make sweetpotato a nutritious staple food for human consumption but will also provide the farmers with a value-added high protein crop for sale and also could cater to animal feed industry. This will promote sweet potato production on small family farms and home gardens, and make sweet potato a part of regular diet.

Key Theme – Horticulture– Vegetables – Sweet Potato

Outputs:

American agriculture is facing economic and structural problems causing distress in rural communities. Sweet potato is an important crop for Georgia farmers but due to weevil problems there are quarantine restrictions to grow it. The decreasing sweet potato acreage is depriving Georgia growers of the opportunity to diversify cropping patterns and grow this high -cash-value crop. Chemical control is not effective and no stable resistance to weevil damage is available in sweet potato or other related crop species. Use of recombinant DNA technology is an alternative option for incorporating weevil resistance in sweet potato. Efficient protocols for *in vitro* plant regeneration and optimum conditions and techniques for DNA delivery to target material were developed.

Impact

The successful development of protocols for transient and stable gene expression will enable the production of transgenic sweetpotato lines with value-added traits to enhance protein, starch, and weevil resistance. These improved genotypes will be available to the farmer. This will promote sustainable agriculture free of environmental pollution. The protocols de veloped for this crop will be model for other crops of economic importance.

Goal 1: Multi-State and Integrated Activities (not identified by specific performance goal)

Horticulture
Multi-State Activities Descriptions and Brief Results

The **Georgia/Florida Green Industry Updates** are a cooperative effort between extension specialists from both states. The program serves the nursery and landscape industry in Georgia and Florida by developing training materials and offering production information semin ars in both states. In 2000 the number of full-day seminars was increased from 2 to 3 and the attendance increased from about 230 to 420. The seminars serve private firms and institutions involved in landscape installation, landscape maintenance, nursery container production, nursery field production, and greenhouse production. This multi-state extension activity addresses the Key Theme Ornamental/Green Agriculture under Goal 1.

The **Southern Region Small Fruit Consortium** is a cooperative venture between the University of Georgia, Clemson University and North Carolina State University. Its goal is to share resources and promote development of the small fruit industry in the three states. Activities in the year 2000 include: 1). A multi-state agent training in strawberries with over 33 agents in attendance. 2). development of a web site with production information www.smallfruits.org with thousands of web "hits" 3). Co-sponsorship of a FQPA Transition Strategy Workshop for Small Fruit Crops. 4). Organiz ation of a regional wine grape meeting with 70 agents and growers in attendance and organization of a regional bramble meeting with 18 agents and growers in attendance 5). Numerous extension and research scientists assisting growers and agents across state lines with talks, farm visits, emails, and phone conferences. This multi-state, multi-discipline (horticulture, entomology, plant pathology, agricultural engineering, and agricultural economics) and integrated program (both research and extension faculty participating) activity addresses the Key Themes Agricultural Competitiveness, Agricultural Profitability, Innovative Farming Techniques, Niche Market, Plant Production Efficiency, and Plant Germplasm under Goal 1.

The **National Sweetpotato Collaborators Group** was founded in 1938 for the purpose of breeding and evaluating sweetpotaoes and releasing new varieties to producers. The purpose of the Collaborators Group has expanded and now is to evaluate new sweetpotato lines, conduct research on all aspects of the sweetpotato and report the findings through the National Sweet Potato Collaborators Progress Report. The National Sweetpotato Collaborators Group is made up of Extension, research, business and producer personnel who are interested in Sweetpotato improvement. Members come from disciplines of horticulture, entomology, plant pathology, agricultural engineering, post harvest physiology, food processing, food science, weed science, crop and soil science, economics, state and federal government, producers and plant production companies. For the 2000 growing season 14 breeding lines from 4 states were evaluated. This multi-state, multi-discipline, and integrated program (both research and extension faculty participating) activity addresses the Key Theme Plant Germplasm under Goal 1. Participating states are AL, CA, GA, KS, LA, MA, MS, NJ, NC, SC, TN, TX, and VA.

The **Southern Regional Consumer Horticulture Committee** functions to share ideas, policies and resources between the southern states. Time, effort and money can be saved by working as a team across state lines. Although the group is newly formed, the several past meetings have proved valuable in establishing a cohesive work team between the states. It is the goal of the committee to look even further into working on joint projects such as consumer horticulture fact sheets, Master Gardener and general horticulture slide sets, advanced MG training, web based information and delivery, as well as universal policies and procedures in conducting programs. This multi-state extension activity addresses the Key Themes Home Lawn and Gardening and Urban Gardening under Goal 1. Participating states are AL, AR, FL, GA, LA, MS, NC, OK, SC, TN, TX, and VA.

The **Southeast Greenhouse Conference** is a joint three-day educational and commerce event sponsored by the Extension Service units of seven state universities, and the trade association of those respective states. Held annually at the Palmetto Center in Greenville, South Carolina, over 1600 growers now take part in one of the most extensive educational programs in the U.S. The educational content is focused on improving profitability and diversity within the floriculture industry that is rapidly developing in the south. Educational formats used include grower panel discussions, hands-on training, interactive seminars and standard lectures. Training for Hispanic growers and workers is also provided, as is pesticide safety re-certification credits. This conference is growing at a rate of 15% per year. The effectiveness of the outreach increases by several hundred growers each year. As a combined effort of the seven states Extension services, this is a very efficient delivery model for crop improvement, crop diversity and profitability directed information. Examples of 2000 output indicators for this conference include 65 classes taught, 23 lessons plans developed, 36 teachers trained, 120 companies attending workshops, 300 companies reached by extension materials, 74 training sessions held, and 330 industry participants (20% of total attenders) that indicated they will adopt measures acquired at the conference. This multi-state extension activity addresses the Key Theme Ornamental/Green Agriculture under Goal 1. Participating states are AL, FL, GA, NC, SC, TN, and VA.

Southeastern Floriculture Magazine is a regional Extension publication founded in 1993 for the purpose of efficiently disseminating cultural and management information to the region's greenhouse growers. This publication is a partnership between five state universities, their respective state trade associations and industries in the southern region of the U.S. The magazine is a bi-monthly, periodical with a format that includes an average of ten research reports, management and agribusiness features and production articles in addition to news from the state trade association. Current distribution is around 1500 copies per issue by mail, and several hundred more through distribution at annual trade shows. The cost to publish the magazine is picked up by the industry. Georgia, Alabama, Tennessee, Virginia and South Carolina currently sponsor the publication. Pass-through reading among staff at member greenhouses is estimated to yield over 4500 readers. This magazine is an effective information delivery tool for Extension staff and serves as an efficient tool for advertising outreach programs to a very wide audience. Examples of output indicators for 2000 include 12 media spots used, 60 newsletter articles dealing with agricultural practices, 56 teachers trained (number of high school and VoTech

subscriptions), and 1,120 companies reached by extension education materials (up from 1,060 in 1999). This multi-state extension activity addresses the Key Theme Ornamental/Green Agriculture under Goal 1. Participating states are AL, GA, SC, LA, TN, and VA.

The **Southeastern Peach Convention and Trade Show** is designed for the exchange of information among professionals and paraprofessionals linked to the peach production industry both in the southeast region at a national level. Besides the trade show, an educational meeting is held that features the issues of most immediate concern to the industry in that year. This meeting is a cooperative effort between Georgia and South Carolina. Primary responsibility for this meeting resides with Georgia each even numbered year, but both states are involved in planning and implementation each year. This multi-state extension activity addresses the Key Themes Agricultural Competitiveness, Agricultural Profitability, Innovative Farming Techniques, and Plant Production Efficiency under Goal 1. Participating states are GA and SC.

The **South Georgia/North Florida Peach Meeting** is a cooperative effort between Georgia and Florida. Primary responsibility for this meeting resides with Georgia each odd numbered year. But both states are involved in planning and implementation each year. The meeting place rotates between Georgia and Florida each year. This multi-state extension activity addresses the Key Themes Agricultural Competitiveness, Agricultural Profitability, Innovative Farming Techniques, and Plant Production Efficiency under Goal 1. Participating states are GA and FL.

Poultry

Key Themes - Profitability, Environmental Stability, Animal Health and Well-being

Issue Statement:

Georgia is the leading poultry producing state in the nation and is considered to be one of the most progressive in regard to developing and implementing new technology. Poultry production is highly competitive and for Georgia and its sister Southeastern states to remain profitable in the global marketplace, continuing to remain on the cutting-edge of scientific advancement will be critical.

Outputs:

Poultry scientists have published 3 book chapters, 30 refereed journal articles, and 17 scientific abstracts in areas of vital importance to poultry producers. A few of the major foci of these research efforts include genetics, nutrition, and poultry health. In addition, over 30 courses have been taught and 50 presentations delivered directly related to these themes.

Impact:

Important research findings have been added to the knowledge base that will continue to contribute to more effective dietary rations for poultry. These actions will promote performance and minimize environmental concerns. Animal health and welfare will be enhanced by research published in the areas of behavior, parasitology, toxicology, physiology and nutrition.

Source of Federal Funds - Hatch.

Scope of Impact - **Multi-state research** with Alabama and Arkansas.

Crop and Soil Science

Contributions to Regional and National Conferences/meetings:

1. Southeastern Peanut Farmers Conference, Panama City, Fl.
2. American Peanut Research and Education Society, Point Clear, AL
3. Southern Peanut Growers Conference, Panama City, Fl.
4. U.S. Cotton Specialist Summer Tour and Meeting.
5. Delta and Pine Land Company Academic Seminar, Scot, MS
6. Monsanto Southeast Cotton Consultants Meeting, San Destin, Fl.
7. Dow Agro Sciences Southeast Cotton and Peanut Meeting, St. Mark, FL.
8. Beltwide Cotton Research Conference
9. Southern Weed Science Society of America.
10. Southern Soil Fertility Conference.
11. SERA-IEG-25 (Turfgrass).
12. 39th Tobacco Workers Conference. Williamsburg, VA.
13. SERA-IEG-Soil Testing and Plant Analysis.
14. SERA-IEG 11- Oilseed crops.
15. Forage Production 2000 in-Service Training-Georgia, Florida, Alabama.
16. Agroforestry & Wildlife Field Day - Regional attendance.
17. Deep South Weed Tour (Georgia, Alabama, Florida).

Biological and Agricultural Engineering

Decision Support System for Beef Cattle Producers

Scientists (engineers, animal scientists, forge specialists, and agricultural economists) from the University of Georgia and the University of Tennessee have been developing a decision support system for beef cattle producers using a Fund for Rural American Grant. The program is now in the testing stage and should be ready for distribution by the Summer of 2001.

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

Performance Goal 2-1: To minimize the risk of food borne illness through adoption of recommended food handling and preservation practices.

1890 Extension

Key Theme: Food Safety Education Program

Issue Statement:

The Centers for Disease Control and Prevention (CDC) and the Food and Drug Administration (FDA) have estimated that there are as many as 33 million reported cases of foodborne illnesses each year in the United States. Many more cases go unreported since the symptoms of foodborne illness may be mistaken for other illnesses. Estimates of the economic costs of foodborne illness vary from a low of nearly $500 million to a high of $7 billion a year. The consequences of foodborne illness can be serious for people with weakened or underdeveloped immune systems such as older adults, the chronically ill, and the young (particularly newborns and children under one). These people, because of their weakened immune systems, are at greater risk for developing serious complications as a result of foodborne illnesses. In spite of the risks associated with foodborne illness, few consumers have had any food handling education. This lack of education has implications both for consumers handling their own food at home and for their ability to assess the safety of food obtained in eating establishments. Rural areas, often because of a lack of resources, could greatly benefit from food safety education designed specifically for their residents and delivered in their communit ies. The Fort Valley State University Cooperative Extension Program is particularly sensitive to the problems, concerns, and cultural and ethnic factors that influence food safety practices of the low-income and limited resource audience. The benefits of implementing a Food Safety Education Program for audiences with low-income and limited resources, many of whom are at increased risk for foodborne illnesses, are that these families and individuals will improve their food handling practices, and in turn, reduce their risk for foodborne illnesses. It is also expected that the economic costs associated with foodborne illness will be reduced. Another benefit of a Food Safety Education Program is that the families and individuals reached could act as community resources and assist the Fort Valley State University Cooperative Extension Program in reaching families and individuals who might not otherwise be reached.

Outputs:

The Extension Program Leader for Family and Consumer Sciences developed a comprehen sive Food Safety Education Program for county-based employees to teach and educate their clientele. The major components of the program are food preparation, preservation, storage and handling practices; cooking and storage methods; proper hygiene practices; cooking times and temperatures; food selection techniques; and understanding risks and responsible practices. Curriculums were designed and adopted. Food safety exhibits were designed and purchased. Educational resources were purchased. Resources include various videotapes, posters, textbooks, flip charts, brochures and displays. The program leader designed and distributed food safety brochures and publications. The program leader trained county-based employees. County-based employees are sharing new information with their clientele in various settings in their counties.

Impact:
Fifteen (15) county-based employees reported that they made and/or conducted 39 presentations, programs and workshops; reached 504 families; reached 189 high school students; made 1250 home visits; made 417 telephone calls; distributed 4734 publications; reached 1038 adults; reached 213 foodservice workers, small business owners and others; and worked with 372 volunteers. County-based employees estimated that they reached and currently have enrolled 1418 clientele. They reported that 877 clientele and program participants increased their adoption of recommended food handling and home food preservation practices that minimize the risk of foodborne illness. In addition 1213 clientele and program participants improved their understanding of risks and responsible practices in relation to food and health. One hundred fifteen (115) clientele and stakehol ders were surveyed. The results revealed that 95 are currently enrolled in the Food Safety Education Program. Their responses indicated that 91 had changed behavior, 80 had improved their finances and 92 had increased their knowledge. Overall they stated that they are making changes in their homes and lives because they are more aware of food safety and preservation practices. They rated the Food Safety Education Program as excellent to good.

Source of Federal Funds: USDA-CSREES 1890 Funds

Scope of Impact: Middle Georgia Specific

Key Theme: Food Safety Education
Issue Statement:
Food service workers, high school students and other consumers are greatly concerned about foodborne illness. Every link in the food chain has the potential to develop an outbreak of foodborne illness. For example, in a recent 20/20 Report, a child contracted E-coli 0157-H7 from lettuce and nearly died. The child has permanent damage to eyesight. In January 1999 through a FDA warning, it was learned that 60 people in Michigan and 48 in Virginia suffered from E-coli 0157-H7 connected to alfalfa sprouts. In 1994, Listeria was found in Sara Lee products which resulted in 12 deaths, 5 women had spontaneous abortions, over 82 people were sick and 425 died from the Listeria pathogen. On November 9, 1997 the New York Times reported that "a town is dazed after a deadly church dinner" where 1,400 people ate church dinner, 700 people became sick, 100 went to the hospital and 2 elderly people died from Salmonella B in the ham roll. As indicated, food safety continues to be a major issue facing food service workers and consumers (high school students). Foodborne illnesses are primarily due to the mishandling of foods at home and in the food service facility. Educating food servic e workers and consumers is the best method of lowering foodborne illness. Fort Valley State University Cooperative Extension Program proposes to undertake a multi-disciplinary approach to teaching food service workers and high school students methodologi es and techniques of reducing foodborne illness.

Outputs:
The Extension Program Leader for Family and Consumer Sciences worked with a committee to develop a comprehensive program for food service workers and high school students. The Fort Valley

State University Pre-K, Cafeteria/Food Service Workers, Cooperative Extension Program county-based employees and Peach County High School Home Economics/Family and Consumer Sciences students were chosen to be the target population for the program. The primary objective of the program was to implement food safety and sanitation education through methods and techniques that would reduce foodborne illness in the daily lives and activities of participants. The program proposed to increase participants adoption of recommended food handling practices designed to minimize the risk of foodborne illness; and to improve their understanding of the risks and responsible practices in relation to food and health. Pre- and post-tests were used. The program was expanded to include exhibits, additional trainings and presentations, and a bus tour. The program started in October 1999 and ended in September 2000.

Impact:

The pre- and post-tests were administered to eighteen (18) Fort Valley State University Pre-K, Cafeteria/Food Service Workers, and Cooperative Extension Program county-based employees. The average pre-test score was eighty-three (83), while the average post-test score was ninety (90). They mentioned that they will put their knowledge to work in their homes and they will share their knowledge with family members and their communities. The pre- and post-tests were also administered to thirty-three (33) Peach County High School Home Economics/Family and Consumer Sciences students. The average pre-test score was seventy-two (72), while the average post-test score was seventy-five (75). They shared that the information was valuable and vital and the informa tion will help them to improve their personal habits that will promote good health for years to come. They felt that the information should be shared with all high school students. The program reached an additional 12,033 participants through exhibits, additional trainings and presentations, and a bus tour. As a result of the program, fifteen (15) new partnerships were built, two (2) curriculums were adopted and modified, seven (7) tri-fold brochures were developed, and one (1) laminated table-top display was designed. The program will be expanded in Middle Georgia.

Source of Federal Funds: USDA-CSREES Food Safety and Quality National Initiatives ($30,000)

Scope of Impact: Peach County Specific

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1862 Extension

Overview:

The risk of foodborne illness can be minimized through the adoption of safe food handling and food preservation practices. The Georgia Extension Service provides consistent, accessible food safety and sanitation education for consumers and foodservice employees. These food handler training programs improve knowledge of the causes of foodborne illness as well as recommended food handling practices.

Key theme: Foodborne Illness

Outputs:

County and state Extension faculty provided group training programs, made home visits, and provided individual consultation to teach safe food handling for child care providers, personal care home providers, school food service employees, restaurant employees, and consumers of all ages . Educators utilized a wide variety of media to reach almost 7 million people in the state, including 54 newsletter articles, 204 news stories, radio and television spots, and 2,403 direct telephone inquiries. The county-based faculty participated in 9 trainings designed to increase their competence and knowledge of the risks and responsible practices in relation to food and health. Almost 75 volunteers assisted with food safety and preservation training.

Impact

More than 10,000 individuals were reached through 415 educational programs. Of these individuals, 60% were youth, 10% were child care providers and schools, 10% were senior adults and personal care home providers and 5% were commercial and institutional food handlers. Approximately 73% of the participants in short educational programs indicated that they planned to adopt recommended food handling and food preservation practices that minimize the risk of foodborne illness as a result of their participation in these programs. Forty-two percent of program participants indicated that they would adopt the use of recommended food cooling storage methods that minimize risk; 18% would adopt the use of proper hand washing practices; and 50% would adopt the use of thermometers to determine proper cooking and holding temperatures. Over 1,400 institutional/commercial food handlers participated in ServSafe, an extensive workshop designed to teach foodservice employees safe food handling techniques and implementation of HACCP systems. In addition, state fa culty revised and released the fourth edition of "So Easy to Preserve", the definitive source of information on home food preservation and a primary reference in more than 30 states.

Source of Federal Funds - Smith-Lever; USDA-CSREES grants

Scope of Impact - State Specific

Food Science and Technology

Issue Statement:

Minimize the risk of food borne illness through adoption of recommended food handling and preservation practices.

Output indicators:

Numbers in food processing industry reached: 875
Number of food companies represented at workshops: 286
Number of food companies requesting technical assistance by telephone or on-site: 228
Number of food companies reached by extension educational materials: 191
Number of food companies that considered feasibility of incorporating steps to enhance or maintain food quality: 360
Number of presentations made to professional, scientific and consumer groups: 84

Outcome indicators:

Number of program participants using HACCP systems in food processing operations: 297
Number of program participants passing HACCP certification examinations: 229

Related Impact Statements:

HACCP Model Development and Educational Program

Ready-to-eat (RTE) foods have become increasingly popular as value added convenience items to the American consumer. They include items like Vidalia onion relish, potato salads, delicatessen meats, cheeses, pecan logs, peanut brittle and many others. Today, Georgia has more than 300 RTE food operations. Risk of consuming human pathogens in RTE foods is greater than other foods because these foods are not cooked. Extension Service food scientists worked with the Georgia Department of Agriculture to receive a $50,000 grant from the Food and Drug Administration to develop HACCP (Hazard Analysis Critical Control Point) programs for fresh produce and small food processing plants. HACCP models were developed for food operations handling pasteurized apple cider, raw carrot juice, a field/packinghouse bell pepper operation, a wholesale distributor of bell pepper, hot pepper salad dressing, raw sashimi (fish), key lime pie, fresh-cut vegetables and deli-style roast beef. Each of these HACCP models will serve as the national standard for guidance in developing food safety programs in similar food operations throughout the U.S.

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Is Country Ham Safe?

Nothing compares to the taste of dry cured meat, but is it free of pathogens like E. coli O157:H7 and Salmonella? To answer this question, UGA food scientists put the dry curing process through a series of tests. The surfaces of hams were inoculated with pathogens before the curing process and tested for the pathogens after the meat was dry cured. The test results showed the pathogens were controlled by the dry curing and aging process.

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Performance Goal 2-2: To increase consumer understanding of agriculture and aquaculture practices that are necessary to consistently produce an abundant, safe, and inexpensive food supply.

Statement of Issue:

The production of agriculture commodities using integrated pest management techniques and is vital and important part of food safety, resulting in agricultural economic integrity.

Key Program Components:

We will continue to provide agriculture outreach through field days and demonstrations through existing and new programs at the University of Georgia. Experiment stations and other faci lities. Additionally, extension, research, and teaching faculty regularly publish scholarly and popular articles concerning agriculture production. Media outlets of all kinds utilize our personnel to support articles in newspapers, radio, and television.

Output Indicators:

2-Number of demonstrations, field days, research station open houses.
18-Number of newsletter articles and other publications dealing with agriculture production practices.

In-State Outcome Indicators

1. On a per acre basis more pesticides are used by the homeowner than by growers in production agriculture. Clientele are increasingly aware and concerned about environmental issues regarding pesticide use. Integrated Pest Management (IPM) strategies that minimize pesticide use are applicable to home landscape, garden and orchard problems and need to become more widely used. The Homeowner IPM Clinic is the extension education program for disease and insect related problems of noncommercial plant samples. This includes diagnoses and recommendations for plant disease and insect infested plant samples as well as identification of insect and other arthropod specimens from in and around the home. Approximately 2,200 - 2,500 samples are received and processed annually. Management recommendations focus on diagnosing the problem prior to implementing any control practices. Controls for disease, nematode and insect problems are based on integrated pest management strategies so that the homeowner can have an attractively landscaped yard, productive home garden, fruitful home orchard and pest free home with minimal use of pesticides. Cultural practices are emphasized. Often no pesticide applications are required and the problem can be solved through cultural practices and/or manipulation of the environment. These responses reinforce the University of Georgia's commitment to environmental quality and the sustainability of agriculture in Georgia. With the implementation of the Distance Diagnostics through Digital Imaging project, the response time to the homeowner through county faculty is being reduced. This facilitates educating the homeowner in a timely manner and helps make sure an appropriate management method is used. The Homeowner IPM Clinic solidifies the county delivery system, provides educational information useful to faculty and clientele for management of problems around the home landscape and results in a healthier environment by reducing haphazard and nontargeted pesticide use. A summary of samples received from the Homeowner IPM Clinic and the Plant Disease Clinic is published annually and serves as a valuable diagnostic reference tool for all crop areas.

2. Homeowners are an important clientele of the University of Georgia Cooperative Extension Service and are present in all counties across the state of Georgia. Often their interests and requirements of county extension agents are diagnosis and management of plant disease or insect problems from the home landscape, orchard and garden. Most homeowners have these common interests. In April 2000, a four-hour training was held in Macon, GA to provide county extension agents with training and education concerning plant disease or insect problems from the home landscape, orchard and garden. Due to the vast subject area (all crops, insects and diseases from homeowners) registered county extension faculty determined the topics that were covered via correspondence between them and the coordinator prior to the training. Some participants also brought plant material representative of the problems they were experiencing in their county. Twenty-three agents attended this training. Evaluation responses were good to excellent regarding the format and presentation of the material. This training provided educational information useful to faculty for diagnosis and management of problems around the home landscape and hopefully has served to solidify the county delivery system.

Performance Goal 2-3: To ensure full participation in the reassessment of the pesticide regulatory system as mandated by the Food Quality Protection Act.

Biological and Agricultural Engineering
Theme: Food Quality

Output Indicators:
1 presentation made to an agricultural group concerning FQPA
23 participants at meetings with presentations concerning FQPA

Entomology
Key Theme:
Improved Pest Control and Food Quality Protection Act Implementation

Outputs:
It is imperative for the University and the state of Georgia to be actively engaged in pes ticide policy dialogue. Extension specialist served on advisory committees, addressed workshops on pesticide issues, developed crop profiles for Georgia crops most a risk from FQPA activity, and participated in request for emergency labels for pesticide u se in Georgia.

Impact:
Section 18 Emergency Exemptions allowed for the use of SpinTor for control of flower thrips on blueberries and the use of Admire for whitefly control on snapbeans. Extension specialists served as the liaison for the National Peach Council to EPA's technical briefing team on phosmet, address three different workshops across the United States on the impacts of the Food Quality Protection Act. In addition, Extension specialists developed crop profiles peaches and other crops at risk from FQPA activity.

Source of Federal Funds: Smith-Lever

Scope of Impact : State and **region**

Performance mailto:ereynold@uga.edu**Goal 2-4:** Develop a systems approach that combine extension, teaching, and research to enhance food handling, processing, value-added technologies, marketing and distribution at the state, national, and international levels to insure Georgia's place in the increasingly global food economy:

Food Science and Technology
Output indicators:
Number of extension workshops on postharvest issues for agricultural commodities in Georgia: 5
Number of courses offered that relate to food processing, value-added technology: 16
Number of seminars scheduled relative to postharverst technologi es and food processing: 23
Number of undergraduate and graduate students targeted to major or minor food processing:

24 undergraduates; 88 graduate students

Number of Hatch projects involved in post-harvest technologies and food processing: 2

Number of research projects the focus on key postharvest issues: 3

Scientific presentations and refereed journal articles on postharvest technologies and food processing issues:

- Presentations: 35
- Refereed journal articles: 37

Outcome indicators:

Number in food industries and commodity groups participating in processing workshops: 28

Measured reduction of farm-to-consumer losses based on surveys: No survey taken. Actual measured recovery

- peppers - $145,000
- onions - $1,780,000
- waste recovery - $2,800,000
- farm process

Biological and Agricultural Engineering

Output Indicators:

- 4 extension workshops
- 2 seminars
- 1 refereed journal article

Outcome Indicators:

- PAL LAB
  - A major international conference was hosted for 90 participants
  - Conducted a three month training program for an FAO Fellow from India
  - Co-hosted a six month visit by senior B.S. student from France
  - 2 seminars given with a total of 70 participants
- 2 companies are using quality control procedures developed
- 7 presentations given to professional groups
- 1 book co-edited, 4 book chapters, 3 refereed journal articles, 5 retrievable publications and 2 reports to industry published

Performance Goal 2-6: To have all poultry producers and processing plants producing the safest, highest quality product possible using currently available technology and best management programs.

Poultry

Overview

Processing, further processing, and value added poultry meat plants are major components of the poultry industry in Georgia. Over 30 plants are currently operating in Georgia, processing more than 5 billion pounds of product annually. It is imperative that these plants operate with the highest l evel of efficiency while providing food safety and quality control to ensure profitability and compliance with government regulations. These plants are in need of educational assistance in the areas of food safety, quality control, plant sanitation, government regulation, improving in-plant yields, and reduction of water usage during processing.

Key Theme - Food Safety

Outputs:
Poultry specialists have developed comprehensive programs to assist poultry processors with implementation with HACCP programs and compliance with government regulations for food safety. Workshops related to development, monitoring, and documentation of in-plant HACCP programs have been conducted. Training notebooks and visual aids were develope d to facilitate these trainings. The programs were targeted to processing plant and processing line supervisors. Cooperating Institutions/Organizations: The Georgia Poultry Federation, the Georgia Egg Association, and Georgia Poultry Companies.

Impact:
A total of six HACCP workshops involving 175 processing plant managers were conducted. Three of the workshops were directed to poultry meat processors with over 80% of the companies in Georgia represented. Three workshops were designed for egg processors and involved over 90% of the table egg companies in Georgia. Evaluations for the six workshops averaged 4.5 on a scale of 1 to 5. As a result of these workshops, all of Georgia's poultry processors have implemented HACCP programs and are currently operating within federal compliance requirements.

Source of Federal Funds - Smith-Lever

Scope of Impact - **Multi-State Extension** with South Carolina.

Three HACCP training workshops were conducted jointly with South Carolina. Approximately .1 scientist EFT and .1 clerical EFT were required.

Performance Goal 2-8: Develop, transfer, and promote the adoption of safe and efficient food processing technologies and systems that improve consumer access to affordable, convenient and good-tasting foods while ensuring food safety and quality maintenance in processing systems.

Food Science and Technology
Outcome indicators:

Growth and expansion of food processing industries in Georgia: new plants and additions - 28

Increased value of food commodities processed in Georgia:

Georgia has experience an approximately 21% increase in food processing businesses during the past 5 years with an annual value added of over $100,000,000.

Greater market share opportunities for these Georgia-based products: An increase in available Georgia value added products and further processed products has increased Georgia's product share in the Southeastern U.S. and in Georgia by an estimated 20% or 5%/year

Performance Goal 2-9

Key Theme – Products Technology– Meat Technology

Outputs:

Food safety is of primary importance in any food producing system. It is imperative that meat is handled and processed in a safe way such that it prevents contamination from all sources. Regular E. coli testings have been carried out on goat carcasses processed at the FVSU Slaughter and Meat Processing Facility. A hands-on training was conducted on safe meat handling methods and the HACCP System for small-scale processors, producers, and others. Special topics covered in this workshop included impact of HACCP system, preharvest food safety, and contamination with Listeria. There was also a demonstration of a HACCP system in operation, including sample collection for assessment of E. coli contamination.

Impact

The results have been presented in international professional meetings. The HACCP training sessions and the hands-on training on E. coli sampling were video recorded and included in the FVSU Agricultural Research Web Site. The training drew participants from Alabama, South Carolina, and Georgia.

Performance Goal 2-10

Key Theme – Products Technology– Milk and Cheese Development

Outputs:

Research scientists developed Monterey Jack goat milk cheeses using the surplus goat milk during the peak production season, and conducted consumer acceptability studies as well as rheological property evaluation on the developed products. The first objective of the project on the goat milk cheese development is to establish the year-round uniform supply of goat milk products for general consumers in order to achieve a sustainable, profitable, and survivable dairy goat industry. The second objective is to assess the food quality parameters (i.e., sensory and rheological properties) of the product which are acceptable to ordinary consumers, and also are competitive against cow milk products in marketing for the economic sustenance of the limited resource farmers. These fundamental research objectives were also applied for the fluid goat milk and soft goat cheese production for the same end of economic sustainability for the disadvantaged small dairy goat farmers. Nutritional and rheological qualities of the

cheeses were collaboratively evaluated in different analytical laboratories. The chees e products were introduced for two consecutive years to the general public for consumer acceptability for the participants of the two state and national public exhibition events, including Ag Showcase and Agriculture Expo (which is the largest of its kind in the Southeast U.S.).

Impact

At the Georgia state-wide event of Ag Showcase and the Agricultural Expo which is the largest agricultural exhibition in the Southeast U.S., probably throughout the whole north America, numerous visitors visited the goat products exhibit, and participated in the consumer survey and acceptability study on the developed cheeses. Approximately 45% of the participating average consumer panelists preferred the goat cheese over cow milk cheese counterpart. The survey indicated that there would be a potential market for goat cheese and other dairy goat products. Most of the panelists indicated that they found a milder and less sharper taste in goat Monterey Jack cheese, which was consistent with the rheological and nutritional assay results. The laboratory analyses also confirmed that the cheeses became more meltable, softer, elastic and cohesive body with the increased springiness, elasticity, and shear strain results, as aging progressed.

Sources of Federal Funds – Evans-Allen CSREES/USDA; SARE

Scope of Impact – **Multi-state and multi-institutional research**

Goal 2: Multi-state and Integrated Activities (not identified by a specific performance goal)

Poultry

Issue Statement:

Approximately 1.4 billion broilers and 3.3 billion eggs are produced and processed in Georgia each year. As is the case with all food products, food safety and quality are of paramount importance to consumers and poultry processors. Providing science-based solutions to microbiological and other quality concerns is critical to ensuring that poultry products are safe and wholesome and that the consuming public is effectively protected.

Key Themes - Poultry Processing, Food Safety, Value-Added Products

Outputs:

Poultry scientists have published 6 book chapters, 6 refereed journal articles, and 12 scientific abstracts in relevant areas of poultry processing, value-added products and food safety. In addition, over 30 presentations have been made to industry groups in these topics.

Impact

This research will allow poultry processors to continue to reduce the risk of food-related illness, improve product quality and extend product shelf-life.

Source of Federal Funds - Hatch.

Scope of Impact - **Multi-state research** with Alabama, Arkansas, Texas.

Food Science and Technology

Reducing Microbial Risks in Fruits and Vegetables with Good Agricultural Practices in the U.S.

Contractor: Cornell University

Period: Oct. 1, 2000 - Dec. 31, 2001

Budget: $19,238

Subcontractor's Principal Investigator: William C. Hurst

Project Summary: In response to the increase in produce related foodborne illnesses, the Extension Food Science and Horticulture Departments at the University of Georgia have participated as a subcontractor in a USDA funded grant awarded to the Institute of Food Science at Cornell University. The need to make Georgia county agents, growers, packers, and shippers of fresh produce aware of food safety practices concerning the production, packing and shipping of fresh crops is urgent. Appropriate educational materials have been utilized and developed and a series of training programs have been held on how to implement good agricultural practices for Georgia and Alabama clientele who deal with fresh produce.

Project Accomplishments:

Date	Location	Attendance	Clientele
9/5/00	Tifton, GA	16	growers/packers
11/1-3/00	Gulf Shores, AL (Alabama Grower Association Annual Conference	200	growers, packers, shippers, county agents
12/7/00	Claxton, GA	45	county agents
12/11/200	Tifton, GA	33	county agents
12/12/00	Tifton, GA	20	Georgia watermelon and other vegetable growers meeting
1/6/01	Savannah, GA (GA Fruit & Veg. Conv. & Trade Show)	87	growers, packers, wholesalers, county agents from GA, SC, FL, CA
1/18/01	Rock Eagle, GA	22	county agents

Fresh Produce Food Safety Training Programs for the Southeast

Contractor: North Carolina State University

Period: Sept. 15, 2000 - Sept. 14, 2001

Budget: $66,100

Subcontractor Principal Investigator: William C. Hurst

Project Summary: Fresh Produce Food Safety (FPFS) programs and educational materials are being developed for all produce handlers located in the southeastern United States. Food scientists and horticulturists from thirteen southeastern states including Texas are involved in developing and coordinating this project. Three targeted audiences have been identified for training in an effort to reduce produce-related disease between the field and consumer. First, four area "train the trainer" meetings (Ft. Worth, TX; Lake Alfred, FL; Charleston, SC; and Memphis, TN) have been set up for intensively training food scientists, horticulturists and selected county agents. Following this training, agricu ltural materials and a series of training workshops, using a HACCP-like approach, will be developed to meet the produce production, harvesting and shipping peculiarities of each state or region. These materials will be used to educate the second level of handlers, namely produce growers, packers, shippers and field personnel. Finally, programs will be developed and practices implemented for distributors (truckers), wholesalers and retailers, who represent the third level of handlers in the produce marketing chain.

Project Accomplishments:

1. Developed three PowerPoint slide sets and accompanying handout material on (a) *Basic Food Microbiology and HACCP Principles*; (b) *Worker Health and Hygiene*; and (c) *Building Relationships with the Fresh-cut Produce Industry*.

2. Presented topics at first area meeting in Ft. Worth, TX, January 30-31, 2001, 32 participants from TX, OK, LA.

GOAL 3: A healthy, more well-nourished population.

Performance goal 3-1: Georgia will become aware of their risk factors for chronic disease and change their eating and exercise habits to decrease those risks. Georgians with diabetes who attend Extension-sponsored education programs will use food products and recipes lower in fat, sugar and/or sodium in order to improve their blood glucose and blood pressure levels. Women who participate in the Teenage Mothers Nutrition Program (TAMS) will gain weight within the recommended range during their pregnancy.

Overview:

The Georgia Extension Service provides a comprehensive nutrition education program that helps individuals identify their risk factors for chronic disease and change their eating and exercise habits to decrease those risks as well as maintain optimum health.
The Family Nutrition Program and Expanded Foods and Nutrition Education Pro gram target low-income and limited resource audiences with nutrition education.

Birth Weight

Outputs

ition Education Program addresses the special needs of low- income pregnant women and teenage mothers. During the past year, 53 pregnant women were reached, 62% of which were ages 16-19 and 27% were 15 or younger.

mpact:

ipating in the prenatal education program, over 55% gained the recommended amount of weight during their pregnancy and 89% of the babies born to the participants were of normal birthweight.

Source of Federal Funds -USDA-EFNEP

Scope of Impact -

Key Theme - Human Nutrition

Outputs

ome visits, group training, and media. During the past year, approximately 45,000 i individuals were reached in 2,032 educational programs; 830,000 were reached by over 100 publications; and almost 30 million were reached by 1,120 radio and television presentations. County faculty attended 16 intensive training sessions in nutrition issues. The Family Nutrition Program reached 8,157 clients who completed a class series of 6 - 12 hours. A total of 220 class series were taught. In addition, 3,073 presentations

were given to groups, reaching 76,235 individuals and one-on-one consultations reached 3,519 individuals. Over 57 million contacts health Fairs. An additional 105,356 individuals were reached through 252 newsletter. 142 clients completed a home study series of 9 lessons. The Expanded Foods and Nutrition Education Program reached an additional 2,555 families and 13,189 youth. To increase the research and knowledge base available to human nutrition, the Foods and Nutrition department of the College of Family and Consumer Sciences received 39 grants, produced 118 refereed and popular publications, provided 58 meeting presentations, and conferred 12 graduate degrees.
presentations, and conferred 12 graduate degrees.

Impact

r fat in their diet and increase their intake of fruits, vegetables, and whole grain breads and cereals -- all practices directly related to positive heart and cancer prevention outcomes. Almost 80% indicated that they would start using the Food Guide Pyramid to plan balanced meals. Follow-up clinical and medical data on almost 400 Walk-A-Weigh (weight management) program participants showed that 59% had decreased both their weight and blood pressure and 72% had decreased at least 2 of 8 risk factors for chronic disease. Habit surveys indicated that they had also significantly increased their practice of 16 positive nutrition and health habits to reduce their risk factors. Follow-up habit surveys from the diabetes cooking school programs indicated that 65% of the participants had improved one or more behaviors to decrease the risk of chronic disease complications. As a result of EFNEP programs, 80% of the clients indicated that they had made improvements in food resource management, nutrition practices, and food safety.

Source of Federal Funds - Smith-Lever, USDA-EFNEP, USDA-Food Stamp Program (Ga. Dept. of Human Resources)

Scope of Impact - State Specific

Performance Goal 3-2: To reduce the risk of chronic diseases (hypertension, cancer, diabetes and obesity) and to maintain optimum health for all ages, families and individuals will use the appropriate dietary guidelines to choose a healthy diet and integrate physical activity into daily life.

Key Theme: Nutrition Education Program

Issue Statement:
Leading causes of diet-related morbidity and mortality in the U.S. today include heart disease, cancer,

stroke, and diabetes, ranked respectively from most prevalent to least prevalent (US DHHS, 1998). Other significant diet-related public health concerns include osteoporosis and obesity. Research has shown strong and consistent patterns of relation ship between diet quality such as a diet rich in fruits and vegetables and lowered risk of a number of chronic diseases (Gilman et al, 1995). The U.S. Dietary Guidelines and the Food Guide Pyramid, as well as other national disease prevention recommendati ons, advise individuals to consume five or more servings of fruits and vegetables each day (US DHHS, 1995). In addition to the positive reports on fruits and vegetables, many clinical and experimental studies support a role for dietary fiber, trace elements, vitamins, and other components of whole grains in reducing risk for chronic diseases such as cancer and coronary heart disease (Food Science and Nutrition, 1994). Most populations consume fewer servings of breads and cereals than recommended, and both adults and children have low fiber intakes. On the other hand, most populations consume generous amounts of protein. Protein deficiency is not a problem in the healthy American population (Krause, 1996). Iron deficiency is the most common nutrient deficiency as well as the most common cause of anemia among children and women of childbearing age in the U.S. and worldwide (Krause, 1996). Compared to the 1989 Recommended Dietary Allowances (RDA), recommended intakes of calcium have recently been increased for most adults, and recommended intakes of vitamin D have been increased for older adults (FNB, 1997). As a result of these increases, nutrition education programs which focus on improving dietary quality will need to place extra emphasis on the role of dairy products as important sources of calcium and vitamin D. It is possible that dairy products, as opposed to calcium supplements, may have a greater effect on blood pressure. The Dietary Approaches to Stop Hypertension (DASH) Study convincingly demonstrated that a diet that was high in fruits, vegetables, and low-fat dairy products, and low in fat, saturated fat, and cholesterol, could reduce both systolic and diastolic blood pressure when compared to a typical American diet. High-fat diets have been linked to major causes of death in the United States, including heart disease and cancer of the lung, endometrium, breast, colon, rectum and prostate. An estimated 20-40 percent of all deaths from heart disease and over 40 percent of all deaths from cancer are associated with the typical American high-fat, low-fiber diet. High fat diets can lead to obesity. One of three adults in the U.S. is obese. It is of great concern that one out of four youths in the nation is obese. More than 80% of obese teens remain obese as adults, according to the National Research Council of the National Academy of Sciences. Fast food restaurants are teens' primary outlet for food eaten away from home, according to a 1989 national survey. The National Children and Youth Fitness Study showed a 25 percent reduction from 1984 to 1990 in the percentage of students in grades 10 to 12 who participated in vigorous physical activity 20 or more minutes three or more times per week.

Outputs:

Extension Program Leader for Family and Consumer Sciences developed a comprehensiv e Nutrition Education Program to address the chronic diseases (hypertension, heart disease, cancer, diabetes, obesity). Eight (8) Extension county-based employees received training. Fifteen (15) Extension county-based employees received support materials and educational resources. Major components of the program are The Food Guide Pyramid, The Daily Food Guide, Hypertension Resources, Heart Disease Resources, Cancer Resources, Diabetes Resources, Obesity Resources, Exercise Resources and various nutrition, diet and health resources. Curriculums were adopted. Nutrition exhibits were

designed and purchased. Educational resources were purchased. Resources include various videotapes, posters, textbooks, flip charts, brochures and displays. The program leader designed and distributed nutrition brochures and publications. The program leader trained county-based employees. County-based employees are sharing new information with their clientele in various settings in their counties.

Impact:
Fifteen (15) Extension county-based employees reported that they recruited 104 volunteers; reached 824 families; reached 1222 individuals; made 2554 home visits; distributed 3923 publications; and made and/or conducted 132 presentations, programs and workshops. They reported that 1052 clientele improved their nutrition behavior to decrease the risk of chronic diseases. One hundred fifteen (115) clientele and stakeholders were surveyed. The results revealed that 79 are currently enrolled in the Nutrition Education Program. Their responses indicated that 75 had changed behavior, 64 had improved their finances, and 77 had increased their knowledge. Overall they stated that they are changing their eating habits, learning more about food preparation and meal planning, buying foods in season and with coupons, using grocery lists and learning to buy the right foods, and they are saving money. They rated the Nutrition Education Program as excellent to good.

Source of Federal Funds: USDA-CSREES 1890 Funds

Scope of Impact: Middle Georgia Specific

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Performance Goal 3-5: Develop neutraceutical products from soybean

Outputs:
Publications: 6
New articles: 1 (the associated press article was run nationally)

Our department has been engaged in development of neutraceutical products from peanuts and pecans. In 2000 we had six publications on this topic. The result of this research is to develop technology that will allow food manufacturers to produce peanut butter and other peanut products with

higher levels of sterols. Such products have the potential to lower serum cholesterol levels in consumers.

Performance Goal 3-4
Key Theme – Products Technology– Meat Technology

Outputs:
Because of its lower fat content than other types of red meat, chevon can be an excellent resource in the preparation of value-added products. There is immense opportunity to popularize goat meat in further processed forms using suitable postmortem methodologies. A preliminary study has been completed on the effects of refrigerated storage time on the shelf stability of chevon patties with different proportions of beef fat. Goat carcasses were deboned and the meat used for preparing meat patties containing 100, 95, or 90% chevon. The patties were place on styrofoam trays, wrapped with PVC film, and stored for either 0, 2, 4 or 6 days. The patties were assessed for lipid and myoglobin oxidation at each storage time. Change in the rate of percent MetMb accumulation was more rapid in patties prepared using 100% chevon than those prepared using 95 or 90% chevon. The data indicated that oxidation takes place more rapidly in ground chevon compared to meat from other species.

Texture profile analysis (TPA) of low-fat chevon, beef, pork, and combination (chevon, beef, pork) sausages were also studied. Chevon, beef, and pork sausages were manufactured using a commercial sausage seasoning. A combination sausage was also prepared using equal proportions of chevon, beef, and pork (Mixed). All sausages were prepared under identical conditions and stuffed into natural hog casings. All types of sausages were cooked in a convection oven to an internal temperature of 75 C, drained, and then kept at 2 C for 24 h. Sausage subsamples were then sliced out for texture profile analysis (TPA), proximate analysis, and assessment of Warner-Bratzler (WB) shear values. Cooking losses were lowest for chevon and highest for beef sausages. Pork and mixed sausages had intermediate levels of cooking losses. Fat contents were 2.29, 7.07, 2.77, and 3.02%, respectively, for chevon, beef, pork, and mixed sausages. Springiness, cohesiveness, and resilience were significantly influenced by sausage type ($P < .05$). Springiness was higher in chevon, pork, and mixed sausages compared to that of beef sausages. Cohesiveness was high in beef and pork sausages (0.29), low in chevon sausages (0.25), and intermediate in mixed sausages (0.27). The results suggested that textural attributes of chevon sausages are comparable to those of other types of sausages studied. Incorporation of chevon in mixed-type sausages may result in a low-fat product with superior water-holding and textural properties.

A consumer acceptance trial was conducted comparing two different recipes of barbecued chevon during the Sunbelt Expo 2000. About 150 people who visited FVSU tent were asked to sample the two chevon recipes rate on a 9-point hedonic scale. A majority of the panelists preferred the recipe with added sauce that masked the natural flavor of chevon.

Impact
The data are being analyzed to be presented in scientific meetings. The salient findings will also

published in Georgia Small Ruminant Research and Extension Center's Newsletter that reaches goat producers and processors in the Southeast US. The barbecued chevon was accepted well by consumers of all ethnic groups.

Performance Goal 3-5
Key Theme – Agronomy– Field Crops – Soybean

Outputs:
The vegetable soybean research project focused on evaluating several vegetable soybean genotypes of American and Japanese origin to select for agronomic performance and nutritional quality for human consumption. With increased public awareness of nutritional quality of soyfoods as nutraceutical, it is essential to develop soybean cultivars having nutritional quality traits tailored for human consumption. Fifteen elite vegetable soybean genotypes including 11 Japanese commercial cultivars, 3 plant introductions, and one elite American cultivar were evaluated for growth, development, and fresh green pod yield in collaboration with Washington State University.

Impact
Several high yielding vegetable soybean genotypes adapted to Georgia were established on a certified organic farm (Glover organic Farms, Douglasville, GA). The fresh green pods were sold by the bunch at the Morningside Market in Atlanta and were also demonstrated as a nutritious salad mix. A number of organic small family farmers became aware of this high -value cash crop and plan to benefit from its sale in niche markets.

Goal 4: A healthy, more well-nourished population.

Performance Goal 4-1: To have an agricultural sector that manages its waste in an environmentally sound manner, utilizes production by-products to the greatest extent possible and practical, and provides society with sustainable waste management options.

Executive Summary for this goal:
Many horticultural crops in Georgia are rapidly expanding in importance. Research and outreach programs have to a large degree fed these expansions. For example, blueberry research on plant growth regulators has greatly increased fruit set and profitability of the crop. Extension efforts have assisted the development of the emerging vinifera wine grape industry, and the number of wineries in the state increased from two to five last year. Research at the Coastal Plain Experiment Station directly resulted in the development of a carrot industry in South Georgia, valued at over $15 million in 2000.

Key Theme- Ornamental/Green Agriculture

Outputs:
Extension specialists from UGA and UF combined efforts to increase nursery and landscape educational efficiency. Three full-day seminars were implemented in 2000.

Impact
Over 420 nursery and landscape professionals attended the meetings. Georgia nursery attenders represented about 80% of the wholesale value of nursery production in the state. Post-program surveys indicated that over 78% received information during the ses sion that will result in a change in their current practices and will lead to increased profitability in their businesses.

Source of Federal Funds – Smith-Lever 3b

Scope of Impact - Multi-state Extension, GA and FL

Key Theme - Diversified/Alternative Agriculture

Outputs:
Many of Georgia's traditional row crops have suffered from declining profits over the last **few** years, and this has led to growers seeking alternative crops such as vegetables as a diversification strategy to increase farm income. UGA extension specialists developed basic and advanced training materials and held over 12 county production meetings targeting farmers seeking information on alternative crops. In addition, a 3-day statewide vegetable and fruit production conference coordinated and conducted through UGA attracted over 2000 participants in January of 2000.

Impact
More than 150 farmers attended county training meetings; follow-up farm visits and correspondence indicates that many opted to diversify into vegetable production during 2000. Statewide, an estimated

$10 to $20 million in gross receipts were generated by the integration of alternative crops such as pepper, squash, cucumber, carrot, and eggplant into traditional row crop farms. The profitability and survival of these farms were enhanced by the educational programming provided.

Source of Federal Funds - Smith-Lever 3b

Scope of Impact - State specific

Key Theme - Urban Gardening

Outputs:

As the population in Georgia continues to expand, especially in the urban and transitional counties, there is a tremendous demand for correct and environmentally safe horticulture information. Pesticide sensitivity, water shortages, and total environment protection are a few of the issues concerning today's public. The Southern Regional Consumer Horticulture Committee had three multi -state meetings in different locations of the Southeast to discuss collaborative ideas. They created a southern r egional list serve and coordinators list to be used for rapid communication; developed a list of consumer horticultural resources; and are in the process of developing a Southern Regional Consumer Horticulture Web page.

Impact

This project is early in its development. Impacts during 2000 included a report of time saved through sharing of resources and adopting horticultural materials between states (by participants), and the development of an efficient system of communication b etween states.

Source of Federal Funds - Smith-Lever 3b

Scope of Impact - **Multi-State Extension,** AL, AR, FL, GA, LA, MS, NC, OK, SC, TN, TX, and VA.

Biological and Agricultural Engineering

Key Theme - Agricultural Waste Management

Output Indicators:

- 1 course taught that addresses aspects of waste management and util ization
- 5 research projects involving the development of methods that focus on byproduct utilization for further processing
- 3 research projects funded addressing environmental impacts of wastes
- 1 journal article published
- 18 public educational meetings held on waste management issues

- 8 nutrient management plans developed
- 72 certified operators trained to manage waste
- 8 environmental assessments conducted on farms or for industries
- 5 extension publications and web pages developed on waste management

Outcome Indicators:

- 2 new industries developed that further process agricultural, municipal and industrial byproducts
- 1 percent of farms have developed comprehensive nutrient management plans

Performance Goal 4-2: To provide the research, instruction, and extension activities necessary to insure that Georgia citizens protect, conserve and utilize surface and groundwater resources in a sustainable manner.

Key Theme: Integrated Pest Management

Outputs:

Extension specialists continue to develop and refine insect pest management programs and decision making processes for produces on cotton, peanuts, pecans, peaches, tobacco, and vegetable and forage crops grown in Georgia. In addition due to increased concern about potential health risks associated with pesticide application in schools, extension specialists initiated an IPM program for schools and the pest control industry in Georgia. Researchers continue to develop biomonitoring systems applicable to streams, wetlands and agricultural watersheds in general which focus on pesticides used in IPM programs and the use of insects and other invertebrate animals to measure environmental quality and relate findings to potential impacts on human and animal health.

In the IPM is schools program three publications were created and distributed to every public school system in the state. A protocol and information package was developed to assist county agents in implementing IPM in Schools program. Partnerships were developed with key industry and health organizations to gain their support of the program.

Impact:

More than 4000 people attended one of seventy-five county based meetings where insect pest management in cotton, peanuts, pecans, peaches, tobacco, vegetable or forage crops was presented. Extension specialist shared information on insect pest management practices in these crops during professional presentations at two international and twenty -three national meetings. Information on insect pest management practices was made available in thirteen new Extension publications and seventeen crop spray guides (annually revised). Over 320,000 dollars in industry or commodity grants were received in support of insect pest management programs in these crops. Extension specialist were involved in regional/national leadership positions with the peach, v egetable, peanut, pecan, tobacco and cotton industries and provided valuable input into regional IPM strategies, research and Extension priorities, and pesticide use patterns on these crops.

Source of Federal Funds: Smith-Lever Funds

Scope of Impact: State**, regional and national; Multi-State Research** with South Carolina, Florida, Alabama

Key Theme: Pesticide Application

Outputs:
Effective training in pesticide application is necessary in order to minimize pesticide risks. Extension specialists developed a comprehensive program to train both commercial and noncommercial applicators in Georgia. Researchers are currently conducting studies on reduced pesticide usage through studies on insecticide delivery at planting to restrict insecticide delivery to the immediate vicinity of the seed rather than a continuous application throughout the row. Bioassessment research with biorational pesticides to assess efficacy and ultimately application rates is ongoing in addition to insecticide resistance assessment.

Impact:

An annual satellite program (with 12 downlink sites) on pesticide application was attended by more than 800 participants. In addition, the program was taped for distribution to 159 county Extension offices for their use in training applicators throughout the year. A grant for $26,000 was received from the Georgia Department of Agriculture to review and revise all pesticide applicator exams. A program was initiated to translate all of pesticide application information into Spanish in order to better serve Hispanic audiences. Two grants were obtained from EPA to develop pesticide educational materials for Georgians with low literacy skills ($40,000) and to fund the Georgia pesticide training program ($49,000).

Source of Federal Funds: Smith-Lever

Scope of Impact: State, **Regional and National**

Biological and Agricultural Engineering
Output Indicators:

- 2 publications related to ground and surface water quality and quantity were published
- 13 meetings related to ground and surface water quality and quantity were conducted
- 3 research projects were developed which address ground and surface water use and conservation and protection of ground and surface water
- 10 public educational meetings were held which addressed ground and surface water use, management and protection

Performance Goal 4.3: Conduct research, establish demonstrations and educational programs in sustainable agriculture that will enable Georgia's small and limited resource farmers to increase productivity while reducing the physical limitations of their farms; enhance soil quality through the application of organic matter; and compare the performance of a bio-terrace system to a conventional terrace system.

Overview:

The establishment of a vetiver grass bio-terrace on Fort Valley State University (FVSU) Research Farm has resulted in a system that shows possibilities for small limited resource farmers and homeowners to control soil lost form water erosion. The bio-terrace system, established in 1999, grows to a height slightly above six (6) feet in 2000. The bunch grass, spaced six (6) inches apart provide a mechanism that significantly reduce soil movement via water and wind across a field. In order to evaluate regro wth after winter dormancy, the bio-terrace was mowed last February to a height of ten (10) inches. Mowed vetiver grass bio-terrace was compared to a non-mowed segment of the bio-terrace system. Providing new options to control wind and water erosion becomes the focal point of this project.

Key Themes: Agricultural Waste Management, Land Use, Air Quality

Output Indicators:

- Two presentations were conducted at the Annual NRCS Georgia Plant Material field day in Americus, Georgia. Participants came from Alabama, Georgia, Florida and South Carolina. More than 100 professional agents and specialists received in-depth training on production and management techniques of vetiver grass. An overall evaluation by confer ence attendees revealed that vetiver grass could save farmers and the federal government more than 10 million dollars annually via erosion control.

- Twelve (12) Extension based employees and nine (9) Fort Valley State University Plant Science majors received training on growth characteristics and utilization of vetiver grass in bio-terrace systems.

- 5000 copies of "How To Establish Vetiver Grass" was mailed or handed out to farmers, state and federal agencies that provide technical assistance on erosion control.

- 95 program participants at the annual NRCS Georgia Plant Material field day indicated that they had adopted one or more recommended practices in controlling erosion in their state.

- 30 program participants changed behavior about using vetiver grass as an option and/or increased their knowledge about the species and plan to reconsider their methodology

of controlling erosion.

- One Eastern Gammagrass research plot was established on FVSU Research Farm. No data was collected due to drought conditions and initial poor seed germination. Three off campus demonstrations were planned and seeds were provided for each farmer participant. Only one of the three farmers planted Eastern Gammagrass. Germination was slow in one five acre field but very good in a second five acre field. As progressive growth of the Eastern Gammagrass occurred, the farmer experienced a drought period. The forage was grazed when it was approximately 18 inches. When compared with other grasses for grazing during the same period, Eastern Gammagrass was for superior to bermuda, Bahia, and other summer annuals. Daily gains on cattle grazing were 1.57 pounds daily per animal on a hundred day trial.

Outcome Indicators:

- 100 professional agents/specialists indicated that vetiver grass could save farmers and other state/federal agencies involved in erosion control could experience a savings of 10 million dollars annually
- Trained 12 Extension based employees on production controls and management of the grass under different growing conditions
- Distributed 5000 copies of printed material to farmers and state/federal agencies on vetiver grass and its use as an erosion control specimen.
- Demonstrated to seven small farmers experiencing highly erodible conditions on their farms. Each farmer plans to increase vetiver grass use by thirty percent if plant material is made available.
- Participated with Monsanto Marketing Representatives and NRCS District Conservation in strip-tilling training, demonstrations and on-farm plots. A sustainable agriculture cotton research plot was established on FVSU Research Farm by two of my colleagues. We were instrumental in coordinating activities with Monsanto for chemicals and a strip-till plow. Data results are being analyzed from the plot which included strip-till treatments vs no-till vs conventional treatments. One local small farmer tried strip-till for the first time and recorded several hundred pound weight differences in his peanut yield.

Funding Source: Federal Extension

Cooperating Institutions: Monsanto, Natural Resource Conservation Service, Farm Service Agency, Agents, Specialists, farmers

Program Duration: Long term - 2000-2004

Stakeholders Input: Monsanto, Natural Resource Conservation Service, Farm Service Agency, Team Ag Georgia, Fort Valley State University College of Agriculture, Students, Farmers

Allocated Resources:

Fiscal	2000 Federal Extension		$50,000
Human	Professional FTE	.75	
	Paraprofessional FTE		1.00
	Volunteer FTE	.2	

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Biological and Agricultural Engineering

Output Indicators:

- 2 research plots established to evaluate applications of municipal wastes to native forages
- 1 demonstration established to introduce small and limited resource farmers to native forages and Best Management Practices relating to application of organic wastes

Outcome Indicators:

- 1 farmer adopted practice to improve or protect soil/water quality
- 250 farmers trained in manure management
- 170 agricultural professionals trained or updated

Performance Goal 4-6: To have all poultry producers in Georgia implement nutrient management plans.

Overview

Growth of Georgia's poultry industry has resulted in more than 2 million tons of poultry manure and used litter produced annually. Poultry litter and manure has value as a fertilizer when used properly. Most of these byproducts of production are applied to the land as a soil amendment. Poultry

production operations are receiving increasing pressure to comply with EPA proposed CAFO regulations and to apply poultry manures with best management p ractices to protect the state's water resources. The implementation of comprehensive nutrient management plans by poultry producers can reduce the potential for adverse impacts on the environment.

Key Theme - Poultry Production Waste Management

Outputs:
Extension specialists developed a comprehensive nutrient management training program for poultry producers. The training programs consisted of two-hour evening sessions conducted for poultry growers by a team of specialists and county agents. A training notebook and slide set were developed and utilized in the trainings. The trainings were supported by Georgia Poultry Companies, the Georgia Poultry Federation, and the Georgia Egg Association.

Impact:
More than 3,700 people attended these meetings representing about 98% of the state's poultry growers. As a result of these programs, over 50% of the poultry growers have implemented comprehensive nutrient management plans. Follow-up trainings are continuing and new growers are developing nutrient management plans each month. In addition, this program received an honorable mention award from the Governor of Georgia for its effectiveness in promoting conservation efforts on poultry farms.

Source of Federal Funds - Smith-Lever.

Scope of Impact - State specific.

Biological and Agricultural Engineering
Key Theme - Nutrient Management

Output Indicators:

- 2 publications produced related to nutrient management
- 1 poultry integrator training session conducted
- 3 poultry grower meetings held with a total of 220 individuals

Performance Goal 4-10: Improve production and marketing of agricultural and forestry products through a greater understanding of weather and climate and their impacts on and interactions with agricultural and forestry products.

Key Theme - Weather and Climate Variability

Output Indicators:

- 1 new mechanism developed for delivery of weather conditions to producers and other stakeholders

Outcome Indicators:

- Improve production and marketing capabilities as a result of adopting new and improved models of commodity - weather - climate relationships.

Performance Goal 4-11: Develop economically and ecologically viable methods of managing converting and using animal, plant, and human wastes as a resource that can be recycled through agricultural and forestry production systems while not posing an environmental threat to communities.

Key Theme - Soil Quality

Outcome Indicators:

- Soil management team including row crop producers, organic producers, NRCS and UGA personnel have developed soil quality database to measure soil quality on farms with different management and use or organic amendments. Goal is to have producers and others involved in tracking and measuring soil quality.
-

Performance Goal 4-13

Key Theme – Agronomy– Field Crops – Soybean

Outputs:

Environmental pollution from agricultural chemicals has created a need for alternative farming systems that are less dependant on chemicals, stay sustainable and profitable in the long term. Integrating organic production systems with innovative natural fertilizers such as Effective Microorganisms (EM) can ensure agricultural sustainability, create harmony with the environment and could provide safe, healthy and nutritious foods. A collaborative experiment, involving Southern Region Sustainable Agricultural Research and Education (SARE) Program, EM Technologies, Tucson, AZ, and FVSU, was established on a certified organic farm (Glover Organic Farms, Douglasville) to evaluate the effects of microorganisms on soil structure and fertility, and productivity of several summer vegetable crops.

Impact

The results form the study have been presented at an international professional meeting. A similar presentation was made at the SARE funded professional development program "Train the Trainer" workshops in North Georgia. Organic food consumers, organic farmers, and agricultural service providers were educated on the importance of soil microorganisms in sustainable organic production system. National and international interns were trained at this farm. These on - farm experiments were

featured on many farm tours.

Performance Goal 4-14

Key Theme – Agronomy– Carbon Sequestration and Nutrient and Water Management

Outputs:

Soil is the largest reservoir of sequestered carbon which determines the soil quality. Carbon released from the soil and fossil fuel burning contribute to global warming. Researchers in central Georgia are studying the effects of tillage, cover crop, and nitrogen fertilization on carbon sequestration and nitrogen management under cotton production system. The treatments include tillage (no-till, disk-chisel, and strip-till), cover crops (rye, hairy vetch, rye plus hairy vetch, and fallow), and nitrogen fertilization (0, 53, and 106 lb nitrogen/acre). The observations include amount of carbon and nitrogen sequestered on cover crop biomass, cotton biomass, and soil to a depth of 4 ft. This will help us develop the best management practice that sequesters maximum amount of carbon and nitrogen in the plant and soil to help reduce global warming and use of nitrogen fertilizers while sustaining cotton yield.

Impact

The preliminary investigation reveals that rye plus hairy vetch cover crop produces greater biomass than rye or hairy vetch. Students were given hands-on experience in the laboratory analyses of plant and soil samples.

Performance Goal 4-15

Key Theme – Horticulture– Vegetables – Sustainable Vegetables Production

Outputs:

Developing environment friendly vegetable production systems would enhance Georgia's agricultural industry by reducing initial high investment and commercial nitrogen use. This research studies the effectiveness of winter cover crops as a nitrogen source compare to the commercial source. Effects on yield, plant component, gas exchange, leaf area index, and root growth are measured, and relationships between soil organic carbon and plant nitrogen composition is determined.

Impact

Depending on weather conditions during the summer growing season, cover crops can supply more than 50% of supplemental nitrogen needs of tomato and eggplant. Research findings have been disseminated through Ag-Showcase, Ag-Expo, professional conferences and publications in peer reviewed journals.

Performance Goal 4-16

Key Theme – Horticulture– Vegetables – Sweet Potato

Outputs:

The purpose of this research is to minimize chemical use to control sweetpotato weevil by developing weevil resistant transgenic cultivars. Currently, our research focuses on introducing cry IIIA and cry IB insect resistance genes into elite sweetpotato. An electroporation method for gene transfer and transient gene expression has been developed and optimized for stable expression of β - glucoronidase (GUS) gene. Transient expression of the GUS gene was observed in leaf-derived embryogenic callus of sweetpotato. Thus, intact cell electroporation can be used for producing transgenic sweetpotato. This system might be suitable for introducing cry IIIA and cry IB genes into elite sweetpotato cultivars.

Impact

The system developed will enable the production of transgenic sweetpotato with resistance to sweetpotato weevil using the electroporation and other related techniques. This will provide better understanding of the principle of genetic engineering and gen e integration which will reduce pesticide use and alleviate environmental pollution.

Goal 4: Multi-State and Integrated Activities (not identified by a specific performance goal)

Crop & Soil Science

Contributions to Regional and National Conferences/meetings:

1. No-Till Wheat Production in the Southeastern U.S. AgExpo, Clemson,SC
2. Southern Region Water Quality Conference.
3. Southern CAFO conference. "Nutrient Management Plans".
4. Southern Precision AG Conference.
5. Southern Well Workshop "Well-Head Protection and Nitrate Testing."
6. Regional Forage Workshop (Ga, Al,Tn.).

Biological and Agricultural Engineering

Georgia Southern Region SARE Professional Development Program

The Georgia PDP program continues to lead State efforts in developing sustainable agriculture educational programs by developing appropriate partnerships and supporting efforts with proven success. This multi-institutional program includes the University of Georgia, Fort Valley State University, and several other state and federal agencies in Georgia. It also operates as part of the Southern Region Program that includes 13 other states. This year, we conducted about 24 activities reaching an estimated audience of greater than 900 individuals. These individuals ranged from organic farmers conducting educational programs for extension agents to business and community leaders attending the annual Georgia Agri-leaders forum. We reached traditional audiences such as county agents and NRCS professionals through training workshops and field days but also cultivated new audiences through programs such as master gardeners workshops, small and beginning farmer workshops, and youth programs in soil quality through 4-H and open houses at our composting center. We developed new resources such as extension bulletins focusing on composting and nutrient management and used existing resources to insure that new professionals were introduced to the concepts of sustainable agriculture. We also worked to disseminate results from on-going SARE projects through the State. This was accomplished through press released and television clips as well as training workshops and field days at research sites.

Evaluating Agricultural Environmental Management Assessment Systems

Agricultural organizations are increasingly pursuing the development of positive programs to address issues related to water quality, family health and the environment. The ability of these organizations to support state and local implementation of these programs is limited. This project organizes, pilot tests and evaluates a support system that builds partnerships between agricultural organizations and pub lic agencies, evaluates

the results and develops guidelines on the development and implementation of agricultural environmental management assessment systems. This IFAIS funded project includes representatives from more than ten states and a national coor dination and communication network will support dynamic distant learning education that: allows states, commodity associations and other organizations to tailor assessments to identify and address priority state and local needs; support staff training prog rams; provides for coordinated private/public sector implementation efforts; and empowers individuals to access information needed to develop personal action plans that guide voluntary changes and assist in accomplishing priority state and local environmen tal management goals. Georgia's responsibility in this project will be the development and testing of an Environmental Mangement System for the poultry industry.

National Waste Management Center and Environmental Stewardship Curriculum

While this is really two distinct projects, they are closely linked. The development of a National Environmental Stewardship Curriculum was funded by the EPA and provides support for the development and testing of a set of educational tools for livestock and poultry producers. It includes representatives from more than ten land grant Universities. Many of these individual institutions also function as part of the National Waste Management Center that is funded by The Fund for Rural America and includes members of 16 different institutions. The goals of the center are to coordinate the identification of research needs, the development of Extension demonstration programs, develop new waste management technologies and deliver these technologies to stakeholders throughout the country.

Best Management Practices for Cattle Producers Workshop

A Best Management Practices for Cattle Producers Workshop was held May 24-25, 2000 in Calhoun, Georgia. This two day workshop focused on BMP's to improve water quality within the Coosa River Watershed. Topics covered included poultry litter spreader calibration, grazing allocation, alternative water sources, riparian buffers, impact of cattle and water quality and safe use of byproducts. This mult istate effort included agricultural professional and producers from Alabama, Georgia, North Carolina, South Carolina and Tennessee. The workshop received very high evaluations (3.5 out of 4). Many participants commented on the value of making contacts in other states.

GOAL 5: Enhanced economic opportunities and quality of life for Americans.

Overview:

Consumer and human development education, especially for those with limited resources, is essential for improving the quality of life for Georgia families. The Georgia Extension Service provides education and information to help consumers identify quality child care; acquire skills in positive parenting; reduce their debt, increase savings and make financial plans to achieve family goals; become aware of energy and water conservation and waste management; attain affordable housing; and develop other life skills.

Performance Goal 5-1: To annually improve the financial status of families through financial management education programs implemented in CSREES partmers and cooperators and play an active education, or extension role.

Key Theme: Family Resource Management

Outputs:

ıancial self-reliance. Educators utilized a wide variety of mass media (including 21 newsletter articles, 37 radio spots, 41 newspaper columns, and 23 televised shows) to reach almost 3 million people. In addition, there were 309 direct contacts with individuals and 142 group presentations and workshops that reached 3,100 individuals. The county-based faculty participated in 9 trainings designed to increase their competence in teaching and advising their low-income clientele and 29 volunteers were recruited to assist these faculty.

Impact

t programs were considered to be low income or at risk audiences. To increase awareness of the obstacles faced by families living in poverty, 27 poverty simulations were conducted, reaching more than 1,300 community leaders and decision-makers. More than 96% of the participants indicated that they had a better understanding of the state of poverty and almost 75% felt more able to develop community plans of action.

Source of Federal Funds - Smith-Lever

Scope of Impact - State Specific

Key Theme: Aging

Outputs:

A wide variety of family and consumer sciences topics were presented to senior adults, including foods and nutrition, human development, housing, and consumer economics.

Impact

r 13,000 senior adults participated in educational training and workshops. In addition, almost 840 hours of required continuing education were provided to 477 personal care home providers that focused on improving safety and quality of life for aging residents.

Source of Federal Funds - Smith Lever

Scope of Impact - State Specific

1862 Extension

Outputs:

nduct the Cotton Boll and Consumer Jamboree Educational Judging Events (CBCJ). Using hypothetical situations, CBCJ teaches 4-H'ers how to evaluate goods, services and clothing items to meet the needs and wants of different consumers. County Extension staff or volunteers train 4-H'ers using Consumer Education less plans, Cotton Boll and Consumer Jamboree judging manuals, and a subject matter training packet developed by Extension Specialists. Six area events are held throughout the state as well as a State Senior Competition. Participants judge four different classes of items with each class containing four brands or styles of the same good, service or clothing item. They give oral reasons on one class telling why they ranked the items the way they did. Participants also present a two-minute speech on any aspect of cotton or a thirty second cotton commercial according to their age.

Impact:

Cotton Boll and Consumer Jamboree continues to have high participation with 983 participants. An impact survey conducted at the contests also yielded the following results: a total of 602 4-H'ers completed the impact survey; 50% indicated they knew something about cotton as a fiber prior to the contest.; 74% indicated the most important things they learned about cotton were cotton history and uses of cotton; 74% also indicated they would use this knowledge about cotton in the future; 90% of the 4-H'ers indicated they had purchased some of the items judged in the contest. Therefore, the contest is very relevant to youth. 72% responded that they would benefit in the future from what they learned through this contest. 58% indicated that consumer skills were the most important thing they learned through this event. Evaluations also indicated that pa rticipants and their leaders feel the contest is educational and worthwhile.

Impact Statement

Title: Youth Becoming Responsible Consumers

Situation: Today's children and teenagers have more money to spend, more financial responsibilities and more influence on family purchases than did youth in the past. Children and teens directly influence the spending behavior of their parents. Teenagers have a tremendous amount of influence on family purchases such as foods, audio equipment, computers, other electronics, clothes, etc. Childhood is a time when much consumer learning takes place. Attention should be given to educating youth to be more effective consumers, since experiences during childhood influence adult consumer behavior. Youth are targeted by advertisers and marketers and typically do not engage in comparison shopping. A challenge exists to increase the knowledge, skills and abilities of young consumers.

Response: Georgia 4-H conducts a yearly competition based on decision-making skills called "Cotton Boll and Consumer Jamboree". Using hypothetical situations, Cotton Boll and Consumer Jamboree teaches 4-H'ers how to evaluate goods, services, and clothing items to meet the needs and wants of different consumers. County Extension staff or volunteers train 4-H'ers using Consumer education lesson plans, Cotton Boll and Consumer Jamboree Judging manuals, and a subject matter training packet developed by Extension Specialists. Six area contests are held throughout the state. Contest participants judge four different classes of items with each class containing four brands or styles of the same good, service, or clothing item. They give oral reasons on one class telling why they ranked the items the way they did. Participants also present a two-minute speech on any aspect of cotton or a thirty second cotton commercial according to their age group. The top three Junior and Senor teams at each area contest receive cotton prizes such as backpacks, attaches, or duffel bags. The top two Senior teams from each area contest advance to the state competition. The State winning team is awarded saving bonds for each of the team members.

Results: Cotton Boll and Consumer Jamboree continues to have the highest participation of any 4-H educational judging event with 983 participants.

An impact survey conducted at the contests also yielded the following results:

A total of 602 4-H'ers completed the impact survey.

-62% reported that their county had six or more training sessions for the event.

-40% attended 4 - 5 sessions in their county

-64% indicated they practiced and mock judged in their training workshops

-When asked what they would change about their trainings, 36% indicated they needed more practice

-50% indicated they knew something about cotton as a fiber prior to the contest

-74% indicated the most important things they learned about cotton were cotton history and uses of cotton

-74% also indicated they would use this knowledge about cotton in the future

-90% of the 4-H'ers indicated they had purchased some of the items judged in the contest; therefore, the contest is very relevant **to youth.**

-72% responded that they would benefit in the future from what they learned through this contest

-58% indicated that consumer skills were the most important thing they learned through this event

Evaluations also indicate that participants and their leaders feel they contest is educational and worthwhile.

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Performance Goal 5-2: To annually improve the financial status (coping strategies and life skills) of limited resource (at-risk) families and individuals through management education (family development/life, clothing and textiles, and family resource management) programs implemented in which CSREES partners and cooperators play an active research, education, or Extension role.

Key Theme: Family Development

Issue Statement

There are internal and external social problems impacting families, indi viduals and communities. Some of these problems are centered around ineffective parenting, communication skills and family life. Parents need to learn how to openly and effectively communica te and share values, attitudes, and knowledge with their children. Society increasing ly

recognizes the critical importance of effective parenting and communicating. Unemployment, mobility, divorce, and absent parents, along with related social conditions, combine to aggravate parent-child relations. Adults play critical roles in the physical, emotional and mental development of children. Increasing numbers of youth are growing up without the basic types of support necessary to become capable and responsible adults. This support takes many different forms, including nurturing parenting, positive school experiences, supportive communities and opportunities to explore career and life options. Extension provides a unique approach to supporting youth and families at-risk through an overall positive youth development focus.

Outputs:

education and basic skills. Eight (8) Extension county-based employees were trained. Fifteen (15) Extension county-based employees received support materials and educational resources. Major components of the programs are curriculums and resources that were adopted from and supplied by both 1862 and 1890 institutions with similar outreach programs, such as the University of Arkansas at Pine Bluff, Washington State University and Oregon State University. Additional curriculums were purchased. Educational resources were purchased, such as videotapes, textbooks and brochures. The program leader trained county-based employees. County-based employees are sharing resources and information with their clientele.

Impact:

Fifteen (15) Extension county-based employees reported that they distributed 2305 publications; made and/or conducted 245 presentations, programs and workshops; recruited 100 volunteers; reached 487 families; reached 908 adults and individuals; made 882 home visits; reached 641 youth and received 21 trainings. They reported that 555 clientele adopted one or more recommended practices and 480 clientele changed behavior and increased knowledge. One hundred fifteen (115) clientele were surveyed. The results revealed that 72 are currently enrolled in the Family Development/Life Program. Their responses indicated that 68 had changed behavior, 57 had improved their finances and 70 had increased their knowledge. Overall they stated that as parents they are spending more time in their children schools to check on the progress of the children, learning more about responsibility and how to share responsibility, sharing family expenditures with family members, learning to shop for good merchandise, learning about bargain, and learning good parenting skills. The youth are learning skills to take charge of their lives by making wise decisions. Both adults and youth are learning basic skills centered around nutrition, money management, home care and clothing care. They rated the Family Development/Life Program as excellent to good.

Source of Federal Funds: USDA-CSREES 1890 Funds

Scope of Impact: Middle Georgia Specific

Key Theme: Clothing and Textiles

Issue Statement:

Limited resource and low-income families living in Georgia are faced with economic uncertainty. Many of these families live on the edge of poverty and are at great risk of an economic crisis as a result of decline in purchasing power. According to the 1999 census, it is estimated that 16.0% of families living in Georgia earned less than $10,000. Since 1995, the average per cent of income per family member allocated to apparel and apparel services has remained around 5.9% of the annual family budget. Cost of clothing continues to rise and limited resource families are faced with making even more decisions. Clothing and textiles education is needed to help limited resource families make ends meet and to help make wise clothing purchases.

Outputs:

thing program consisted to county- based programs on Back-to-School Shopping, Sharpening Your Consumer Skills, and Personal Development. The programs focused on clothing selection, reading labels, clothing care/storage, and personal appearance. One Textiles and Clothing Training was designed for program assistants to provide up-to-date information on recent trends and issues in clothing and textiles related areas. These program were presented at summer day camps for youth, parenting programs, DFACS, Headstart agencies, colleges and universities. "Fiber Facts Booklets", "Ten Steps to a Clean Wash" poster, "The Clothes Line" Newsletter, "A Circus of Good Habits" were distributed to over 5,000 participants.

Impact:

verall evaluation of the value of the program by participants was excellent. Nearly 80% of those surveyed after the meeting indicated they plan to adopt one or more recommended practices to improve their skills, and to change their spending behavior.

Source of Federal Funds: USDA-CSREES 1890 Funds

Scope of Impact: Middle Georgia Specific

Key Theme: Family Resource Management

Issue Statement:

of these families live on the edge of poverty and are at great risk of an economic crisis as a result of a decline in purchasing power. According to the 1999 Georgia Census, it is estimated that 13.7% persons are living below poverty level in Georgia. These low-income families need to know basic money management skills; how to copy with lack of adequate income effectively and how to manage credit and debt wisely.

Outputs:

m consisted of county-based programs, Earned-Income Credit (EIC), the Made-At-Home Show (Making Money At Home), and Money Management Programs. These educational programs were provided through individual contacts, workshops, group meetings, printed publications, demonstrations, and exhibits. The EIC Program helped families build awareness about ways to apply for, get and manage EIC dollars as well as offered money management training to EIC recipients. Money management was taught to low-income families using a money management curriculum designed for limited resource audiences. Extension agents and paraprofessionals provided financial education to help limited resource families stretch their dollars and make more effective financial decisions. Nearly 50 low-income participants attended a Making Money at Home Show which was designed to help families find ways to generate extra family income.

Impact:

rograms by participants were excellent. Nearly 80% of these participants after the meetings/programs indicated they plan to adopt one or more recommended practices to improve their skills, and to change their spending by decreasing consumer credit debt or increasing savings.

Source of Federal Funds: USDA-CSREES 1890 Funds

Scope of Impact: Middle Georgia Specific

Performance Goal 5-3: To provide the educational resources to enable older Georgians to make informed decisions about lifestyles.

Overview:

Citizens were involved in efforts to address community leadership, community services and needs of older Americans and minorities and special needs populations, development of plans for infrastructure improvement, and establishment of new enterprises. Grants were used in many counties to acquire educational resources and support and complement efforts of other programs

and agencies. Primary areas of accomplishments were in leadership training, rural health issues, and community development.

ny industries that once moved to Georgia for low labor and operating costs have closed or moved to other countries in search of ways to further reduce their costs.

Georgia's rural areas, these moves have resulted in the loss of many vital services like health care, social services and education for limited-resource citizens. can only generate limited revenue because their tax bases have eroded and property tax delinquencies have soared. Georgians are worried about the high and rising cost of taxes and other basic necessities in order to survive.

Key Theme: Aging, Changes on Rural Communities, Promoting Business Programs, Promoting Housing Programs, Community Development

Outputs:

a special initiative to increase the awareness and participation in breast and cervical cancer screening among underserved older, African-American Women. The components of this initiative include health education interventions and follow-up. The initiative targets inner-city and rural communities. The initiative supports the breast test and more program efforts to recruit more women from underserved areas. Unique features of this initiative has been the use of Lay Health Education Workers indigenous to the communities, grassroots recruitment strategies, and the use of infodramas to motivate and educate the target population and their primary he alth care providers.

w initiative are the Southeastern Region Black Leadership Initiative on Cancer, and the Cooperative Extension Program at Fort Valley State University. This initiative activities has focused on education of both consumers and health care providers.

g sessions are empowering residents to assume their rightful role in the operation of their housing and the social and economic development of their communities. The principle vehicle to accomplish this purpose has been a comprehensive package of training programs to these residents. The training curriculum includes board development, resident leadership development, community organization, community and economic development, the social service needs assessment, grantsmanship and other special training to be developed around special needs.

Impact:

The Fort Valley State University Cooperative Extension Program has completed leadership training. Eight-hundred (800) residents of public housing across the State of Georgia. These eight-hundred (800)

residents have learned team building and empowerment skills to become citizens and role models in their communities. Citizen participation in all phases of the community is expected. The Fort Valley State University Cooperative Extension Program was selected to conduct leadership development and team building for this project with the Fort Valley State University having the lead role in the training. The value of this training is valued at over five hundred thousand dollars ($500,000) by reduced welfare benefits increased participation in community activities such as PTA and health advocates.

These training sessions were empowering empowered residents to assure their rightful role in the operation of their housing and in the social and economic development of their communities. The principle vehicle to accomplish this purpose has been a comprehensive package of resident training programs to these residents state-wide. The training curriculum included: board development, resident leadership development, community organization, community and economic development, the social service needs assessment, grantsmanship, fund-raising, advocacy planning and other specialized training to be developed around needs identified by the membership. They offered direct community organization assistance to new and revitalized Resident Associations. Eight (8) of these residents have begun train-the-trainers sessions state-wide to other residents of housing authorities

The Fort Valley State University Cooperative Extension Program and Morehouse School of Medicine, Department of Community Health and Preventive Medicine has initiated an initiative to increase the awareness and participation in breast and cervical cancer screening among underserved older, African-American women. More than sixteen hundred (1,600) women have been served. The components of this initiative include health education interventions and follow -up. The initiative targets inner-city and rural communities. The initiative supports the breast test and more program efforts to recruit more women from under-served areas. Unique features of this initiative has been the use of Lay Health Education Workers indigenous to the communities, grassroots recruitment strategies, and the use of info dramas to motivate and educate the targeted population and their primary health care providers.

Another important impact has the participation in community activities that affect the entire Macon community such as day care, drugs, teenage pregnancy, and senior citizen programs.

A program "Seniors Come To The College Focused On A Health & Well-Nourished Population" day long event consisted of a keynote address entitled, "Something Wonderful is About To Happen: Successful Strategies to Celebrate Uncertain Times." This was followed by six (6) break out sessions covering topics such as: "Nurturing the Self Through Creative Expression"; "Estate Planning"; "Spirituality and Aging"; and "Exercise - The Anti-Aging Prescription". The Fort Valley State University students volunteered their time as part of a course on aging. They helped with organizing the speakers and the luncheon and were present for the entire conference. This added an intergenerational com ponent to the day that was inspirational and a surprise for all participants. Group discussions about marriage, divorce, independence, and relationships were shared among a wide-aged group - with the oldest being 84 and the youngest 21! The day ended with the Educational Playmakers, a group of writers and performers presenting a play entitled, "The Ring" that expressed the joys and sorrows or growing older as a woman.

Three-hundred (300) individuals attended the March 2000 annual conference designed to highlight Rural Health Issues. The theme for this conference was "Developing a Comprehensive Health Care Vision for the Entire Family". Subject matters discussed were as follows: Organ Donations and Tissue Procurement - a workshop focusing on the need for more organ donations in the state of Georgia. Presenters went over the waiting list for transplantation, discussed the need for donors in the minority community and why it was important that more minorities agree in becoming organ donors. The topic "Network of Trust: A Solution to Teenage Pregnancy That Works" included health professionals, community leaders and interested individuals that shared information on making the difference in the life of a teen. The session focused on parenting teens which addressed topics of interest to teen parents such as abstinence. Participants in the Resource Mother's Program session discussed the role lay health workers play in bridging the gap between the community and health or social systems. Presenters provided a look at the "back to the community" approach to protecting and promoting the health, well-being and self-sufficiency of at-risk women, mothers, teens, and young children. Another session, "Hospice & Counseling" dealt with families that face a life-limiting illness and are unaware of the help available to them which addresses their medical needs and the stresses faced; " Health Care Choices for End-of-Life Care" workshop presented participants with a dramatization of their health care choices, services and help available to those experiencing this difficulty; "Sickle Cell Awareness" information was shared on disease process, problems often encouraged, psychological aspect, medical management and the potential future outlook for sickle cell victims; "Teaching Our Youth About Health Relationships" provided participants with a summarization of a curriculum addressing health relationships, dating violence, sexual harassment and sexual assault. This session also defined the need for this type of education in every community.

Funding Source - CSREES

Cooperating Institutions:

Fort Valley State University Cooperative Extension Program
Dr. Mary Williams, Morehouse School of Medicine

Program Duration: This program is long term, 2000-2004

Stakeholders Input: Older Americans Council Advisory Board, Morehouse School of Medicine, Agents, Paraprofessional, Senior Citizens & Specialists

Allocated Resources:

Fiscal 2000 Federal Extension	$70,000
Professional FTE	1.7
Paraprofessional FTE	1.25
Volunteers	0.8

Contact Person:

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Performance Goal 5-4: Develop, provide and expand effective child caregiving.

Key Theme: Child Care

Outputs:

ld care providers were reached in face-to-face trainings by county agents and state faculty, resulting in 23,484 contact hours. Child care providers were also reached through almost 40 different newsletters and publications.

Impact

Over 300 child care providers participated in self-study courses. Of those participating, 77% scored 80% or better on the competency exam.

Source of Federal Funds - Smith Lever

Scope of Impact - State Specific

Performance Goal 5-5: Develop citizenship skills.

Key Program Components:

e 4-H Council involves more than 600 youth who take part in a citizenship emphasis program which includes those who will be eligible to vote actually taking an oath and pledge to be active citizens and voters.

nship Community Pride Projects were conducted by 17 counties in Georgia and document in the 4-H Community Pride Program. These programs cover a myriad of citizenship projects conducted at the local level.

Forty-two students participated in the Citizenship Washington Focus project which involves a week long experience in our national capital visiting centers of government and discussing issues with fellow 4-H members across the national.

ect work required by every 4-H member participating in 4-H project achievement. Youth are asked to carry out individual citizenship projects. The evidence of this citizenship work is documented in the members portfolios which are submitted for competition purposes. More than 3000 students participated in these individual citizenship projects last year.

es through citizenship education training has been accomplished through educational components of Junior District Officer Training (84 youth), State 4-H Council (572 youth) and Junior 4-H Conference (767 youth) completing character & civic education programs. Additionally, Fall Forum (843 youth) included leadership and citizenship training.

orgia have involved middle school students in discussing the future of their community and lifting up needs . This is being captured ion a statewide survey. Involving youth at a young age in citizenship by engaging them in the development of their community is a major focus of the program. Approximately 5,500 youth involved in the initial ph ase of this project.

Performance Goal 5-6: Develop skills in communications, arts and leisure.

Key Program Components: 4-H Leisure Education projects, Clovers & Co., 4-H Camping Program

Outputs:

-Number of 4-H'ers participating in communication, arts, and leisure programs on district and state level: 37,180 members enrolled in Arts & Leisure Education. 94 competed in the Communications project at District and State contests.

-Number of 4-H'ers demonstrating skills identified via public speaking, demonstration, illustrated talks, expressive and performing arts on district and state level: 6610 4-H'ers competed at District 4-H Project Achievement and 2061 competed in educational judging events.

-Number of 4-H'ers involved in Issues Public Speaking Contest: 15.

-Number of 4-H'ers involved in Photography exhibits: 260

-Number of 4-H'ers involved in Public Speaking, Communications, Arts and Crafts, Performing Arts, Recreation and Sports Projects: 1468.

-Number of 4-H'ers involved in 4-H Day at Six Flags, Braves Game, UGA Football, UGA basketball, and UGA gymnastics: 4210.

-Number of 4-H'ers involved in District, regional and State 4-H camps, conferences, and workshops: 10,684.

Impact Statement:

Title: Youth Performing Arts - 20 Years of Excellent Public Relations

Situation:

Youth need opportunities to enhance their self-esteem, acquire teamwork skills, and develop leadership abilities. Performing Arts is the most popular project in Georgia 4-H with an average of 723 4-H'ers competing at District and State 4-H competitions yearly. A vehicle was needed to showcase and highlight these talented 4-H'ers while keeping them involved in all aspects of the program. Georgia 4-H also needed a public relations instrument to publicize 4-H throughout the state and nation.

Response:

Georgia 4-H created the 4-H Clovers & Co. Performing Arts group. The group is celebrating it's 20th anniversary in 2001. The group is composed of 35 4-H singers, dancers, and instrumentalists from across the state. A group of volunteers and 4-H staff members plan the show schedule for the year and manage all the details for the performances (10 - 12 per year) including try-outs, song selection, show development, instrumentation, costume design, choreography, lighting and sound. They promote the group to civic groups, associations, and the general public on the state and national level, as well as to Extension faculty and 4-H members.

Results:

Clovers & Co. provides a learning ground for 4-H members to improve their performing arts skills and increases their interest in the overall Georgia 4-H program. Over 115 4-H'ers audition annually for positions in the show cast, band, and crew. In 2000, four members of the cast were elected to serve as District 4-H Leadership Officers. Twelve were named District 4-H winners in their 4-H projects with four of these achieving State titles. Over 550 4-H'ers have been a part of Clovers & Co. through the past nineteen years. Over 900 parent volunteers have contributed to the show through fund-raising, chaperoning, set-building and most importantly, support of their Clovers & Co. members. Several alumni of the group have achieved successful careers in the music and recording industry as a result of their involvement in Clovers & Co., and numerous other 4-H'ers have been exposed to career opportunities in the Performing Arts arena.

Clovers & Co. promotes the Georgia 4-H program on the state and national level in a positive manner and is recognized as the premiere 4-H Performing Arts group in the nation. The group reaches average audiences of 6,500 Georgians yearly. Out of state performances reach an average audience of 750 patrons yearly. Because of their stellar reputation, Clovers & Co. is in constant demand across the state and nation. In just the past year, Georgia 4-H has worked with Tennessee 4-H and Virginia 4-H in forming groups of their own.

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Performance Goal 5-7: Developing coping and life skills among children, youth and families at risk.

Key program components:

State 4-H Council provides an educational experience for high school age youth to focus on an area of Citizenship each year. Fall Forum provides an educational experience for high school age youth to learn about an issue-related topic. These educational programs include workshops, sessions, panels, and motivational speakers, that engage these young people in the learning process. The participants are asked to go back into their local communities and put into action the material learned at State 4-H Council and / or Fall Forum.

Stakeholders were involved in identifying and prioritizing life skills for programming during the upcoming program planning cycle. Georgia 4-H is targeting life skill development intentionally in educational programming. Leadership, character, decision making, communication, concern for others, teamwork, and healthy lifestyle choices are all life skills that 4-H Faculty will be targeting.

Building assets in the lives of young people is important to the development in youth with limited assets or at risk. Providing 4-H program experiences for all youth provide them with meaningful relationships with caring adults. Through character education, we are teaching, enforcing, advocating, and modeling positive character traits. Establishing parameters in which youth conduct themselves at 4-H meetings influence youth in many positive ways.

Key Theme - Character Counts

Output Indicators

- Agents trained in CHARACTER COUNTS! Character Education framework
- Agents trained in Targeting Life Skills curriculum development – using subject-based curriculum to target life skills development.
- Senior 4-H'ers trained in the BOOMERANG! curriculum
- 40 Senior District Officers trained to facilitate Character Education classes at Fall Conference for middle school age youth
- Two State Specialists certified as CHARACTER COUNTS! Trainer
- Nine Georgia 4-H Faculty and Staff participated in multi-state character education conference

Outcome Indicators

- In-school 4-H curriculum – Friends Issue – Family and Consumer Sciences
- 657 participated in State 4-H Council – Character Education
- 879 participated in Fall Forum – Violence Prevention educational theme

Internal and External Linkages:

Georgia Department of Education, local school districts
Moody AFB
Fort Valley State University
Iowa State University
Josephsen Institute of Ethics, CHARACTER COUNTS! Coalition

Target Audiences

School-age youth, ages 9-19

Key Theme: Children, Youth and Families at Risk

Outputs

r 127 youth (ages 5-18) were involved in CYFAR programs in three areas of the state: Bulloch County, Moody Air Force Base, and Cobb County. Approximately 135 agents, including FACS and 4-H, received training in CYFAR programming.

Impact

in an after-school program showed improvement in reading and science and their parents reported that their social skills had improved. In Cobb County, the youth and their families were enrolled in a program that involves

one-on-one tutoring, group learning and computer skill-building combined with parental supervision of homework and provision of study space. Evaluations showed that these children have made significant improvement in reading, language, and math. At Moody Air Force Base in Lowndes County, dependent children of armed forces personnel participated in after-school programming that promoted positive decision-making, conflict resolution, and prevention of at-risk behaviors.

Source of Federal Funds - USDA-CSREES grant

Scope of Impact - State Specific

Performance Goal 5-8: To build the leadership capacity of individual, groups and organizations to make decisions and take action for the public well-being.

To annually increase the research and knowledge base available from CSREES Partners and Cooperators on the economic well-being of communities and their citizens.

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Issue statement:

Increasing numbers of youth are growing up without the basic types of support necessary to become capable and responsible adults. This support takes many different forms, including nurturing, parenting, positive school and after-school experiences, supportive communities and opportunities to explore career and life options. Youth in rural economic-strapped communities are often not aware of the economic or career options that exist because life in the community is so bleak.

The Fort Valley State University Cooperative Extension Youth Program developed a non-formal Entrepreneurial Education Program to address the self-esteem, critical thinking, problem-solving, language arts, math, science and cooperative learning skills of youth in grades 3rd through 12th.

Entrepreneurship teaches youth the art to become better communicators, serve their communities and help them to reach their potential.

The Fort Valley Extension Agents and Program Assistants reached 39,938 youth between the ages of 5-19 in 38 counties. County Extension 4-H Sprouts - K-4 clubs enrolled 4,403 children through club meetings and specialized summer programs designed to give youth opportunities to participate in organized county based educational programs.

The Youth Program expended $59,941 in program grants and income. The communities saved

over $35,000 in community services from youth, keeping youth offs the street during summer vacation resulted in cities and counties saving over $40,000 in security for mall and business protection from shoplifting.

Outputs:

Three hundred fifty-eight (358) youth completed sixty (60) hours of entrepreneurial training in the YESS! (Youth Empowerment Self Sufficiency) Program an experiential-based program which includes 15 hours of curricula and 15 hours of community experience.

One hundred-four (104) volunteers representing five (5) different agencies, small businesses, the ministry, medicine and education mentors youth and provided job-shadowing opportunities to mentors. Fourteen (14) entrepreneur students, twelve (12) mentors taught classes on diversity, cooperation, anger resolution, and the consequences of violence.

One-hundred (100) youth, ages 12-17, participated in a Start-Your-Own-Business Residential Camp. Targeted youth acquired skills in business and management, careers and job skills, communication, decision-making, leadership and citizenship through youth entrepreneurship camp. Entrepreneurial Residential Camp provided learning and growth experiences for youth which enhanced and fostered a sense of positive self-esteem, independent living skills, decision making, self-discovery, effective communication with peers, parents and others, and experiencing the value of participating.

Summer Day Camps were held in Twiggs, Talbot, Monroe, Schley and Marion Counties for youth 5 to 16 years of age enrolling over 750 youth a day for four weeks.

Summer YESS! (Youth Empowerment Self-Sufficiency Program) enrolled one hundred fifty-eight (158) youth grades 3-7 in a 2 month entrepreneurial program.

Impact:

Two hundred and seventy (270) participants gained knowledge about making personal decisions, managing peer pressure, strategies for improving self-confidence, and handling stress. The Dare-to-Be-You Curriculum offered many interactive activities which hel ped students learn through hands-on experiences.

Three hundred and seven (307) participants in grades 3-6 increased their entrepreneurial skills and knowledge through YESS!/Mini Society curricula in language arts, social studies, math, science, critical thinking, problem solving practical arts and cooperative learning.

2,752 youth learned coping and conflict resolution skills through managing their own businesses.

Program Resources:

YESS!/Mini Society Curricula

PARC Curriculum
Dare-to-Be-You Curriculum
After-School Programs
WISP Curriculum

Internal and External Linkages:

E. Marion Kauffman Center for Entrepreneurial Leadership
PARCS, Inc.
Concerned Citizens of Atlanta, Inc.
Local Government Leaders

Target Audience:

4-H and other Youth
Pre-4-H Youth
Teen Leaders Enrolled in Programs
At-Risk Youth and Young Adults
Adults
Volunteers
Teen Parents
3rd - 7th Graders

Program Duration: 2000-2004

Allocated Resources:

EFT	2000
Professional	1.7
Paraprofessional	1.5
Volunteers	16

Funding Source: CSREES

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Output Indicators

2898 youth participants completing programs
12 brochures/handouts, & program aids developed
-Sowing the Seeds of Character
-Boomerang Curriculum Instructional Packet
(State Council, Jr Officer Training, Jr Conference)
-Leadership for Youth Instructional Packet
(Fall Forum

-Tools of the Trade
(District Officer Training Notebook)
-Tools of the Trade II
(State Officer Training Notebook)
-Certified Teen Leader-All Bout Camp Handbook
-Camp Counselor Handbook
-Certified Leader Training for Counselors Handbook
-Teen Leader Recognition Program Packet
-Managing & Training Volunteers Packet
-Horse Club Leaders Packet
-Training 4-H Officers (Leaders Guide)
10 statewide youth programs held
16 training sessions for adults (volunteers & faculty)
Cooperators include
South Eastern Electrification Council
Character Counts Coalition
Georgia Power
Georgia 4-H Volunteer Leaders Association
Georgia Master 4-H Club
Georgia Farm Bureau

Outcome Indicators

2 new 4-H leadership programs started (Georgia 4-H State Officer Training, Certified Teen Leader Program-All 'Bout Camp)

Key Program Components

- Training young citizens to accept responsibilities through citizenship education training has been accomplished through educational components of Junior District Officer Training (84 youth), State 4-H Council (572 youth) and Junior 4-H Conference (767 youth) completing character & civic education programs. Additionally, Fall Forum (843 youth) included leadership and citizenship training.
- Enhance opportunities for youth to learn and adapt entrepreneurial skills has been accomplished through the new Certified Teen Leader-All Bout Camp program as well as the work done by the 18 youth in the Workforce Preparation and Career Development Project.
- Teen Leadership Competition recognized more than 450 youth for their work as leaders in their community. These youth completed community service, agricultural awareness, environmental, and public relations project as well as working with at risk audiences and forming more than 75 new project clubs. As a 4-H'er completing the program describes "The Teen Leader program recognizes everybody who met their goal. Even those who don't like competition can win in Teen Leader. I think that's important. Kids should be applauded for making an effort not just for being the best."

- The District and State Officer Training program has been expanded to included training in conflict resolution, decision making, ethics, and teamwork for the more than 52 youth that participate in the program. A pretest, post test evaluation has been included in the program with participants showing an increase in knowledge immediately following the week. Additionally, state 4-H officers participate in year long self-evaluation of progress, knowledge and usefulness of the training sessions.
- Counselor Training includes more than 75 hours of hands on training for 72 college age youth working the camping program. Training is not only job specific but also includes first aid & cpr, ages and stages of youth development, discipline & working with youth, teamwork, conflict resolution and other training activities.
- Certified Teen Leader-All Bout Camp program has developed to provide youth with hands on experience and training in the teen leader camping role. 40 youth completed the inaugural training program and donated more than 4000 hours in the camping program. After completing the program, the ABC's cited the program as superior. Having found the experience "rewarding," "exhilarating," "wonderful, and "a great learning experience." The program included a post-test evaluation of knowledge gained along with an self analysis following completion of the program. Additionally, ABC's have been asked to complete surveys throughout the year to access the level to which they put the training to use outside the ABC summer activities.
- Georgia Youth Tour included 4 youth selected as leaders to work with other officers from other youth agencies in Georgia on a week long business and industry tour. Youth participated in classes, clinics and workshops providing work related information and development of donor relation skills.

1890 Research
Performance Goal 5-10
Key Theme – Consumption and Market Trends of High Value Products

Outputs:

Consumer health concerns and food product development have resulted in substantial change in the food buying patterns. It is hypothesized that growth in the food product industry will be affected by new food products, nutritionally improved foods (NIF), and nutraceutical foods. The new consumer demands appear to be driven by factors such as convenience, household time management, the level of consumer food dollar(s) for spending, and beliefs and values on health and nutritional issues. An exploratory market survey of middle Georgia households that focused on their buying decisions regarding nutritionally improved foods was conducted. A study is also underway in the southern region to focus on the demand for NIF by low-income disadvantaged households.

Impact

The middle Georgia study has heighten the awareness of the community and should encourage health dialogue between retail and wholesale grocery chains on the types of new products that consumers are demanding. Studies like these have the potential to influence consumer health maintenance and to target more fresh foods, as well as enhance the role of nutraceuticals in foods.

Performance Goal 5-11

Key Theme – Horticulture– Vegetables – Irish Potato

Outputs:

Potato is generally considered a cool season crop for temperate climates but its cultivation and production is extending to warm climates especially in developing countries. Several constraints including lack of quality certified seed, the need for seed renewal annually, pest damage, and marketing hamper production. In middle Georgia, the establishment of Frito Lay facility has created opportunities for potato production. In warm climates potatoes are produced for fresh consumption but their chipping quality is low due to low specific gravity. Because of multiple problems associated with potato production from seed tubers in warm climates, the use of true potato seed (TPS) as planting material is becoming a viable alternative. Furthermore, seed plot technique has been used to solve the problem of seed, that is, the need to renew seed every year. Research was also conducted on specific gravity for potato produced in middle Georgia.

Impact

This research indicated that fresh market quality potatoes and chipping quality potatoes can be produced in Georgia. Moreover, the combination of TPS technology and seed plot technique can help reduce seed related problems. With TPS technology and seed plot technique, potato tuber yields averaged about 25 MT/ha. Seed plot technique showed that potato tubers can be used as seed for four years without renewal and reduction in yield. The mean specific gravity of the tubers ranged from 1.051 to 1.089 and many TPS lines had higher specific gravity than elite cultivar Red Pontiac. The yields and specific gravity of TPS lines in this study were comparable to those normally reported for table varieties in the main potato growing regions of North America. Potato could be a viable short season cash crop for Georgia farmers. Potato production offers Georgia farmers an opportunity to increase their income and that could enhance their quality of life.

Goal 5: Multi-State and Integrated Activities (not identified by specific performance goal)

Volunteers

1-Did the planned programs address critical issues of strategic importance, including those identified by stakeholders?

Yes.

2-Did the planned programs address the needs of the under-served and under-represented populations of the State (s)?

Yes.

3-Did the planned programs describe the expected outcomes and impacts?

Yes. An increase in participation in this past year's Southern Regional Leader Forum has shown an expected increase in participation of projects led by leaders in their home counties. Additionally, a sharing of current volunteer screening and certificat ion processes across the southern region on an informal basis has enabled states without processes to develop those in keeping with their neighboring communities.

4-Did the planned programs result in improved program effectiveness and/or efficiency?

The volunteer faculty specialists have met as planned from the plan. This has resulted in increased sharing of work and efficiency in development of additional resources to use throughout the region. Additionally, plans are in place for continued quarterly s haring and involvement.

Character Education

1-Did the planned programs address critical issues of strategic importance, including those identified by stakeholders?

Yes.

2-Did the planned programs address the needs of the under-served and under-represented populations of the State (s)?

Yes.

3-Did the planned programs describe the expected outcomes and impacts?

Yes. Character education emerged as one of the primary needs in both the region and the state. Impacts statements have been developed in the state reporting system and the national

4-Did the planned programs result in improved program effectiveness and/or efficiency?

4-H and Extension has not only partnered with multiple state in this program development and delivery but has become a partner with other youth serving agencies in delivering education and youth development in Character Education .

Stakeholder Input Process

The University of Georgia College of Agricultural and Environmental Sciences' (CAES) three components are univied under one Dean. As a result advisory activities often serve for all three functions.

The various stakeholder input methods are described as follows:
The CAES Advisory Council, which includes representatives from across the state and for all programs, has 41 members which meet every 6 months to give input to the dean and Associate deans.

The Ag Leaders is a group which made up of the CAES Dean, Georgia's Secretary of Agriculture, the Georgia Farm Bureau President, and others key agricultural leaders. This group meets quarterly to discuss agriculture's successes and directions.

The Ag Round table is a coalition of approximately 50 agricultural commodity groups and agribusinesses which meets quarterly with the Dean to provide discussion and input for the college.

The CAES Dean established a liaison program about five years ago. There are approximately 200 organizations/industries to which a faculty member (tenured or non-tenured) is assigned as a liaison. The faculty member may serve as a resource person, as a board member, attend board meetings or meet individually with members in order to learn what is happening in that organization/industry. The Dean meets with these liaisons once a year for a report, but also asks for input if there are important issues surfacing which needs to be considered for action.

The county field staff are very active in gathering input for the college. They do this in a variety of ways: advisory committees, being active with organizations/industries in their county, one-on-one input with clientele and by monitoring phone call and office visit content for any trends. Every county is required to have a committee in place and to meet with that committee at least twice a year. The committee members are based on a matrix so that all members of the community are represented.

Each subject matter department has its own method for staying in touch with the industry with which it works. Some departments have an advisory committee, others are active in the industry's major organization and others rely on one-on-one contact with the industry's representatives.

Stakeholder input processes for The Fort Valley State University Research and Extension Programs employ diverse methodologies which allow for input from end users, including county advisory committees and individual clients, peers and other agricultural professionals, partners and cooperating agencies, including community-based organizations, and university

administrators. The College of Agriculture, Home Economics and Allied is currently finalizing the establishment of a college-wide advisory board for teaching, research and extension programs.

Annually, county-based professionals and para-professional complete and submit survey instruments used to measure clientele needs for programs and services offered at the loc al level by the Extension Program. Concurrently, 1890 program clients are included on county-wide advisory boards which provide for development of individual county plans of work. Evaluations of programs conducted are also used to measure value of ongoing programs.

Agricultural researchers and Extension specialists also use feedback gained from clients and others attending workshop and similar events to gather input on current and planned programs. At the same time, these agricultural professionals use peer-to-peer contacts, professional meeting, media reports and other data to gauge emerging issues and evaluate their relative value to identified need of clientele. Active partnerships wit h community-based organizations also provide useful perspective on issued and opportunities which may be integrated into research and extension programs.

University administrators also provide valuable input for program development and implementation as b oth research and extension programs are evaluated in terms of their relationship to the overall university mission. A major current focus is engaging the total university in the Land-Grant process.

Program Review Process

There will be no changes in the review process for either the 1862 or 1890 institution.

Evaluation of the Success of Multi and Joint Activities
Multi-State Extension Activities
Integrated Research and Extension Activities

There are review comments on these three parts in the body of the Planned Programs section.