Georgia
Annual Report of Accomplishments
FY 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
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The Georgia Annual Report of Accomplishment
FY2004
(updated April 12, 2005)

Table of Contents:

Signatures required on the cover page and the expenditure reports are not included in the electronic versions of this report. Signatures are on record with original report.

INTRODUCTION:

The Georgia Annual Report of Accomplishments and Results for year 2003-2004 represents a coordinated effort between Georgia's 1890 and 1862 institutions – Fort Valley State University (FVSU) and the University of Georgia (UGA), and includes singular and combined results of Research and Extension units at both Universities.

Within the Extension Service UGA and FVSU state faculty with extension appointments coordinate efforts with UGA county faculty housed in 158 of Georgia's 159 counties. FVSU has 7 county agents of which are housed with UGA extension faculty. Extension programming is delivered as individual county efforts, multi-county programming, and state wide programming efforts.

The research programs of FVSU and UGA are conducted through the Agricultural Experiment Stations system. The Agricultural Experiment Stations consist of four major campuses located in Athens, Tifton, Griffin and Fort Valley, Georgia. These four campuses are supported by several research and education centers located strategically throughout the state.

Research and Extension faculty have made major accomplishments toward goals identified in the current Plan of Work. While reduced state funding has greatly impacted the efforts of our faculty, our organizations have been effective and productive during the past year. Many of the documented outcomes within this report demonstrated immediate and prolonged impact on the citizens of Georgia.

This report represents the Extension and Research programs of both the University of Georgia and Fort Valley State University as represented in the AREERA plan of work submitted in 1999 and revised in 2003. The accomplishments are recorded according to Key Themes and State Performance Goals.

In addition to this report, hundreds of impact statements may be accessed at

http://apps.caes.uga.edu/impact/

This impact database website contains advanced search capabilities that allow the user to sort for key words and program goals. These 2004 impact statements are summarized in a document entitled Countdown 2004 and can be located at

http://interests.caes.uga.edu/impacts/countdown2003/index.htm

Many of the accomplishments highlighted in this report are summaries of these impact statements. The impact statement database contains a great deal more information than the limited summaries included in this report.

GOAL ONE
AN AGRICULTURAL PRODUCTION SYSTEM THAT IS HIGHLY COMPETITIVE IN THE GLOBAL ECONOMY

Today, agriculture remains the largest segment of Georgia's economy. The 2003 Georgia Farm Gate Value Report indicates that 2003 was a notable production year for most of Georgia's farm products. Weather was much improved and conducive to higher field crops yields, and prices were higher for animal and crop products when compared to 2002. As a result, the total estimated Farm Gate Value was up about $1 billion from previous year, the largest year-to-year increase in value reported by Farm Gate surveys.

Of the $9.8 billion in farm gate value for Georgia, poultry accounts for 40% of the total value. The remaining 60% is greatly divided among a diverse agricultural system. The top ten commodities in the state are (listed in order): Broilers, Cotton, Timber, Eggs, Horses, Beef, Peanuts, Greenhouses, Dairy, and Container Nursery.

There have been significant accomplishments toward improving the agricultural system in Georgia. The work has been diverse and representative of the industry in Georgia.

Water continues to be a major area of interest. Following lawsuits by Alabama and Florida against the US Army Corp of Engineers, much attention has turned toward irrigation. Claims of farmers' excessive water use could neither be discredited nor supported since there was no metering or reporting mechanism. College scientists teamed up with 680 farmers who volunteered to allow specialist to visit their fields and record irrigation. This program has provided the state with a comprehensive examination of water use amounts for four years. The data is now assisting water planning efforts.

Biological and agricultural engineers have developed a cheap and reliable process using 10-20 real-time smart sensors to alert a grower when a crop needs irrigation. This cheap and reliable could be implemented for less than $1500 per field. Another irrigation scheduling tool known as the Easy Pan is spreading across the southern U.S. A start up business was initiated in Georgia and has sold over 500 units as far away as North Dakota.

Weather, plant health, equipment availability, and soil & environmental conditions all affect peanut harvest timing. Research has documented the increase need for farmers to manage harvest date. Harvesting 10 days too early can result in a yield reduction of 830 pounds per acre. Harvesting 10 days too late can reduce yields by 845 pounds per acre. Harvesting too early or late could result in a $22.5 million lose in income if just twenty-five percent of the crop is harvested outside of the ideal harvest window.

A small portion of nearly 500,000 plant species has been investigated for their medicinal attributes. Plant-based medicines play a significant role in the primary health care of 80% of the world's population. Chemicals derived from plant sources account for 25% of today's prescription drugs. Researchers are identifying, introducing, and improving potential bioactive plant species to assist small farmers to produce for this niche market.

Georgia's second largest crop is already benefiting from the construction of Cotton Micro-Gin this year. This world class facility will continue to be a valuable research tool for addressing current and future fiber quality issues. Work also continued with weed control procedures. Even with Roundup Ready cotton, long growing seasons and seed resistance issues necessitate the use of residual herbicides applied preemergence or either tank-mixed with ghyphosate. Regional studies indicate that residual herbicides used in combination with glyphosate can be used effectively for weed control, but there is risk for Roundup Ready cotton crop injury.

Tomato spotted wilt virus (TSWV) continues to be the largest restraint to tobacco production in Georgia. The level of disease fluctuates from a few percent to over 40% in past years. Research has demonstrated that the strategic application of about $100 of agrichemical reduces disease from a very high (67%) to a manageable (22%) level and regain yield. These management techniques increased yield 1,475 pounds or $2400 per acre.

Rust, a fungal infection, can negatively affect production of many nursery and floriculture ornamental crops. These pathogens cannot be adequately detected on symptomless but contaminated propagation material entering the U.S or moving state-to-state. Scientists have increased our understanding fungicide applications for the sole purpose of reducing or eliminating spores plant surfaces in several situations.

The Southeastern Small Fruit Center is an excellent example of multistate cooperation with limited resources. Scientists from multiple states have worked together with success. These collaborative efforts have been largely responsible for increased production in the last two years.

Georgia poultry producers spend over a billion dollars per year on feed. The University of Georgia poultry feed services lab has established the university as the leading center of nutritive energy determination of poultry in the western hemisphere.

The training of over 5000 Home Depot garden employees is just one example of the impact of extension programs in Georgia. Training models like this are helping Extension to multiple its impact to homeowners.

This section of Georgia's Accomplishment Report highlights these and other accomplishments impacting agriculture.

Key Themes: Agricultural Competitiveness

State Performance Goal: 1-1

a. **Peaches are harvested while very firm to help reduce bruising when transported from tree to packinghouse in bulk bins about 18 inches deep on modified farm or peanut wagons.** The wagons haul up to eight peach bins on a

rigid frame that lacks any springs or shock absorbers to cushion the peaches from rough roads. The distance traveled can be several miles over combinations of field, gravel, and paved roads. Recently, a few wagons were equipped with low-pressure tires in an effort to reduce bruising. However, even with low-pressure tires the rough ride from orchard to packinghouse still requires that peaches must be harvested at less than the maturity needed for developing full flavor.

The University of Georgia and Fort Valley State University have developed new and improved wagon prototypes for the last three years. A peach wagon with a full suspension system was developed through a collaborative project between UGA and Fort Valley State University (FVSU). A low-cost solution for providing springs and shock absorbers was found by using pick-up trucks previously assigned to salvage.

b. Measurements of samples showed less bruising for peaches transported on wagons with suspensions than those without. Suspended wagons will enable the harvest of more mature peaches, giving them better taste when consumed. The wagon with brakes increased the driver's sense of security, especially at highway speeds. Peach growers/packers can build their own suspended wagons based on the design prototypes. In addition, similar suspended wagons could be built for other crops needing increased cushioning. The friendly competition between UGA and FVSU resulted in unique design features in the wagons and a productive collaboration among faculty, staff, and students at the two institutions.

c. Hatch Act, Smith Lever, NARETPA, State Matching Funds

d. Integrated Research and Extension

Key Themes: Agricultural Profitability, Plant Germplasm, Plant Health

State Performance Goal: 1-11

a. Peanut growers in Georgia have traditionally grown runner-type cultivars, specifically those that have been developed in either Georgia or Florida. However, there are several other excellent peanut breeding programs in the United States that are developing both runner and virginia-type peanut cultivars. Some of these have very high yield potential, and there is increasing interest in the southeastern U.S. in planting other cultivars. This is particularly true of the Virginia market types which have historically been grown in North Carolina and Virginia. **Drastic changes in the recent Farm Bill have resulted in reduced peanut production in those two states, and growers in Georgia will likely increase their production of Virginia-type peanuts. UGA plant pathologists know it is important to evaluate this germplasm for susceptibility to the major diseases in the Southeast.**

b. About 120 lines were screened in the greenhouse for susceptibility to root knot nematode and Cylindrocladium black rot. Additional plots in the field evaluated the susceptibility of 76 lines to southern stem rot, tomato spotted wilt, and early and late leaf spots. A wide range of susceptibility was identified to each disease evaluated. Some genotypes that performed well in other locations clearly were not suitable for widespread planting in the Southeast. Other genotypes were very promising and will be evaluated in more detail. This information will be critical as breeders decide which germplasm to release for use in the Southeast. Some of these genotypes have been released and are starting to be grown commercially. This corresponds to **the release of Georgia's Fungal Disease Risk Index which helps growers decide on levels of input based on the inherent risk factors present in each field.** One of the major components of that risk is the susceptibility of genotypes to the various diseases. This work provides information to refine that key element of the Risk Index, thus enabling growers to target the money spent for fungicides where it is most needed.

c. Hatch Act, State Matching Funds

d. State Specific

Key Theme: Agricultural Profitability

State Performance Goal: 1-11

a. Georgia is the third largest cotton producing state in the U.S. and largest in the Southeast. **The survival of Georgia’s cotton industries is threatened by lack of varietal improvement.** Yield and fiber quality have not improved in the past 10 years, while production costs have concurrently risen faster than the rate of inflation, resulting in unit production costs often exceeding returns for many Georgia cotton growers. Poor fiber quality of Georgia cotton for the last several years has damaged its reputation to the extent that certain yarn manufacturers now stipulate that they will not purchase Georgia cotton entirely or they limit the amount of Georgia cotton in purchase contracts.

b. The UGA Cotton Breeding Program develops high yielding germplasm and varieties with the needed fiber properties to support Georgia's cotton industry. The germplasm line GA98066 was released in 2004 for use as a parent in cotton variety breeding programs. GA98066 has similar or better yield potential than the popular transgenic varieties, each planted to large portions of the Georgia cotton acreage in 2004. Compared with these varieties, GA98066 has longer staple length and higher fiber strength, fiber characteristics required by yarn manufacturers to construct strong, high-quality yarns at profitable unit costs.

c. Hatch Act, Smith-Lever Act, State Matching Funds

d. Integrated Research and Extension

Key Theme: Agricultural Competitiveness

State Performance Goal 1-11

a. **Georgia leads the nation in total annual peanut production** with nearly half, and average state peanut yields have more than tripled in the latter half of the 20th Century. **Publicly developed cultivars have played a major role in this overall process,** and the quality of this vitally important commodity has likewise been enhanced.

b. 'Georgia-03L' is a new large-podded runner-type peanut variety that was released in 2003 by the Georgia Agricultural Experiment Stations. It was developed at the University of Georgia, Coastal Plain Experiment Stations in Tifton, Georgia. Georgia-03L has similar maturity as Georgia Green with pods and seed significantly larger. Georgia-03L also has a high level of resistance to tomato spotted wilt virus (TSWV) and moderate resistance to soil borne diseases: white mold or stem rot and CBR. It has a high percentage of large smooth bright pods with an intermediate runner growth habit and pink seed coat color. Georgia-03L is highly productive, produces high yield and high dollar value return per acre.

c. Hatch Act, State Matching Funds

d. State Specific

Key Theme: Agricultural Competitiveness

State Performance Goal: 1-11

a. **Seashore paspalum is an environmentally-friendly warm-season turfgrass** and is grown primarily in coastal regions of the southern United States. This grass has a low requirement for fertilizer and is adapted to saline sites. However, similar to all turfgrasses, weeds can be a problem in seashore paspalum. As this turfgrass is relatively new (within the last 5 years) in the United States and most areas of the world, very few herbicides are registered for weed control in this species.

   Research conducted over the past three years at the UGA-Griffin Campus has identified several herbicides that could be used for weed control in seashore paspalum. These include metsulfuron for broadleaf weed control and quinclorac for the postemergence control of crabgrass and certain other annual grass weeds. Additionally, we have shown that quinclorac can be applied to seashore paspalum at the time of seeding and at the seedling growth stage. Seashore paspalum is a

prolific producer of seedheads which are objectionable in highly-maintained turfgrasses. Research has shown that low rates of some sulfonylurea herbicides have potential for decreasing seedhead production in this turfgrass.

b. Information generated from this research is being supplied to agri-chemical companies who have proprietary rights for these herbicides. Companies will be able to use this information to register these herbicides for use on seashore paspalum. The net impact will be that turfgrass managers and homeowners will soon have effective herbicides that can be used to control objectionable weeds in seashore paspalum. As weed control programs continue to be developed for seashore paspalum, this use of this grass will continue to increase in geographical areas where other turfgrasses are poorly adapted

c. Hatch Act, State Matching Funds

d. State Specific

Key Themes: Agricultural Competitiveness

State Performance Goal 1-11

a. Small grains are used for grain and forage crops and fit well as a double-cropping alternative. The development of resistant cultivars significantly prevents yield and economic losses as well as protects the environment by reducing the amount of fungicides or insecticides used. The UGA **Small Grain Breeding Team is working to develop improved cultivars.**

b. The UGA Small Grain Breeding Team regional program has resulted in the release of broadly adapted cultivars. In 2004, a new high yielding wheat cultivar, GA 931233E17, was exclusively released as “McIntosh” to Vigoro Seeds, Inc. This wheat release is high yielding cultivars with excellent test weight and disease and insect resistance and will offer new source of resistance to both pathogens and insects. A new triticale variety,” Monarch”, and a new rye variety, “Boss”, were released for use in wildlife plots. Several new wheat, oats, rye and triticale elite lines will be released in 2005.

c. Hatch Act, State Matching Funds

d. State Specific

Key Theme: Agricultural Profitability

State Performance Goal: 1-12

a. Cotton and peanuts are a common combination for many producers in South Georgia. Unfortunately, cotton and peanuts both require about the same number of days to mature. As a result, cotton harvest is generally initiated following the completion of peanut harvest. Due to excessive weathering, this **delay in cotton harvest may cause significant losses in lint yield and quality.** UGA crop and soil scientists in Tifton conducted studies to determine the physiology of cotton fiber development and the extent of losses incurred in lint yield, fiber quality and profitability when cotton harvest is delayed. Cotton was harvested at 13 timings during the fiber development stage.

b. Results showed that a two-week harvest delay reduced the adjusted gross income $20.61 per acre. These losses were incurred from reductions in lint yield and price discounts for unacceptable fiber quality. An additional two-week harvest delay (four weeks total) reduced income an additional $61.84 per acre ($82.45 per acre total) while a six-week delay resulted in an additional $103.06 per acre loss ($185.51 per acre total). The rate of income loss increased exponentially with continued harvest delays.

c. Hatch Act, Smith Lever, State Matching Funds

d. Integrated Research and Extension

Key Theme: Agricultural Profitability

State Performance Goal: 1-12

a. Alabama and later Florida brought suit against the US Army Corps of Engineers over proposed water use in the Metro-Atlanta and West Georgia area. However, soon after the Flint River Basin was added to the suit, much of the attention on water use was turned towards farm irrigation. **Claims of farmers' excessive water use could neither be discredited nor supported** since there was no metering or reporting mechanism for agricultural water use. Georgia negotiators made conservatively high estimates of annual irrigation amounts in order to reserve more water for the state's farmers. Those estimates contributed to the public's impression that agricultural irrigators were profligate. However, even as Tri-State Compact negotiations were underway, Georgia regulators sought new information on agricultural irrigation, information that would be based in science.

   College scientists and extension specialists teamed up with 680 Georgia farmers who volunteered to allow UGA personnel to visit their fields and record irrigation. Potential participants were selected by a random draw of EPD-issued water withdrawal permits. When asked, almost all agreed to participate in the metering program that became known as Ag Water Pumping. For the next 5 years, field teams from Tifton, Griffin and Statesboro made monthly visits to each selected field and recorded the crops present and the water consumed. Traveling

more than 500,000 miles to make almost 40,000 field visits to 860 fields, team members accumulated an accurate picture of agricultural water use in wet years as well as during the most severe drought in half a century.

b. Farmers in the study used their irrigation systems to supply water for 53 different crop commodities. Ninety percent of all fields received less than 18 inches per year, even in the most severe droughts and regardless of which crops were grown. The average annual irrigation was less than 10 inches during the drought years and less than 6 inches in wetter years. Farmers who had groundwater for their irrigation supply typically applied 3 to 4 inches more per year than those who had to rely upon runoff collected in ponds. About 80% of irrigation systems in Georgia are center pivots. These are efficient in water application and farm management, and Georgia farmers have enhanced that efficiency by converting most to lower pressure, lower energy configurations. Irrigation was primarily applied during months on May through September when rainfall deficits coincide with peak water use of the region's crops. Surface and groundwater withdrawals for irrigation vary among Georgia's 14 river basins, with highest percent withdrawals made from the Ochlocknee, Flint, Suwannee, and Okmulgee basins. Calculated withdrawal volumes are large, particularly in Georgia's basins that lie predominantly in the Coastal Plain. However, when compared to annual rainfall resources, these withdrawals are quite small – 1 to 4% of annual rainfall volume. **The Ag Water Pumping Program has provided the state with a comprehensive examination of water use amounts by Georgia farmers** during the 2000 to 2002 drought years and the wetter 2003 and 2004 years that followed. The data are now available to assist water planning efforts that began recently in the Flint Basin and the Coastal Zone.

c. Hatch Act, Smith-Lever Act, State Matching Funds

d. Integrated Research and Extension

Key Theme: Agricultural Profitability

State Performance Goal: 1-12

a. Various amounts of research and demonstrations have been conducted since the mid-'70s on the effect of harvest date on the yield, grade and quality of peanuts. Many new peanut varieties have been released in recent years and have many different attributes including varying maturity. Complaints have also come from producers regarding seed germination and quality. In 2004, UGA crop and soil scientists evaluated five peanut cultivars of various maturities for the response in yield and grade when harvested ten days early or late compared to optimum maturity.

b. Weather, plant health, equipment availability, and soil and environmental conditions all affect peanut harvest timing. Harvesting 10 days too early resulted in a yield reduction of 830 pounds per acre at a value of $150 per acre. Harvesting 10 days late reduced yield by 845 pounds per acre at a value of $152 per acre, assuming the same grade for each. This is a tremendous impact on crop value for **the Georgia peanut crop and in this situation would result in lost income of $22.5 million if just a quarter of the crop was harvested too early or too late.**

c. Smith-Lever Act, Hatch Act, State Matching Funds

d. Integrated Research and Extension

Key Theme: Agricultural Competitiveness

State Performance Goal 1-12

a. Over the past eight years, the adoption of genetically engineered varieties with genes conferring pest management traits has revolutionized cotton production in Georgia. Transgenic varieties have been planted on more than 90 percent of the acreage each year since 2000. Unfortunately, these changes have also brought **a decline in reputation of the fiber quality of cotton produced in the state**. In 2004, at least four major U.S. textile mills publicly declared a bias against Georgia cotton. Several UGA Cotton Team members have interacted with the Georgia Cotton Commission, Southeastern Ginners, Southern Cotton Growers, the USDA Cotton Quality Research Station, Cotton Incorporated, and the National Cotton Council to consider the nature and scope of the problem and possible solutions. Scientists conceived the idea of a scaled down but fully equipped micro gin to employ commercial-like effects to small plot samples. This gin could more accurately measure the effects of experimental treatments such as cultivar, production management, pest control, fertility, etc., on fiber quality.

b. **The first cotton samples were run in the UGA Cotton Micro-Gin in the summer of 2004**. It is anticipated that this world class facility will be a valuable research tool for addressing current and future fiber quality issues. A UGA cotton breeder has been advancing high yielding lines and nematode tolerant lines with superior fiber quality. Exploration of the cotton genome expands the possibilities for future advancements of cotton genetics as it relates to both yield and quality. Applied field research efforts are studying glyphosphates in Roundup Ready cotton, managing stink bugs, nematode damage and many other projects. The spotlight on fiber quality has caused gin managers to scrutinize and improve their handling/processing systems and to encourage growers to do likewise.

c. Smith-Lever Act, Hatch Act, State Matching Funds

d. Integrated Research and Extension

Key Theme: Agricultural competitiveness

State Performance Goal: 1-12

a. Throughout the southern production region of the US, Roundup Ready cotton has become the standard. Glyphosate can control many of the common and troublesome weeds that are found in this region. However, long growing seasons and weed resistance issues necessitate the use of residual herbicides applied preemergence (PRE), or either tank-mixed with, or as a sequential too, glyphosate.

   A regional study was initiated to evaluate season long cotton response to various herbicide programs in Tifton and Plains GA, Rocky Mount and Lewiston NC, and Alexandria LA. Treatments included a 2 x 5 factorial arrangement of treatments of PRE applied Cotoran + Prowl or Cotoran + Prowl + Staple (0.4 oz/ac) with post-emergence (POST) of Roundup Weathermax followed by (fb) Roundup WeatherMax, Roundup WeatherMax + Staple (0.4 oz/ac) fb Roundup WeatherMax + Staple (0.4), Roundup WeatherMax fb Roundup WeatherMax + Staple (0.6 oz/ac), Roundup WeatherMax fb Roundup WeatherMax + Staple (0.9 oz/ac), or Roundup WeatherMax fb Roundup WeatherMax fb Envoke (0.1 oz/ac).

b. For the factorial analysis, PRE herbicide applications did not injury cotton. There was ~30% injury and 19% height reduction for the Tifton location for Staple POST applied. The other 4 locations exhibited less or no Staple injury. Envoke injured cotton at all locations but was most sever at Alexandria with 56% stunting and 17% height reduction. Season ending height, number of bolls, height/boll ratio, and seed cotton yield were not affected by any treatment. Plant map data for the positions one and two for nodes five through twenty five did not reveal any significant differences for boll development at the GA and NC locations. These regional studies indicate **that residual herbicides used in combination with glyphosate can be used effectively for weed control, but there is risk for Roundup Ready cotton crop injury.**

c. Hatch Act, Smith-Lever Act, State Matching Funds

d. Integrated Research and Extension

Key Theme: Agricultural Competitiveness

State Performance Goal: 1-12

a. **In response to water conservation pressures, turfgrass sites are increasingly being irrigated with water of poorer quality**, containing

soluble salts and various nutrients and elements. This trend has been greatly stimulated with the recent development of seashore paspalum cultivars exhibiting superior salinity tolerances by UGA scientists in the Crop and Soil Science Department. On many sites there is a need to monitor salinity by depth and over time. Salinity monitoring methods/approaches have not been developed for turfgrass sites and the electromagnetic procedure used for many agronomic crops determines total soluble salts in a 12-inch zone rather than the 2- to 4-inch zone required for turfgrasses.

b. In 2004, UGA crop and soil scientists initiated a project to investigate various in-situ and mobile means of monitoring salinity status. Part of the research is being conducted in a real-world situation on a golf course with irrigation water quality that varies from 500 to 5,700 ppm (parts per million) soluble salts. This research will result in development of salt monitor technology and methods that are specific to turfgrass situations, better management of salt-affected sites, more accurate determination of the least quantity of water to leach salts, and support the use of seashore paspalum by turf managers.

c. Hatch Act, State Matching Funds

d. State Specific

Key Theme: Agricultural Competitiveness

State Performance Goal: 1-12

a. **Yellow and purple nutsedge continue to be common and troublesome weeds**. Through the efforts of the United States Interregional Research Project 4 (IR-4), there are new or pending registrations for herbicides that can control nutsedge species in bare-ground and polyethylene mulch vegetable production. However, different environmental conditions exist under polyethylene mulch, especially temperature and moisture regimes, which can affect herbicide degradation and nutsedge growth and reproduction.

b. UGA studies indicate Halosulfuron methyl (Sandea®) provides foliar and preemergence nutsedge control. Through IR-4, halosulfuron has been registered on cucumber, watermelon, pumpkin, squash, tomato, and pepper crops. These studies indicate that halosulfuron as an acceptable replacement for methyl-bromide for nutsedge control in vegetable production but will be crop dependent due to injury and soil carryover potential.

c. Hatch Act, State Matching Funds

d. State Specific

Key Theme: Agricultural Competitiveness, Diversified Alternative Agriculture

State Performance Goal: 1-12

a. Limited resources do not allow each state to duplicate efforts and programs even though industries and clientele groups may be rapidly expanding. This is the case in the Southeast with Small Fruit Production.

   Small fruit crops are knowledge and technology-intensive enterprises, and all the land grant universities in this region have their strengths and weaknesses with regard to expertise and information dissemination with these crops. It is far more cost effective to meet the demands for small fruit crop information and research with a regional approach that capitalizes on the individual strengths of each cooperating land grant university. This is the basic premise on which the Consortium is founded. It originally involved Clemson University, the University of Georgia, and North Carolina State University, and was initially established as the Southeastern Small Fruit Center in January 1999. In March 2000, the name was changed to the **Southern Region Small Fruit Consortium**. The reason for the name change was to include all the Southern Universities not just those in the Southeast. In 2002 the University of Tennessee joined consortium. The long term mission of the Consortium is envisioned to involve collaborative efforts at various sites across the region between small fruit growers and grower organizations, industries and service organizations allied with and/or serving small fruit growers, agricultural extension programs and research stations working together to enhance the development of the small fruit industries in the region.

b. The following describes the outcome of two of the research projects funded by the SRSFC: 1) Georgia's blueberry growers are increasingly interested in producing southern highbush blueberries to achieve early market windows and higher prices. Most of the highbush blueberries grown in Georgia are Florida varieties. The University of Georgia Blueberry Breeding Program has targeted improvements in blueberry cultivars for several decades. After more than 15 years of testing, the southern highbush cultivar 'Palmetto' was released to offer growers a well adapted cultivar for their growing conditions. The primary attributes of 'Palmetto' are that it ripens in late April to early May, has robust plant vigor, and good berry firmness suitable for storage and shipping. In south Georgia, yield of 'Palmetto' exceeded that of 'Georgiagem' by more than 50 percent over a 5-year period, and berry quality has been superior as well. 'Palmetto' ripens more than 75 percent of its fruit in the first two weeks of May, compared to only 35 to 50 percent ripe fruit for the cultivars Georgiagem and Sharpblue, respectively. 'Palmetto' has shown adaptability across south Georgia and southern Mississippi similar to the Florida cultivar Star. The new release is recommended for trial by growers interested in an early season southern highbush cultivar. 2) Georgia faces a

number of challenges in blackberry production. Some of the best cultivars for distant shipping such as ‘Navaho', require about 800 hours of winter chilling for normal development in the spring. However, the mean (average) winter chilling in lower south Georgia is only about 750 hours. This means than inadequate winter chilling on some cultivars will occur about 50 percent of the time in south Georgia. Dormex is a plant growth regulator that has been very effective for improving spring foliar development of blueberries. UGA horticulturists tested it on blackberries for two years. **Based on this research, they were able to obtain a state label for the use of Dormex on Georgia blackberries.** In 2004 many Georgia blackberry growers applied Dormex to enhance their yields with good results.

c. Hatch Act, Smith-Lever Act, State Matching Funds

d. Multistate Integrated Research and Extension

Key Theme: Agricultural Competitiveness, Agricultural Profitability, Plant Health

State Performance Goal: 1-16

a. **Tomato spotted wilt virus (TSWV) continues to be the largest restraint to tobacco production in Georgia.** The level of disease fluctuates from a few percent to over 40% in 2002. The virus is vectored by insects called thrips and the level of infection is dependant on both the population dynamics of the insect and environmental aspects which drive insect reproduction and plant growth

   In 2004 a study was initiated to evaluate the use of Imidacloprid (I) an insecticide and acibenzolar-S-methyl (ASM) a plant activator to manage TSWV. The chemicals were used as a greenhouse pretreatment followed by post plant field sprays of ASM, applied at various times after planting. The greenhouse applications of I & ASM reduced incidence of TSWV over the non-treated control. The addition of some post plant applications of ASM reduced TSWV even below the I & ASM greenhouse application.

b. The best combination of treatments reduced disease from 67% symptomatic plants to 22% symptomatic plants. Yields of plots were increased from 1,699 lb/A for the non-treated control to 2,313 lb/A for the greenhouse application of I & ASM, and as high as 3,174 lb/A for the best combination of greenhouse and post plant applications. A transgenic K 326, which was included as an internal standard yielded 3,301 lb/A with no diseases. This test demonstrated that the strategic application of about $ 100 of agrichemical reduced disease from a very high (67%) to a manageable (22%) level and regained yield to almost equivalent of the non infected transgenic. **These management techniques increased yield 1,475 lb or about $2400 per acre.**

c. Hatch Act, State Matching Funds

d. State Specific

Key Theme: Plant Health

State Performance Goal: 1-16

a. **One serious disease that can negatively affect production of many nursery and floriculture ornamental crops is a fungal infection called rust**. These pathogens cannot be adequately detected on symptomless but contaminated or infested propagation material entering the U.S. or moving state-to-state. Applications of fungicides with the sole purpose of reducing or eliminating spores on plant surfaces would be beneficial in several situations.

b. UGA plant pathologists determined the direct toxic effect of fungicides labeled for use on ornamental crops to urediniospores of rusts that occur on ornamental crops. Twelve fungicides in seven chemical classes were evaluated in vitro for toxicity to urediniospores of rust fungi. The benzimidazole, dicarboximide, hydroxyanilide, and demethylation-inhibiting fungicides were only fungistatic to rust urediniospores.

c. Hatch Act, State Matching Funds

d. Multistate Research: SC

Key Theme: Agricultural Profitability, Plant Health

State Performance Goal: 1-16

a. **Peaches are highly perishable and are often affected by post-harvest rots.** Especially in wet years, substantial losses can occur in the packinghouse and during transit, despite the application of pre-harvest fungicides in the orchard. Therefore, post-harvest application of fungicides on the packing line is needed in some harvest seasons. Currently, the only fungicide labeled for post-harvest use on peaches is Scholar (fludioxonil), a newly registered reduced-risk compound. A packinghouse survey conducted in 2003 documented that practices and technology used for commercial postharvest wax and fungicide application are extremely variable among operations, often leading to sub-optimal treatment results. Fludioxonil residues, as determined on fruit samples collected in the packinghouse, also varied widely, with residues being too low for optimal rot control in most cases. There was only a weak correlation between Scholar application rate and fludioxonil residues on fruit, suggesting

that application parameters other than Scholar rate may dominate in affecting residue levels.

Based on the previous year's results, the objectives of the 2004 packinghouse survey were to (1) assess factors affecting fludioxonil residue levels in more detail, and (2) optimize application rates and technology to achieve the residues needed for reliable rot control. During winter and early spring, we met individually with packinghouse operators in Georgia and South Carolina to discuss the 2003 findings in detail and to identify potential areas for improvement for each operation. As the 2004 harvest season commenced, follow-up surveys were carried out in these operations. Each packinghouse was visited several times while application of Scholar on the packing line was in progress. Fungicide application parameters were recorded, and treated fruit were sampled and analyzed for fludioxonil residues.

b. **The 2004 survey showed that producers have improved their postharvest application procedures.** Indeed, fludioxonil residue levels were less variable than in the previous year, and the overall median value (across all samples) was almost 70% higher. In addition, a larger number of samples was in the range needed for optimal rot control (0.75 to 1.0 ppm). Nonetheless, we are "not there yet." In individual packinghouses, further improvements are needed relative to calibration, continuous monitoring, and frequent cleaning of the application system, as well as avoidance of highly diluted water-wax mixtures.

c. Hatch Act, Smith-Lever Act, State Matching Funds

d. Integrated Research Extension

Key Theme: Agricultural Profitability, Plant Health

State Performance Goal: 1-16

a. **Cantaloupes and watermelons** are worth approximately $11,000,000 to the Georgia farm gate income**. Gummy stem blight (GSB), caused by the fungus Didymella bryoniae, is the most widespread and destructive disease of these crops in Georgia**, causing devastating losses to transplant and commercial growers alike. Outbreaks of GSB in transplant production facilities have become commonplace and have caused serious losses to transplant producers. Moreover, infected transplants can serve as a source of inoculum for outbreaks of GSB in the field. No fungicides are registered currently for greenhouse use, giving producers few options for this problem.

b. UGA plant pathologists conducted experiments in transplant production houses at Lewis Taylor Farms in Tifton, Ga. They found that seed-applied

fungicides such as boscalid or tebuconazole have the potential to be used as part of a program to manage GSB in the production of watermelon and cantaloupe transplants. Successful management of GSB on seedlings would reduce significant losses to producers of transplants, and would also reduce a source of initial inoculum that contributes to epidemics of GSB in the field. Because fungicides such as boscalid and tebuconazole target specific metabolic pathways in fungi, the risk of resistance development in populations of D. bryoniae is high.

c. Hatch Act, State Matching Funds

d. State Specific

Key Theme: Agricultural Profitability, Plant Health

State Performance Goal: 1-16

a. **Bacterial fruit blotch (BFB) is a serious threat to watermelon production in Georgia,** with the potential to cause up to 100 percent crop loss. Currently, there are no commercially available BFB-resistant watermelon cultivars, and the prophylactic foliar application of copper-based bactericides fails to control the disease under certain environmental conditions. Through greenhouse experiments, UGA plant pathologists determined that seed infection by A. avenae subsp. citrulli occurs via open female watermelon blossoms. They wanted to find out if they could protect blossoms from A. avenae subsp. citrulli colonization, and thereby prevent seed infection. They evaluated the ability of several biocontrol candidates and Kocide, a copper-based bactericide, to limit blossom colonization and seed infection.

b. Results prove that biocontrol blossom protection is an environmentally sound approach that can reduce seed infection by A. avenae subsp. citrulli. While biocontrol strategies are usually difficult to implement, protection of watermelon blossoms can easily be incorporated into current seed production systems. Biological control agents can be applied to blossoms during hand pollination, which is routinely employed in commercial hybrid watermelon seed production. **By preventing seed infection through blossom protection, the need for in-field BFB management will be reduced, resulting in significant economic savings for Georgia's watermelon seedling and fruit producers.**

c. Hatch Act, State Matching Funds

d. State Specific

Key Theme: Agricultural Profitability, Plant Health

State Performance Goal: 1-17

a. **Plant diseases caused by phytopathogenic bacteria tend to be sporadic but are devastating when they occur.** Lacking a modern and effective chemical arsenal to combat bacterial diseases, management practices have relied largely on cultural practices, quarantines, seed certification, and resistance. In 2004, bacterial spot of pepper, caused by Xanthomonas axonopodis pv. vesicatoria, was particularly severe because of favorable environmental conditions caused by the series of hurricanes and tropical storms that passed through Georgia. Watermelon fruit blotch, a seedborne disease caused by Acidovorax avenae subsp. citrulli, was also a sporadic problem in 2004 and caused losses both in the field and in the transplant industry. Experiments in the lab, greenhouse and field were conducted by UGA plant pathologists to investigate the ecology of bacterial pathogens and the epidemiology of the diseases they cause. Field trials evaluating double-cropping systems, crop rotations and solarization for management of soil-borne pathogens were initiated. Isolation of bacteriophages was begun for future biocontrol studies.

b. The phytobacteriology lab once again served as a resource for the state of Georgia by providing detailed identification of bacterial species submitted by growers, extension specialists, county agents, Georgia Department of Agriculture inspectors, and private industry personnel.

c. Hatch Act, Smith-Lever Act, State Matching Funds

d. Integrated Research and Extension

Key Theme: Agricultural Competitiveness, Agricultural Profitability

State Performance Goal: 1-17

a. **There is a great need for a simple and inexpensive method to assay aflatoxins in field research and to screen products in commerce.** Although different analytical methods have been recommended to determine aflatoxins in food and feeds, most of these methods are costly and complex. So UGA plant pathologists developed a rapid, easy and inexpensive method to screen aflatoxins in peanut and corn to help keep highly contaminated foods and feeds away from the marketplace in developing countries and for use in agricultural research on aflatoxin control.

b. **The initial assessment for testing is less than$2, allowing a substantial cost saving over other testing methods.** The smallest amount of aflatoxin in a peanut

and corn sample that can be quantitatively determined with suitable precision and accuracy under the developed method is 6 parts per billion. The current maximum levels for aflatoxins set by the European Commission are 2 ppb for aflatoxin B1 and 4 ppb for total aflatoxins in peanuts, nuts, dried fruits and cereals, which are about five times lower than those established in the U.S.A. However in developing countries where as much as 70 percent of the population practice subsistence agriculture and local food consumption, such threshold levels would be difficult to adhere to. So the developed method can be extremely important for surveying/monitoring high levels of aflatoxin in peanut and corn to help reduce the risk to human health. Additionally, the method can also be used in research or to monitor feedstuffs since the thresholds are much higher than those required for food consumption.

c. Hatch Act, State Matching Funds

d. Multistate Research: NE, WI

Key Theme: Precision Agriculture

State Performance Goal: 1-17

a. In many rural regions, agricultural water use is estimated at 50 percent of total water consumed. In the Flint River Basin, the State has purchased surface water irrigation rights from farmers. If drought returns, this scenario may be repeated in other river basins as well. The impact of this economic policy is devastating to agricultural communities as the ripple effect moves through an economy that revolves around farming. Improved agricultural water-use efficiency can be achieved by developing drought tolerant and water efficient crops and by developing new water management tools.

b. UGA **biological and agricultural engineers developed a real-time smart sensor array for scheduling irrigation** to alert a grower when a crop needs irrigation so that the proper amount of water is provided at the proper time. To make it cheap and reliable, the sensor array mostly uses off-the-shelf components. The best method for scheduling irrigation is to measure soil moisture in many locations within a field and respond to those measurements. Because the smart sensor array is inexpensive and fully automated, it can be installed at high densities. Projected costs for a commercialized system are $1,400 for a field with 10 sensor locations and $1,800 for a field with 20 sensor locations. The smart sensor array was field tested and used to schedule irrigation in peanuts and cotton during 2004. It performed well, matching or surpassing other scheduling techniques.

c. Hatch Act, State Matching Funds

d. State Specific

Key Theme: Agricultural Profitability

State Performance Goal: 1-18

a. Southeastern peanut farms are diversified with rotation field crops, as well as other sources of farm income. These farms use government payments to supplement market receipts. With the passage of the FSRI Act of 2002, peanut farms were shifted from a supply management program to a free market orientation. Future profitability in a market oriented system is a concern to peanut leaders with ongoing discussion in Washington, D.C. of reducing government support for agriculture. UGA **agricultural and applied economists conducted a study based on five Southeastern representative peanut farms and evaluated the potential impact of government payments on the economic viability of Southeastern peanut farms.** While the farms were able to cash flow in the short run, they are not able to cover their fixed cost. If the farms' fixed decouple payments and counter-cyclical payments are included, these farms were able to cover their fixed costs plus have a positive net income. The net income ranged from about $63,000 to $250,000 over the five years. This income must cover the farms' family living expenses and opportunity costs.

b. If all government payments were excluded, the farms' net income would be anywhere from about $138,000 to $278,000. These results do not indicate a very positive outlook for a long term profitable Southeastern agriculture. If government support declines with the expectation that the market place will provide the necessary income, market prices will need to increase at least 33 percent on average to break even without covering any opportunity costs.

c. Hatch Act, State Matching Funds

d. Mulitstate Research: AL

Key Theme: Adding Value to New and Old Ag Products

State Performance Goal: 1-19

a. The principle of competitive advantage in economics supports a global marketplace for the enhancement of competitive resource use. Educators and producers must fully understand concepts within this principle to fully realize its value. Surveys conducted and results published are needed to facilitate this process. **FVSU scientists developed a survey program to collect data on farm and producer characteristics, goat marketing channels and producer**

outlooks. They also developed a consumer survey instrument to be administered by telephone.

b. Data collection with producer survey instrument has been initiated; market level taste tests and survey have been conducted in audience with demographics similar to those in south; preliminary results suggest sensory characteristics are not uniform but vary with demography and comparisons with pork and beef are favorable. These studies have the potential of assisting producers in making more informed marketing decisions, providing information to enhance estimates of the demand for goat meat products as well as determining factors/changes which may increase consumption.

c. NARETPA Funds, Smith-Lever Act, State Matching Funds

d. Integrated Research and Extension

Key Theme: Agricultural Profitability

State Performance Goal: 1-2

a. **Tropical spiderwort** (Commelina benghalensis L.) is a noxious, exotic, invasive weed that has become a serious pest in many Georgia agricultural production areas. Limited information on the control of this weed is available.

   After confirming the plants identification, surveys to map tropical spiderwort's distribution and spread in Georgia were conducted. Over the past 5 years, more than 12 field trials on the control of this weed in peanut, field corn, soybeans, and fallow-land have been completed. This research was supported with grants totaling in excess of $10,000 from the Georgia Peanut Commission and various agricultural chemical companies. The results of this research have been presented locally, regionally, and nationally to growers and other interested professionals.

b. Research and extension programs in this area have lead to the development of various publications including slide sets, abstracts, and an extension circular (in-review). The Dual Magnum (s-metolachlor) herbicide label from Syngenta was amended to include information about the control of tropical spiderwort. The sales of Dual Magnum in Georgia from 2002 to 2003 increased by 13% and from 2003 to 2004 by 26%. Conservatively, it is estimated that approximately 25,000 peanut acres in Georgia are infested with tropical spiderwort. If left uncontrolled, peanut yield reductions would be near 100% due to both weed competition and harvest losses. Thus, **the implementations of the newly identified control strategies have the potential to save Georgia peanut growers more than $13 million annually.**

c. Hatch Act, Smith-Lever Act, State Matching Funds

d. Integrated Research and Extension

Key Theme: Agricultural Profitability

State Performance Goal 1-2

a. **Tropical spiderwort** is among the world's worst weeds. In 1983, the U.S. Department of Agriculture designated tropical spiderwort as a federal noxious weed. In 1998, tropical spiderwort was present in Georgia but not considered a serious pest infesting cotton. However, by 2001, it had quickly become very problematic and was ranked as the ninth most troublesome weed. By 2003, tropical spiderwort was clearly the most troublesome weed facing Georgia producers in several southern counties. A 2004 survey of Georgia county extension faculty determined that tropical spiderwort is now present in over 49 Georgia counties.

   Replicated field trials were conducted on over thirty South Georgia cotton acres in an effort to more effectively and economically manage this pest. Additionally, over thirty replicated field trials have been conducted since 2000. Although we are yet at the point where we can economically manage this pest in cotton, nearly all of our management methods discovered through our research efforts have been adopted within a six months.

b. Our research discovered that S-metolachlor was the most effective cotton herbicide available for the control of this weed species. Since that discovery, the use of S-metolachlor (according to the manufacturer, Syngenta) in Georgia has increased over 180% as this product is now the backbone of tropical spiderwort weed management programs. Additionally, this product was applied by growers on over 100,000 acres of row crops to assist in managing this pest. **Our efforts have also led to the first peer- reviewed publication on the management of tropical spiderwort in cotton in the world.**

c. Hatch Act, Smith Lever Act, State Matching Funds

d. Integrated Research and Extension

Key Theme: Agricultural Profitability

State Performance Goal: 1-2

a. **Irrigation scheduling remains as one of the most critical management factors in any agricultural operation.** A system can be efficiently designed, but if water is not applied at the proper time and at the proper amount, water will be wasted or

crop production will be poor. Irrigation scheduling technologies have been developed and improved upon for decades. Some advanced computer-based programs are available to help a farmer decide when to irrigate and when to stop for specific crops. Unfortunately, many of the advanced technologies and traditional approaches are not being used. Most farmers do not use irrigation scheduling because the techniques are too complicated, the instrumentation requires too much maintenance, is too time consuming, or expensive. An easy and reliable irrigation scheduling method has been needed that can be adapted to a variety of crops.

In 2001, the UGA "EASY" Pan Irrigation Scheduler was introduced. This scheduler uses a simple, but effective design, and is made from readily available parts (such as a wash tub, toilet bowl float, etc.). The EASY pan takes into account the water holding capacity of soil, the water used by the crop being grown, and water applied by sprinkler irrigation and rainfall. In addition, the indicator arm for the float system can be read at a distance (edge of the field) while the unit remains in the field that is being irrigated.

b. Although the system is simple, tests have indicated reliable irrigation recommendations as compared to more sophisticated approaches (like computer-based models). Over 500 units are now in use across the southeast and as far away as North Dakota. A start-up business was initiated in south Georgia to manufacture and market the units (with at least 1.5 employees). Recent tests have improved the unit to allow a smaller 9 gallon tub to be used in place of the original 17 gallon tub. The pan can be seen at many county extension offices in the row crop production areas. Additional tests are being conducted in a variety of crops including Pecans. **The EASY Pan is expected to provide an opportunity for many farmers to better schedule their irrigations, and thus use water more efficiently**. Many farmers, who are not currently using a scheduling method, are using this approach because it is easy to understand and apply. With experience, farmers will be more willing to accept more sophisticated irrigation scheduling approaches for overall improvements in water use efficiency and economic return.

c. Hatch Act, Smith-Lever Act, State Matching Funds

d. Integrated Research and Extension

Key Theme: Agricultural Competitiveness

State Performance Goal 1-2

a. The thirteen Southeastern States with the exception of Texas have one or fewer full time State Extension Equine Specialists. The Southern Regional Equine Specialists for the last thirty years have cooperatively administered the Southern

Regional 4-H Horse Championships. For many years we have tried to work together to provide educational materials that could be used in the Southeast. The main problem in trying to develop educational materials was providing access without extensive traveling and meetings.

b. In February 2002 the **State Extension Equine Specialists of the 13 southeastern states met to formulate a plan for distance education**. The group received a start up grant of $45,000 from USDA Agriculture Telecommunications, resulting in the development of an interactive educational Website called HorseQuest.info. The site has received 62,630 hits from April, 2003 to October, 2004. People contacting the site are from evrey state in the union as well as Asia, Australia, Canada, England, Mexico, South Africa, and South America. The major categories in which answers to the Frequently Asked Questions section were viewed were nutrition 6,099; management 3,365; reproduction 1,880; training and behavior 1,522; facilities 1,449; and health 1,394. **HorseQuest.info has been very successful** and has helped to ease the every day work load of phone calls and repeatedly answering the same questions pertaining to equine care and management. In addition the expertise and collaboration of the thirteen Southeastern States Equine Specialists has given the site credibility as providing a science-based, peer reviewed database of information. Only 3 percent of the time has a user had to ask a unique question that was not already searchable in the system. The site has already won two national awards.

c. Smith-Lever Act, State Matching Funds

d. Multistate Extension: KY, AL, LA, OK, TN, SC, MS, TX, NC, AR

Key Theme: Agricultural Competitiveness, Plant Health

State Performance Goal 1-2

a. **Blueberry leaf spots significantly reduce yields each year.** Recent field surveys have indicated that major leaf diseases are Septoria, anthracnose, and rust. As many as five fungicide applications are required to adequately control Septoria leaf spot, and even more sprays may be needed on cultivars susceptible to other leaf diseases that appear later in the fall, such as anthracnose and rust. Control has recently been limited to Aliette or strobilurin products (Cabrio, Abound, or Pristine). Application costs for Aliette are high, and as a result, producers are reluctant to use this material – the only rotation partner that allows for resistance management of the over-utilized strobilurin fungicides. UGA plant pathologists tested a dipotassium phosphite material, ProPhyt (reported to have efficacy and mode of action similar to that of Aliette – at a fraction of the cost), to control Septoria and anthracnose. As a result, ProPhyt will have a label addition in 2005 for control of Septoria and anthracnose leaf spot pathogens. In addition, based on research conducted in 2003, Section 24C labels were obtained in 2004 for two

chlorothalonil fungicide products to control Septoria and rust. Additional tests were conducted with mancozeb, and data obtained will be used by the IR-4 Minor Use Program to obtain yet another labeled fungicide for control of Septoria, anthracnose and rust. All of these newly-tested materials are logical rotation partners for the strobilurins.

b. **Through these research and regulatory efforts, the Georgia blueberry industry will have two new classes of chemistry for use in 2005, and yet a third is on the way.** This will greatly impact the costs of disease control, since all these new materials are substantially more economical to use relative to the strobilurin materials or Aliette. In addition, the use of these materials will help to extend the life of the strobilurin materials through resistance management.

c. Hatch Act, Smith-Lever Act, State Matching Funds

d. Integrated Research and Extension

Key Theme: Agricultural Competitiveness, Agricultural Profitability

State Performance Goal: 1-2

a. Limited resources do not allow each state to duplicate efforts and programs even though industries and clientele groups may be rapidly expanding. This is the case in the Southeast with Small Fruit Production.

   Small fruit crops are knowledge and technology-intensive enterprises, and all the land grant universities in this region have their strengths and weaknesses with regard to expertise and information dissemination with these crops. It is far more cost effective to meet the demands for small fruit crop information and research with a regional approach that capitalizes on the individual strengths of each cooperating land grant university. This is the basic premise on which the Consortium is founded. It originally involved Clemson University, the University of Georgia, and North Carolina State University, and was initially established as the Southeastern Small Fruit Center in January 1999. In March 2000, the name was changed to the **Southern Region Small Fruit Consortium**. The reason for the name change was to include all the Southern Universities not just those in the Southeast. In 2002 the University of Tennessee joined consortium. The long term mission of the Consortium is envisioned to involve collaborative efforts at various sites across the region between small fruit growers and grower organizations, industries and service organizations allied with and/or serving small fruit growers, agricultural extension programs and research stations working together to enhance the development of the small fruit industries in the region.

b. The average time per web site visit was reduced from 15 minutes to 10 indicating, indicating that the upgrades to the web site have resulted in much more rapid

information retrieval. The value of Georgia blueberries continues to increase ($3.5 million increase over the past two years), and this increase is due to better educated growers who take advantage of the SRSFC products.

c. Smith-Lever Act, State Matching Funds

d. Multistate Extension

Key Theme: Agricultural Competitiveness, Plant Health

State Performance Goal: 1-2

a. The Home Depot was founded in 1978 in Atlanta, Georgia and has since become the world's largest home improvement retailer, operating more than 1,700 stores. Garden and landscape sections at Home Depot are an integral and growing part of this company. The demand for trained and better prepared employees is a priority. UGA plant pathologists developed scientific and technical materials for an interactive, computer-based plant health and plant diseases identification and management training for store employees. Training materials on disease caused by fungi included identification and management of root rots, crown rots, leaf spots, powdery mildews and cankers. Technical topics on bacterial diseases included ID and management of blights, root and stem rots, vascular wilts and galls. From these materials a two-hour digital, interactive computer training was developed. These training materials will provide the necessary tools and knowledge to diagnose ornamental plant problems independently as well as to implement control management strategies, reducing plant losses and saving revenue.

b. **A total of 5,700 Home Depot garden section employees have completed the course in the U.S.** The course is said to exceed most garden and nursery certification programs in the nation. Economic impact of these trainings and programs will render direct savings on plant survival, development of plants free of diseases, reducing or eliminating unneeded chemical applications, on consulting fees, etc.

c. Smith-Lever Act, State Matching Funds

d. State Specific

Key Theme: Agricultural Competitiveness, Plant Health

State Performance Goal: 1-2

a. **In March 2004, the Georgia Department of Agriculture was notified that ornamental plants from Monrovia Nurseries in Azusa, Ca., were potentially infected with the Sudden Oak Death pathogen**, Phytophthora ramorum, and that over 28,000 plants were shipped into Georgia. Immediately, the GDA and USDA plant inspectors began locating and sampling Monrovia Nurseries plants within retail garden centers to determine if any infected plants were introduced into Georgia, and if so, where. Suspect plant samples were brought to the University of Georgia, Extension Plant Pathology, Plant Disease Clinic laboratory in Athens for screening for Phytophthora ramorum. In addition to retail garden center plant samples, news articles and radio programs were developed with extension personnel to alert homeowners of the potential introduction of infected plants into residential landscapes. Homeowners were instructed to submit a plant sample through their local county extension agent for testing if they had purchased a Monrovia Nursery plant from Jan 2002 until March 2004. Through UGA collaboration with the GDA and the Georgia Forestry Commission (GFC), the natural vegetation and forests surrounding P. ramorum-positive retail garden centers and residential landscapes were surveyed for P. ramorum symptoms to determine if the pathogen had spread from the original infected plant(s).

b. More than 3,100 samples were processed in the Extension Plant Pathology laboratory for the USDA, GDA, and GFC. Fifty-three isolates of P. ramorum were obtained from infected camellia plants that originated from 13 retail garden centers and one residential landscape. One additional nursery and two residential landscapes were identified as containing P. ramorum DNA using PCR methods. Georgia has identified more P. ramorum-positive sites outside of California, Oregon or Washington than any other state in the country. Georgia also is one of two states with a known introduction of P. ramorum into a residential landscape (South Carolina is the other). Surveys of the surrounding natural vegetation at the retail garden centers and landscapes show no spread of P. ramorum.

c. Smith-Lever Act, State Matching Funds

d. State Specific

Key Theme: Animal Genomics, Animal Production Efficiency

State Performance Goal 1-22

a. **A major factor limiting successful production of small ruminants such as sheep and goats is their seasonal reproductive pattern.** Small ruminants in the temperate region are restricted to one conception per year even though they are capable of multiple ovulations, and have short gestation periods and precocious breeding. The key to improving productivity in these animals is by increasing the number and total weight of their offspring per year. This could be acheved by breeding does/ewes out of season, within 60 day postpartum, to ensure a twice-

yearly kidding program. Successful induction of off-season breeding has been achieved using photoperiod manipulation, seasonally-controlled contact of males and females and exogenous hormone administration. These procedures, however, are costly and labor intensive. It is therefore imperative to investigate the neuroendocrine basis of the seasonal breeding pattern of these small ruminants. This will facilitate a thorough understanding, provide a more cost-effective control and use of the various methods recognized as important modulators of the breeding cycle of these small ruminants.

Studies were carried out to determine the contribution of pregancy-induced suppression of LH secretion as factor in postpartum anestrus in dairy goats. Eighteen dairy goats were injected with 5 gm GnRH i.v. on either day 140 of gestation (d -10; n=6), day 3 (d3; n=5), or day 20 (d 20; n=7) postpartum. Blood samples were obtained at 15-min intervals for 1 h followed by GnRH injection and sampling continued for 2 h at frequent intervals.

b. Injection of GnRH on d - 10, d 3 and d 20 induced LH release with mean peak concentrations of 1.5 + 0.4, 1.8 + 0.5, and 2.2 + 0.2 ng.ml respectively. Baseline LH concentrations were similar all days.Total LH concentration tended (P=.09) to increase from 6 + 2 ng/ml to d- 10 to 9 + 2 ng/ml on d -10 to 9 + 2 ng/ml on d 3 and reached 13 = 2 ng/ml on d 20 postpartum. The injection - first LH peak interval decreased (P<.01) with days postpartum averaging 55 + 7, 39 + 8 and 20 + 7 min on d -10, d 3, and d 20 respectively. On d -10, GnRH injection stimulated a spike-like LH release while a distinctly bimodal pattern of release was observed on d 20.Area under the curve (AUC, ng/ml/h for plasma increased (P<.04) with days postpartum from 0.5 + o.2 on d -10 to 1 + 0.2 on d 20. These results indicate a progressive increase in the responsiveness of the anterior pituitary with time postpartum, suggesting that although the suppression of anterior pituitary function during late pregnancy may be reversed as early as d 3 postpartum, a marked increase in anterior pituitary function during late pregnancy may be reversed as early as d 3 postpartum, a marked increase in anterior responsiveness occurs between d 3 and d 20 in the doe.

c. NARETPA Funds, State Matching Funds

d. Multistate Research: IA, MD, ID

Key Theme: Animal Genomics, Animal Health

State Performance Goal: 1-23

a. **The advances made recently in procedures for genetic engineering, gene mapping and transfer in farm animals have enhances opportunities for mass production of livestock with specific economic traits.** Gene transfer serves as a potentially useful supplementary tool to classical breeding methods for animal

improvement. It can also be useful for importing unique germplasm that produce high yields of quality productivity traits, and preserve rare germplasm resources that are at risk of elimination. These advances will have tremendous implications for goat products like cashmere, mohair, morocco skins, lean meat, and less allergenic dairy products.

The study assessed the effect of serum source (fetal bovine serum, FBS, vs goat serum, GS, and hormones 100 µg LH/ml plus 1 µg estradiol-17ß/ml on goat oocyte maturation, cleavage and early development (marula/blastocyst) during the non-breeding season. Generally, maturation rate was found to be significantly higher using FSB compared to GS (100% vs. 43%; $P<0.05$). While no cleavage was observed in the absence of hormones, cleavage rate was significantly higher with FSB + hormones (69%) compared with GS = hormone treatment (54%; $P<0.05$). Morula and blastocyst formation were also significantly improved by FSB + hormones (58%) compared with with the GS + hormones treatment (45%; $P<0.05$). These results indicate that goat oocytes can be successfully matured in vitro, during the non-breeding season as well, and that FSB is a superior serum source than goat serum for in vitro maturation of goat oocytes and early embryo development.

b. Previous experiments in our labs indicted the beneficial effect of serum supplementation on the growth of bovine somatic cells in vitro based on the origin of the serum and type of somatic cells in culture. Further experiments were conducted in goats to investigate the effects of freezing on the growth of goat somatic cells in vitro. Tissue samples from the heart, liver, kidney and lung were collected from goats slaughtered at our Meat Technology Center at FVSU. The tissues were either stored frozen at 40 degree C in DMSO or cultured after collection. The frozen samples were thawed after two weeks of freezing, then processed and cultured. Cells were monitored daily for contamination and passage into new media. Repeated experimentation revealed the presence of serum had a beneficial effect on cell growth for all three types of goat cells. Among the three types of caprine somatic cell used in experiments, the heart cells cultured best followed by the longs and kidneys. For establishing of caprine cell lines competently, oviducts were collected from female goats of mixed breeds (Alpine X Spanish). Epithelial cell clusters for the mucosal tissue of the oviducts were squeezed as described by Kato et al. 2002. The cells were cultured suing several media cocktail groups for several passages at 38.5 degree C and 5% CO2 in air. They were usually monitored daily for contamination and the media were replenished every 48 to 72 h. The cells were counted using hemacytometer to assess growth as cell lines were established in all groups. However. Cell growth was significantly higher when DMEM/F12 was used with 10% of goat serum ($p<0.05$). DMEM/F2 with no serum was better than DMEM/F2 + 10% fetal bovine serum, or +10% calf serum ($P<0.05$) or several other sera used. The cells were cryopreserved successfully. The data provided basic techniques of establishing caprine cell lines successfully for future tissue replacements. **Cell**

transfection with nuclear transfer of such cell lines could have tremendous impact on the biopharmeceutical industry.

c. NARETPA Funds, State Matching Funds

d. State Specific

Key Theme: Animal Genomics, Animal Production Efficiency

State Performance Goal 1-24

a. **Success in production systems for goat is limited by reproductive inefficiency.** The major reproductive constraint in goats is their breeding seasonality limiting transmission of desirable genetic traits. Photoperiodism influences the seasonality of breeding in both male and female goats. In dairy goat does, photoperiod causes an ovulation while in bucks it results in inactive period of sperm production, and hence, minimal fertility. Unlike large ruminants and sheep, there is limited information on the goat as a research model for reproduction at the cellular level. Overcoming these constraints is critical for optimizing production and enhancing the competitiveness of the goat industry.

   Studies were carried out to determine the contribution of pregnancy-induced suppression of LH secretion as a factor in postpartum anestrus in dairy goats. Eighteen dairy goats were injected with 5 gm GnRH i.v. on either day 140 of gestation (d -10; n = 6), day 3 (d 3; n = 5), or day 20 (d 20; n = 7) postpartum. Blood samples were obtained at 15-min intervals for 1 h followed by GnRH injection and sampling continued for 2 h at frequent intervals. Injection of GnRH on d -10, d 3 and d 20 induced LH release with mean peak concentrations of 1.5 + 0.4, 1.8 + 0.5, and 2.2 + 0.2 ng/ml, respectively. Baseline LH concentrations were similar across all days. Total LH concentration tended (P=.09) to increase from 6 + 2 ng/ml on d -10 to 9 + 2 ng/ml on d 3 and reached 13 + 2 ng/ml on d 20 postpartum. The injection - first LH peak interval decreased (P<.01) with days postpartum averaging 55 + 7, 39 + 8 and 20 + 7 min on d -10, d 3, and d 20, respectively. On d -10, GnRh injection stimulated a spike-like LH release while a distinctly bimodal pattern of release was observed on d 20. Area under the curve (AUC, ng/ml/h) for plasma LH increased (P <.04) with days postpartum from 0.5 + 0.2 on d -10 to 1 + 0.2 on d 20.

   Publications: Berckman, B., Amoah, E.A.,and Mobini, S. 2004. Superovulation and recovery of goat embryos during the non-breeding and breeding seasons using PG 600. International Conference on Goats, Pretoria, South Africa. July 3-9.

b. These results indicate a progressive increase in the responsiveness of the anterior pituitary with time postpartum, suggesting that although the suppression of

anterior pituitary function during late pregnancy may be reversed as early as d 3 postpartum, a marked increase in anterior pituitary responsiveness occurs between d 3 and d 20 in the doe. The anterior pituitary responsiveness in the postpartum state could not be the limiting factor in the resumption of LH pulsability. A greater role may be played by the repletion of LH stores and possibly an enhanced GnRH receptor population.

c. NARETPA Funds, State Matching Funds

d. Multistate Research: MO

Key Theme: Adding Value to New & Old Ag Products, Agricultural Competitiveness

State Performance Goal: 1-28

a. **There is a developing market for chevon (goat meat) in the USA, particularly among ethnic populations**. Goat carcass import in the USA has steadily increased indicating a potential for increasing domestic consumption. There is immense **opportunity for the American goat processors** to seize this existing market and benefit economically. However, the acceptability of chevon by the general public is lower than beef, lamb, or pork, primarily due to lesser tenderness. Information is limited on the postmortem factors that influence palatability of chevon. Characterization of postmortem behavior of goat muscle may help identify appropriate techniques that would improve palatability of fresh and processed chevon. This, in turn, will boost its public perception and increase demand for chevon in the USA.

   Several trials have been conducted under this project on the acceptability of chevon products such as sausages and jerky. In an effort to further understand the nutritional properties of chevon products, an experiment was conducted to study the fatty acid composition of chevon in comparison with lamb. Meat from ruminants contains high proportions of saturated fatty acids and small amounts of trans-fatty acids, both of which can increase blood cholesterol in humans. However, conjugated linoleic acids (CLA), which are naturally present in ruminant fats, are considered to have a therapeutic effect.

b. Chevon is a good source of red meat for the production of further-processed meat foods, because of its superior water-holding capacity and nutritional properties. The nutritional properties of chevon, particularly the fatty acid profiles, have not been fully understood. The results of our experiment indicate that chevon may have healthier fatty acid profiles compared with lamb. Products developed using chevon may not only have lower fat content, but also healthier fatty acid profile. Our earlier experiments under this project have shown that chevon products are comparable to beef products in quality characteristics, based on consumer

preference trials. The superior palatability and nutritional properties of products developed using chevon are expected to increase chevon consumption in the US.

c. NARETPA Funds, State Matching Funds

d. Multistate Research: MD, LA

Key Theme: Diversified/Alternative Agriculture, Plant Genomics, Plant Germplasm

State Performance Goal: 1-32 & 1-33

a. A small portion of nearly 500,000 plant species has been investigated for their medicinal attributes. Plant-based medicines play a significant role in the primary health care of 80% population of the world. **Chemicals derived from plant sources account for 25% of today's prescription drugs.** Most nations that manufacture plant-based prescription drugs, produce their own bioactive plants. Americans have not invested adequate resources into research investigating plants as a source of drugs. However, a sufficient supply of bioactive plants is crucial to conduct extensive clinical trials. There is a need to explore native wild plants and introduce exotic germplasm to meet an increasing demand for alternate medicine. This will require identification, introduction, and improvement of potential bioactive plant species.. Research at the Fort Valley State University will assist small farmers to produce bioactive plants for a niche market. Furthermore, opportunities exist for collaborative research with institutions that introduce, maintain, study biological activities, chemically analyze, clinically test, and market products from bioactive plant species. It is anticipated that this research will attract extramural funding, quality faculty, graduate and undergraduate students.

   To accomplish objectives of the Scutellaria project (collect/screen gernplasm for flavones using human cell lines in vitro, and develop agrotechnology for cultivating selected species) activities were planned to collect and screen germplasm for flavones, develop in vitro protocols for plant regeneration, calluis induction, suspension and hairyroot culture, somatic embryogenesis and synthetic seed production, and cultivation practices and their packaging. Thus far, we already have 13 species of Scutellaria including angulosa. barbata, baicalensis, costaricansis, integrifolia, lateriflora, mellchampii, montana, racemosa, ocmulgee (pruple and white morphs), ovata, scandens, and suffrutescens growing in the Spacialty Plant House (SPH) whele germplasm collection is still in grogress. All the species flowered well and seeds were collected.

b. Developing appropriate biotechnology for the in vitro regeneration and genetic transformation of medicinal and rare species of Scutellaria will enable scientists to develop protocols will enable scientists to develop protocols for preservation of rare, threatened, and endangered Scutellaria and to integrate gtenes for value-

added traits into popular skullcaps. This will enable possibilities to genetically improve skullcaps for locaal adaptation and medicinal bioactivity, and to preserve rare Scutellaria germplasm in the Southeast.

c. NARETPA Funds, State Matching Funds

d. Multistate Research: LA, CT

Key Theme: Diversified/Alternative Agriculture, Plant Genomics, Plant Germplasm, Small Farm Viability

State Performance Goal: 1-34

a. **An increasing ethnic population, consumer curiosity, and changing eating habits have generated demand for non-traditional and exotic fruits.** These socio-demographic changes have created opportunities for American farmers to grow high value cash crops. Exotic fruits are nutritionally rich and are in demand by health-conscious Americans. Many imported exotic specialties are available in American supermarkets. **Domestic production to meet consumer demands necessitates technology development for growing exotic fruits locally.** The papaya (Carica papaya) is high in vitamins and minerals, has no starch, and is low in sodium, fat and calories. Papain, an enzyme extracted from papaya latex, is extensively used as a meat tenderizer, and in beer, leather, wool, and rayon industries. The guava (Psidium guajava) is the richest source of ascorbic acid (vitamin C) and dietary fiber among all edible fruits. Similarly, phalsa (Grewia asiatica), aonla (phyllanthus emblica), carambola (Averrhoa carambola), and bael (Aegle marmelos) are rich in vitamins and minerals. These fruits are consumed in various ways, including fresh fruit, vegetables, salad, processed products, and have many industrial uses. Introduction, development of production technology, and marketing strategies are needed to be undertaken before cultivating exotic fruits on a commercial scale in southeastern USA. Since they are traditionally grown in warm climates, plant regeneration and crop improvement for tolerance to low temperature need to be addressed. Faculty started to developed and implement a program to explore in vitro plant regeneration protocols like organogenesis and/or embryogenesis needed to develop cold tolerant guava germplasm through Agrobacterium-mediated gene transfer.

   During 2004, standardization of in vitro regeneration of Psidium guajava through organogenesis and somatic embryogenesis were carried out using mature tissues (nodes, shoot tips, internodes, leaves, anthers, and the zygotic embryos of different ages) from outdoor guava trees. Somatic embryogenesis in guava was obtained in immature zygotic embryos by culturing them on BJY medium, a modified MS especially for guava since there was no embryo induction achieved on other media even with hormone supplements cultured for four weeks. Direct somatic embryo induction started from all over the explant surface after four

weeks of cultures and continued for five months when all embryos were isolated for germination and synthetic seed development on 3% alginic acid sodium salt alone or with charcoal. Direct germination of embryos was observed on the induction medium alone or with BA or GA3 for two weeks. The emblings were normal and healthy. The somatic embryos were used as fresh explants to produce numerous somatic embryos when cultured on the same medium. These protocols will be sued for co-cultivation to introduce cold genes into guava. For standardization of gene transfer protocols for guava nodal explants, they were co-cultivated with Agrobacterium containing binary vector pBI 121 having selectable markers (nptII and GUS) with CaMV 35S promoter gene. Standardization of co-cultivation duration, presence of inducing (induce activity of vir genes) compounds (acetosyringone) was performed for effective genetic transformation and the gene transfer frequencies. The resultant plant showed kanamycin resistance and was transferred to soil. During 2005, efforts will be made for use of gene gun and co-cultivating Agrobacterium with embryogenic tissue of guava. Introduction of cold tolerance genes (CBF1, CBF2, CBF3) will be attempted in organogenic and embryogenic explants to develop cold hardy plants using protocols developed at FVSU.

Publications: Joshee. N., M. Mutua, F. Zee and A. K. Yadav. 2004. In vitro Shoot Proliferation in Guava as Influenced by Genotype. Acta Horticulturae Volume number 632, The International Society for Horticultural Sciences. Biswas, B. K., N. Joshee, and A. K. Yadav. 2004. Can Agricultural Biotechnology Help Guava Growing in Temperate Climate. HortScience 39(4):861. Biswas, Bipul K., N. Joshee and A. K Yadav. 2004. Guava (Psidium guajava) - A suitable Fruit Tree for Agroforestry, Book of Abstracts 1:110. Biswas, B. K., N. Joshee and A. K. Yadav. 2004. Developing Biotechnology to Regenerate and Improve Selected Nutraceutical Plant. In Vitro, 2004 World Congress on In Vitro Biology Abstract Issue 40:23-A, P 33.

b. Developing suitable biotechnology for in vitro plant regeneration and genetic transformation of guava will enable scientists to integrate cold hardiness genes into popular guava varieties. Thus, this will enhance cold hardiness of guava germplasm to genetically improve it for adaptation to at least the mild temperate climatic areas of the United States such as Georgia and the rest of the southeastern USA.

c. NARETPA Funds, State Matching Funds

d. Multistate Research: FL, AL, HI, Virgin Islands

Key Theme: Adding Value To New & Old Ag Products, Agricultural Competitiveness, Plant Genomics, Plant Germplasm

State Performance Goal: 1-36

a. The peach is traditionally grown in Georgia and is one of the leading cash crops in Middle Georgia. Lately, **the peach has become less profitable due to declining tree survival** resulting from several factors, including peach tree short life (PTSL) syndrome. The freeze injury and/or Pseudomonas canker, the two primary factors of PTSL, kill trees prematurely before the orchard reaches full productivity. Consequently, peach orchards require frequent replanting, become unprofitable, and make frustrated growers forsake this enterprise. Incorporation of cold hardiness and canker resistance into the existing peach cultivars is a viable approach to control tree losses and improve peach production. However, the efficiency of conventional peach improvement has been impeded by the narrow germplasm base, and time consuming, more expensive, and cumbersome procedures. Now, plant biotechnology is opening up new avenues for more efficient improvement of perennial plants. Plant molecular approaches have been used to improve many tree fruit species; however, success in peach transformation has been limited. Genetic transformation of peaches will be attempted using plant regeneration from mature tissues, like shoot tips and cotyledons, along with somatic embryogenesis from nucellus and other tissues. Agrobacterium-mediated transformation with genes for cold or freeze hardiness of peach explants will be initiated using different reporter genes and promoters. Our primary goal is to employ plant biotechnology to develop peach cultivars resistant to PTSL stresses and to improve tree survival and orchard longevity.

   Faculty have developed and implemented a five-year program with the goal of developing biotechnological approaches toward improving peach tree longevity. Isolated nucellus and zygotic embryo explants were used in 2004 as primary explants to induce somatic embryogenesis. The main challenge has been preventing profuse induction of abnormal somatic embryos since embryogenesis showed no trouble. We are addressing this problem by manipulating medium and culture conditions. Peach nucellus, cotyledons, immature fruit mesocarp, shoot tips, nodal segments, flower/vegetative buds, petiole, first four leaves in shoot tip in juvenile as well as mature plants, and juvenile plant roots were used for explants on MS and WPM media supplemented with plant hormones 2, 4-D, IBA, BAP, Kinetin, TDZ and GA3. MS medium supplemented 100mg/l CaNO3 helped prevent leaf drop in peach tip shoot culture.

   Publication: Yadav, Anand K., Nirmal Joshee, and Bipul k. Biswas. 2004. "The Peach Tree Short Life in Perspectives of Agricultural Biotechnology and organ culture. Jpirnal. Biotechnology Reviews. (Communicated, under review)

b. WPM medium was superior to MS medium for peach shoot tip culture. WPM medium supplemented with BAP along with GA3 was found to be better for peach shoot tip culture compared to other media combinations. MS medium supplemented with L-Glutamine, Casein Hydroslate, 2, 4-D, Kinetin, BA was found suitable for inducing morphogenic callus in juvenile as well as mature terminal peach leaves explants from shoot tips. TCL2 medium was specific for

inducing morphogenic callus in thin cell layer explants of juvenile and mature terminal leaves. Furthermore, embryo maturation was studied in response to various levels of sucrose. The transcription regulator genes for cold tolerance (CBF-1, CBF-2 and CBF-3) that we procured have been introduced in both e coli and Agrobacterium for future use in peach transformation work. Observations indicated that these constructs are well maintained in the hosts used for this study. This project was terminated in August 2004 following 5 years of observation with regard to developing biotechnology protocols for plant regeneration of peach tissues. Since majority of somatic embryos were abnormal in germination, we encapsulated them to make synthetic seeds for later use. Suspension cultures to produce good somatic embryos after induction will be under observation for some time. Development of biotechnology protocols for in vitro regeneration and genetic transformation of peach will enable researchers to integrate cold hardiness genes into popular local cultures. This will allow us to enhance cold hardiness of peach trees and, thus, improve tree survival and orchard longevity to ensure uninterrupted peach production for increasing grower profits.

c. NARETPA Funds, State Matching Funds

d. Multistate Research: FL, MD, CA, AL, NC

Key Theme: Adding Value to New & Old Ag Products, Agricultural Competitiveness, Small Farm Viability

State Performance Goal: 1-37

a. **Amaryllis and daylilies (Hemerocallis spp.) are popular perennials grown throughout the world** as flowering landscape plants, greenhouse cut flowers, and pot plants. Both amaryllis and daylily are high value cash crops. Amateur growers, limited resource farmers, and plant breeders hybridize these crops to produce tetraploid cultivars with flowers of spectacular form and color that are not readily available. Amaryllis and daylilies are slow to multiply using conventional vegetative propagation by crown, producing a net gain of only one or two additional plants per year. Research at the Fort Valley State University Research Station has been proposed to employ tissue culture techniques to rapidly propagate tetraploid amaryllis and daylilies in order to speed up commercial release of new cultivars. This is a commercially viable project that will develop technologies needed by growers.

b. During this period, plantlets developed from the 2003 studies that use different explants sources to determine the effect of true-to-type for maximum flower production were transplanted to 10.2 cm pots and transferring to the greenhouse. It was observed that the plantlets showed nutrient deficiencies causing the plantlets to be yellow and chlorotic. Based these observations, fertilizer studies were established to study the influence of two types of fertilizer on the growth and

development of tissue cultured daylilies transferred to the greenhouse. Peter 20-20-20 water soluble fertilizer and a slow release fertilizer were the two fertilizer evaluated. Peter 20-20-20 fertilizer was used at 0 ppm (control), 50 ppm, 100 ppm and 200 ppm rates. The slow release fertilizer was used at 2.5 grams per 10.2 cm pot. Results from the fertilizer studies showed that when compared to the control all the treatments except for 200 ppm caused an increase in root growth. Shoot growth was increased by the 100 ppm treatment, while the 200 ppm and the slow release treatments suppressed shoot growth. Similar to root and shoot growth, the 100 ppm treatment caused an increase in fresh weight, while the 200 ppm and slow release treatment caused a reduction. Further studies will be conducted with plantlets for each plant source in the field studies to test for trueness-to-type for maximum flower production.

Information from these studies will be disseminated to growers and producers of daylilies on local, national and international levels. **Growers and producers will benefit greatly through the rapid availability of new cultivars which will results in increase profitability.**

c. NARETPA Funds, State Matching Funds

d. State Specific

Key Theme: Agricultural Competitiveness

State Performance Goal: 1-4

a. Purchasers of U.S. flue-cured tobacco have been concerned about the excessive residue levels of maleic hydrazide (MH), a chemical sucker control used universally by all flue-cured tobacco producers in the U.S. Historically, Georgia produced tobacco has contained higher residue levels than found in tobacco from the other U.S. production areas. **Some purchasers have reduced or even cancelled their purchases of tobacco from Georgia because of the concern for MH residue levels.** The most vocal purchasers regarding MH residues are outside the U.S. Over 50 percent of Georgia tobacco is ultimately sold outside the U.S. The international target for MH residues on tobacco is 80 parts per million. Georgia tobacco samples have yearly averaged from 125 ppm to 210 ppm over the last 16 years.

   On-farm demonstrations were conducted to evaluate potential sucker control programs which minimized dependence on MH for control of suckers while maintaining an acceptable level of sucker control. County agents and growers have cooperated to conduct demonstration plots, field days and county meetings to inform growers of acceptable treatments.

b. As a result of the cooperative efforts of county agents, growers and university specialists a sucker control program has been developed and fully tested which results in acceptable residue levels and acceptable season long sucker control. This program includes early and multiple treatments of contact fatty alcohol to burn our suckers as they develop during flower emergence. The program includes the use of flumeturon (Prime+, FluPro) along with an additional application of a contact fatty alcohol in a tank mix with MH as the final treatment in the program. Finally, the program includes the labeled application rate of MH (2.25 lbs/A) in the three-way tank mix. Residue samples, counts and weights of escaped suckers indicate the efficacy of this treatment. With this treatment growers can now control troublesome sucker growth and produce cured leaf which has acceptable MH residue levels which will continue to be purchased by domestic and international customers. **If this approach is followed Georgia growers will be assured of market demand and will avoid the loss of a market for their product.**

c. Hatch Act, Smith-Lever Act, State Matching Funds

d. Integrated Research and Extension

Key Theme: Agricultural Competitiveness, Niche Market

State Performance Goal: 1-4

a. The Georgia Good Agricultural Practices (GAP) Program, now in its second full year, has begun to pay off for Georgia produce growers, packers and shippers. Trained personnel assist them in developing a workable food safety program for their operations, which is followed by a detailed audit.

   A standardized on-farm audit program, with the backing of the Georgia Department of Agriculture, UGA food science and horticulture specialists, and other state-wide organizations, has assisted Georgia fresh produce growers, packers and shippers to implement their own system of food safety guidelines.

b. By the end of 2004, **more than 30 farms or facilities have developed a food safety plan, passed the in-depth third-party review of that plan, and received the right to display Georgia GAPs Certification badge** on their produce packaging from the Georgia Department of Agriculture. To date, 18 more fresh produce businesses are in the process of certification.

c. Smith-Lever Act, State Matching Funds

d. State Specific

Key Theme: Agricultural Competitiveness

State Performance Goal: 1-4

a. Ten percent of the aquaculture industry suffers from disease, deteriorating water quality, or other problems each year. Georgia producers and the UGA Extension Service agents who assist those producers need rapid response to aquaculture problems. Management of aquatic environments requires specialized knowledge so an aquaculture specialist in the UGA Department of Animal and Dairy Science makes personal contacts with producers, county agents and staff in the Georgia Department of Natural Resources to diagnose aquaculture problems and recommend cures. Agents use the Distance Diagnostic system to increase the efficiency of case submission and response.

b. More than 1,200 clients have submitted aquaculture cases to Tifton during 2004. The value of these cases exceeds $3 million based on the acreage and fish value involved. Workshops training county agents to deal with aquatic management cases result in service to an average of 100 cases per county per year. **This service program supports aquaculture pond and private pond owners who have ponds valued at $610 million in Georgia.**

c. Smith Lever Act, NARETPA Funds, State Matching Funds

d. State Specific

Key Theme: Agricultural Competitiveness

State Performance Goal: 1-6

a. Georgia currently has over 11,000 poultry houses in operation with more being built each year. To be competitive in the U.S. poultry industry, poultry producers in Georgia must utilize the best available technologies and management programs to achieve energy efficiencies and to provide optimum environments for maximum bird growth and performance. The proper operation of ventilation, cooling, and brooding systems is particularly critical in Georgia due to the severe summer climates.

b. Research projects and workshops have been conducted to improve ventilation and energy management of poultry houses in Georgia. Research programs related to the use of radiant tube heaters in broiler houses and the improvement of in house air quality using an electrostatic space charge system are underway. Workshops related to summer and winter ventilation programs are conducted on an annual basis.

This program continues to be a very effective outreach program for poultry producers. The workshops annually attract more than 150 individuals. **As a result of this program, all new poultry houses and most of the older facilities in Georgia are operating with state of the art ventilation and heating systems.**

c. Smith-Lever Act, State Matching Funds

d. State Specific

Key Theme: Agricultural Competitiveness

State Performance Goal: 1-8

a. Georgia poultry producers spend over a billion dollars a year on feed. Availability of consistently high quality feed ingredients allows the producer to formulate feeds more efficiently. Since feed represents over 70% of the cost of producing product at the farm level, producers can achieve substantial savings through effective ingredient analysis and utilization.

b. Research projects related to the nutritional value of soybean meal, cotton seed meal and peanut meal as ingredients for poultry rations have been conducted. As a result of these efforts, extension publications and educational programs for poultry producers have been provided in 2004.

   This program continues to improve the feed conversion rates for poultry flocks in Georgia. Poultry flocks in Georgia experience top performance levels for feed efficiency and feed costs as a result of the focus on feed ingredient analysis and evaluation for metabolizable energy levels.

c. Hatch Act, Smith-Lever Act, State Matching Funds

d. Integrated Research and Extension

Key Theme: Adding Value to New and Old Ag Products

State Performance Goal: 1-9

a. The U.S. Energy Tax Act of 1978 authorized the first federal excise tax exemptions for biomass derived fuels, mainly gasohol (a blend of 10 percent ethanol and 90 percent gasoline). The U.S. General Accounting Office estimated this tax exemption (subsidy) will lower highway excise tax revenue projections by a total of $13.72 billion from fiscal years 2002 through 2012. This subsidy yields an ethanol industry with a 7 percent share of the fuel-oxygenate market requiring 5 percent of the domestic corn production. UGA **agricultural and applied**

economists provided information on the impact market determinants have on the ethanol market. They developed an econometric model of the fuel-blending market demand and supply for ethanol.

b. The economic structure of the ethanol market indicates ethanol agents are addicted to the federal tax exemption on ethanol blended fuels. The highly elastic ethanol supply response implies purchasers of ethanol bear more than 90 percent of the increase in costs if the federal subsidy is reduced. Even if the subsidy is only cut in half the resulting price hike is sufficient to squeeze all the demand out of the market. With the subsidy, ethanol competes on the basis of quality and price in the gasoline additive fuels market. The potential for demand expansion resides in structural shifts occurring from clean air and water regulations, health restrictions, renewable fuels, and global warming. Unless these structural shifts in the ethanol industry occur, which significantly improves the competitiveness of ethanol, ethanol will remain dependent on the subsidy.

c. Hatch Act, State Matching Funds

d. State Specific

GOAL TWO
A SAFE AND SECURE FOOD AND FIBER SYSTEM

Food scientists, nutritionists, economists, poultry scientists, engineers, horticulturists, and others concerned with the safety of foods work together to ensure a safe and healthy meal.

Food borne illnesses continue to be a major concern for the food industry. Research and Extension programs have continued to target programs and have recorded many accomplishments toward the goal of a safe and secure food and fiber system.

More than 43,100 educational contact hours in food handler education were provided to 3,060 food service audiences. The Smart Kid Fight BAC! Food safety program provided nearly 3000 contact hours of education to 2,895 elementary school children in the last year. Ninety six percent of food service employees who participated in the SerSafe food safety education program improved their knowledge. The ServSafe Manager Training program certified 828 food service managers in past year.

Changes made to extend shelf life of foods often result in lower consumer satisfaction, even when eaten soon after harvest. Fresh produce supply chains fit the classic pattern where overall system performance declines when each link in the supply chain tries to maximize profits individually. A systems approach has helped the electronics, automotive and other industries improve performance by functioning as interacting systems. Biological and agricultural engineers are conducting workshops for leaders in fresh fruit and vegetable supply chains. Simulation games and models generate enthusiasm for system thinking.

The importation of goat milk cheeses to the US has increased tremendously in recent years. However, dairy goat producers in Georgia and the US are not competitive due to the lack of continuous supply of quality goat milk. Recent research projects have emphasis on capacity building. Current work demonstrates that the prolonged frozen-storage up to six months of goat cheeses appears to be feasible with no noticeable deterioration in sensory properties.

Over 30 poultry processing plants currently operate in Georgia processing more than 6 billion pounds of product annually. As a result of studies conducted on water reuse indicating potential for increased contamination, poultry companies have suspended the use of this practice in their plants. Companies now only allow filtered or disinfected water to be used for reuse, increasing the safety of their product. As a result of the studies and education, using novel disinfectants as a spray for carcasses, plants have reduced the number of coliform counts from the surfaces of carcasses by 99%.

People concerned about water quality are often interested in identifying sources of fecal contamination. With certain DNA-based methods, it is now possible to identify these sources. Through research and education, targeted sampling is now being adopted by

several Georgia Regional Development Centers to identify sources of fecal contamination.

Key Theme: Food Handling, Food Safety, Foodborne Illness, Foodborne Pathogen Protection

State Performance Goal: 2-1

a. The reported incidence of food borne illness from pathogenic bacteria is increasing; these illnesses may be life threatening or trigger chronic disease. Changing patterns of consumption, an aging population, more persons with chronic illness and wide variation in food handling and preparation practices are some of the factors contributing to increased vulnerability of the population to food borne disease. Food safety and quality concerns often put different groups within society in conflict over perceived and real concerns. **Approximately 97% of documented cases of food borne illness result from the mishandling of foods** in food service establishments and in the home. The resulting percentage from food service establishments alone is about 77%. With an increasing number of meals being eaten away from home, there is the potential for an increased incidence of food borne illness. Employee education and certification in the sanitary handling of food is viewed by food protection experts nationally as one strategy for reducing food borne hazards to the consumer.

   County Extension Agents conducted group training programs to teach safe food handling for consumers, elementary and high school students, child care providers, personal care home providers, school food service employees, restaurant employees, food processors, and other food service or distribution professional. County educators collaborated with relevant agencies, organizations and individuals who deliver food handling information to the public and food service industry. Faculty provided technical expertise in food safety to Extension agents and individual or industrial clientele. County Extension educators were trained and updated in food safety issues and recommended food handling practices yearly. Training was offered in use of specific curricula, such as the ServSafe (EFNRA) food service manager certification and employee training programs.

   More than 43,100 educational contact hours in food handler education were provided to 3,060 foodservice audiences. This includes 12,930 educational contact hours provided to 974 foodservice managers who received the ServSafe® manager training and 30,230 educational contact hours provided to 1,394 foodservice workers who received the ServSafe® employee training.

   As part of a federally funded food safety program directed by University of Georgia Extension, two new curriculum packages were developed to teach food

safety based on the nationwide Fight BAC!TM Food Safety Education Campaign. To date, 1716 children in K-3rd grade in Georgia, Mississippi and North Carolina were reached in the first round of this multi-state program.

The Smart Kids Fight BAC! ® food safety program provided nearly 3,000 contact hours of education to 2,895 elementary school children. Nearly 9,500 educational contact hours of food safety education were provided to 6,608 consumers, families, and youths. Seventy three percent of them were at risk or low-income Georgians.

Food safety related educational events such as health fairs reached more than 351,000 Georgians. Over 1,400 educational contact hours in home food preservation were provided to 140 program participants. Media was a major strategy for food safety education: 22 exhibits reached over 32,900 observers; three food safety articles in newsletters reached over 1,050 readers; 75 radio spots were broadcast to a listening audience of over 3.6 million people; newspaper columns went to a circulation of nearly 2.2 million readers; six television programs were targeted to over 430,000 viewers.

b. Ninety six percent of the food service employees who participated in the ServSafe7 food safety education program improved their knowledge. The participants significantly improved their knowledge in five food safety areas: recognizing hazardous food situations, receiving and storing food safely, preparing and serving food safely, preventing contamination and personal hygiene. The ServSafe® Employee Training program certified 1,137 foodservice workers in 2004.

The ServSafe® Manager Training program certified 628 food service managers in 2004. Most of the food service managers who completed the ServSafe® training planned to implement recommended food handling practices in their food establishments. For example, 95% of the participants said that they plan to monitor food temperatures regularly in cold and hot holding; 96% planned to have written standards for personal hygiene; 95% planned to train and monitor employees to recognize food spoilage and unsafe foods; and 96% planned to train and monitor employees on cleaning and sanitizing equipment and dishware. At the end of the training, participants committed to apply gained knowledge to train others, for example a manager said "This class has really inspired me to be more conscious about temperature, receiving, and food handling. I will make sure this information is passed on and hopefully inspire others, as I have been."

Comparison of pre and post-test evaluations indicates that the elementary school children who participated in the Smart Kids Fight BAC! ® program significantly improved their knowledge related to all four basic food safety principles: cleaning, preventing cross contamination, cooking, and chilling. Most of the children learned recommended food safety practices, for example, 89% of the

children learned the correct method to decide whether a hamburger is properly cooked.

Eighty-one percent of the consumers and families who participated in the food safety education program said that it was helpful for them to learn about food safety practices. Most of the participants said that they intend to adopt recommended food safety practices. For example, 86% said that they intend to wash their hands with warm running water and soap for at least 20 seconds before working with foods; 93% said that they intend to keep raw meats separate from other foods to prevent cross contamination; 81% said that they intend to keep foods like milk and eggs at or below 40F; and 68% said that they intend to use a food thermometer to decide whether meat is done when they cook meat, poultry or fish.

c. Smith-Lever Act, State Matching Funds

d. Multistate Extension: AL, CA, SC, NC,

Key Theme: Food Handling, Food Quality, Food Safety

State Performance Goal: 2-1

a. 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 food borne illnesses each year in the United States. Estimates of the economic costs of food borne illness vary from a low of nearly $500 million to a high of $7 billion a year. The consequences of food borne illness can be serious for many people. In spite of the serious consequences associated with food borne illness, few consumers have had any food handling education. This lack of education in rural low-income communities 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. The benefits of implementing a Food Safety Program for audiences with low-income and limited resources are that these families and individuals will improve their food handling practices, and in turn, reduce their risk for food borne illness at the same time reduce the economic costs associated with food borne illness.

   A Food Safety Program for county-based employees to teach and educate their clients was continued. 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, exhibits, and various resources were written, designed, purchased and adopted.

b. Campus and county-based employees reached a reported 6,797clients. Programs were implemented in schools, churches, homes and other sites on food safety, food preparation, hand washing, thawing foods and stopping bacterial growth. One (1) county agent and six (6) program assistants reported that **30% or 2,049 clients increased their knowledge of food borne illness, 15% or 993 clients are cooking and storing foods correctly or better, 40% or 2,696 clients are using proper hand washing practices, 4% or 291 clients are using thermometers and 24% or 1,627 clients are better understanding the relations of food safety** to better health. In addition, there are 1,831 clients that the county-based employees are regularly working with. By working with these 1,831 clients, county-based employees identified 14 food safety and health issues and concerns in their counties that they are working to address. In addition, county-based employees indicated that they implemented 5 food safety programs and activities in their counties this year.

c. NARETPA Funds, State Matching Funds

d. State Specific

Key Theme: Food Quality

State Performance Goal: 2-2

a. **A new agricultural park in South Georgia will help scientists find solutions to problems faced by commercial vegetable growers**. Scientists often work within their specific disciplines whether it is working with weeds, diseases, insects or horticultural traits. Although work within a discipline is extremely important, scientists at the University of Georgia must also work collectively across disciplines to address multiple pests and issues currently facing vegetable growers.

b. The park, although still in the developmental stages, has already provided scientists from all disciplines the opportunity to conduct applied research trials generating information that will immediately have a positive impact on Georgia vegetable production. Several trials conducted at the park during 2004 were initiated to develop data to support the Georgia Fruit and Vegetable Growers Critical Use Exemption Packages for Methyl Bromide which are estimated to be worth more than $70 million a year to Georgia growers.

c. Smith-Lever Act, State Matching Funds

d. State Specific

Key Theme: Food Handling

State Performance Goal: 2-4

a. Changes made to extend shelf life of foods often result in lower consumer satisfaction, even when eaten soon after harvest. **Fresh produce supply chains fit the classic pattern where overall system performance declines when each link in the supply chain tries to maximize profit individually**. A systems approach has helped the electronics, automotive, and other industries improve performance by functioning as interacting systems. A UGA biological and agricultural engineer conducted two round table workshops for leaders in fresh fruit and vegetable supply chains (growers, packers, distributors, retailers) and supporting suppliers, agencies, and institutions. At one workshop the participants learned about system dynamics by forming teams that played a board game simulating supply chain management. Four round table workshops were conducted in 2004. Participants were from major links of postharvest supply chains for fresh fruits and vegetables and from service and support groups and agencies. Approaches for introducing systems thinking to the participants included: the original distribution board game, an improved version of the board game, the UGA peach retailing game, and the UGA postharvest simulator. Personality profiles were added at one workshop to help improve the ability of participates to communicate with others who hold different viewpoints.

b. The simulation games and models continue to generate the desired enthusiasm for systems thinking and revealed to participants the intricacies of the interactions among various links of fresh produce supply chains. Other results from the workshops included improved understanding of the interactions among postharvest business links, new ideas for improving business operations, and realization of the importance of focusing on the consumers of the fresh produce.

c. Hatch Act, Smith-Lever Act, State Matching Funds

d. Multistate Integrated Research and Extension: USDA

Key Theme: Food Accessibility and Affordability

State Performance Goal: 2-4

a. Countries with predominantly small- and medium-scale farms, poor infrastructure for transportation and communication, and limited material resources have large populations with marginal economic income. Much of the development efforts in these countries has been to provide technical assistance to enhance agricultural productivity, sometimes at the cost of exploiting natural resources to unsustainable levels. A primary goal of the **Honduras Project**, conducted by UGA biological and agricultural engineers, is to **train small- and medium-scale Tilapia farmers, NGOs, extension agents and service providers** on several

aspects of Tilapia culture and decision making methodology to institutionalize Tilapia culture in Honduras and Central America. Two major activities in the project have been 1) the training workshops and on-site visits with Tilapia farmers to advice on all aspects of Tilapia culture through which than a thousand people have been reached, and 2) the development of a Web-based information delivery and communication system. These contacts with participants began to identify the need for an organization that could become “the voice” for Tilapia in the Central America region. Several participants encouraged the UGA scientists to help form a consortium. Participants from Honduras, Guatemala, Nicaragua and El Salvador volunteered to work for the objectives of the consortium they named the Tilapia Connection. The object of the Tilapia Connection is to coordinate the efforts of various Tilapia constituencies and increase communication and access to knowledge for institutionalizing Tilapia.

b. The formation of the Tilapia Connection is a capstone achievement that may prove to be a pivotal action in the institutionalization of Tilapia in Honduras and Central America because of the increased ability in the people of the region to self identify needs, access current information and technology, communicate effectively on a timely basis and influence decision and policy makers.

c. Smith-Lever Act, Hatch Act, State Matching Funds

d. Multistate Integrated Research and Extension

Key Theme: Food Accessibility and Affordability, Food Handling, Food Quality, Food Safety

State Performance Goal: 2-10

a. Import of goat milk cheeses to the US has increased tremendously in recent years. However, **dairy goat producers in Georgia and the US are not competitive due to the lack of continuous supply of quality goat milk.** Technology needs to be developed to complement milk supply and enhance the year-round production of value-added products acceptable to consumers. Development of suitable technology is essential for the profitability and sustainability of the dairy goat industry.

   The primary emphasis of this year's Capacity Building project was centered on the continuous evaluation on food quality of the prolonged frozen-stored goat cheeses, where extended storage life of the product is extremely important for future profitability and sustainability of the dairy goat industry. The last year's report was based on the frozen-storage of 3 month data, while this year's experiment was extended to 6 months. The extended frozen-storage can be detrimental to texture and flavor of the cheese including organic acids. Effects of 6 months prolonged frozen-storage on organic acid profiles, rheological and

proteolytic characteristics of commercial plain soft and Monterey Jack goat cheeses were evaluated, compared to fresh and non-frozen control cheese samples.

b. **Prolonged frozen-storage up to 6 months appeared to be feasible** since no noticeable deterioration was found in sensory properties of goat cheeses although elevations occurred in several organic acid contents. This finding in feasibility of 6 month prolonged frozen-storage of goat cheeses is extremely important for off-season marketing and sustainability of the dairy goat industry. Furthermore, little data is available on effects of extended frozen-storage on goat cheese quality, texture and flavor compounds. The plain soft cheeses showed some changes in textural and proteolytic properties, especially between different batches, suggesting that variations in manufacturing methods between lots would exist. The loss of textural quality of MJ caprine cheese indicates that the extended frozen-storage may not be highly desirable in textural properties. However, other quality parameters such as proteolytic, lipolytic and sensory properties of the same cheeses revealed minimal changes, whereby the 6 months extended frozen-storage of the MJ cheese would give a strong potential for application of this food technological approach for extension of the storage life of goat cheeses for later marketing.

c. NARETPA Funds, State Matching Funds

d. Multistate Research: PA, OH

Key Theme: Food Safety

State Performance Goal: 2-5

a. Processing, further processing and value added poultry plants are major components of the poultry industry in Georgia. Over 30 plants are currently operating in Georgia processing more than 6 billion pounds of product annually. It is imperative that these plants operate with the highest level of efficiency while providing food safety and quality control to ensure profitability and compliance with government regulations.

   Research and educational programs related to the potential and prevention of cross contamination with the reuse of process waste water in processing plants and the use of novel disinfectants in final carcass spray wash as a method of reducing bacterial contaminations have been implemented.

b. As a result of the studies conducted on waste water reuse indicating potential for increased contamination, poultry companies have suspended the use of this practice in their plants. Companies now only allow filtered or disinfected water to be used for reuse increasing the safety of their product. As a result of the studies

using novel disinfectants as a spray for carcasses, **plants have reduced the number of total coliform counts from the surfaces of carcasses by 99%.**

c. Hatch Act, Smith Lever Act, State Matching Funds

d. Integrated Research and Extension

Key Theme: Food Safety

State Performance Goal: 2-7

a. **People concerned about water quality are often interested in identifying sources of fecal contamination**. With certain DNA-based methods, it is now possible to identify these sources; this is called bacterial source tracking. Most of these methods involve isolating specific fecal bacteria from the contaminated water and from a variety of different warm-blooded animals. The DNA "fingerprints" of the bacteria from the water match one or more of the host sources, then the source is identified. The problem with this method was that the DNA of the specific fecal bacteria varied too much over time and geography to get a lot of matching. UGA crop and soil scientists developed targeted sampling to solve this problem. Targeted sampling has four steps. The first step is to sample the entire area of contaminated water, collecting between 50 and 100 water samples in one day. Fecal contamination is plotted on a map and hotspots are identified. The second step is to talk with local citizens, concerned groups like Adopt-A-Stream and state agencies about these hotspots. The third step is to combine this local knowledge with another sampling in the area around the hotspots. If the source is not obvious, then this requires the fourth step, bacterial source tracking. Here the potential host animal sources and the contaminated water are sampled in one day around the persistent source.

b. Targeted sampling was tried on the Sapelo River on the Georgia Coast and it worked well. Almost half of the fecal contamination in this tidal river came from a failing private wastewater treatment facility. This facility is now fixed. Targeted sampling made the site easy to identify. For bacterial source tracking, the bacteria did not vary so much with regard to time and geography, and it was easy to get good DNA “fingerprint” matching. Targeted sampling is also a lot less expensive and time-consuming than the original method. **Targeted sampling is now being adopted by several Georgia Regional Development Centers to identify sources of fecal contamination.**

c. Hatch Act, State Matching Funds

d. State Specific

Key Theme: Food Safety

State Performance Goal: 2-7

a. Irradiating food products provides one means of addressing the food safety issue by significantly reducing the presence of foodborne bacteria and diseases. The USDA's Food Safety Inspection Service has approved the use of irradiation to control bacteria in frozen and refrigerated meat and seafood products. However, the **poultry industry is hesitant to adopt irradiation technology despite its benefits because of potential and perceived consumer resistance to irradiated products.** UGA agricultural and applied economists conducted a study to investigate consumers' perception and concern about food safety issues and their willingness to pay for irradiated poultry products. Georgians appear to be concerned with the safety of the food they purchase. Nearly 60 percent of the respondents indicated they are very or somewhat concerned with the safety of domestically produced food. Concern about bacteria and disease appears to be the top safety issue, followed by freshness/expiration date, additives/chemicals, cleanliness and handling/food preparation. Surprisingly, few respondents appear to be very concerned with genetically modified food (2 percent) or terrorism (1 percent). Many Georgia consumers are significantly more concerned about irradiation and chlorination than they are about using other food processing methods, such as food preservatives or pasteurization, for controlling bacteria, producing safer foods and extending product shelf life. Georgians' concern with the process of food irradiation may be attributed to their lack of knowledge about the irradiation technology.

b. The results indicate that most Georgia consumers have heard of the food irradiation process. However, just over 20 percent of those interviewed know anything about it. The lack of understanding may explain the concern expressed over irradiated food. Although many consumers are concerned about the use of food irradiation technology, 80 percent of the respondents considered that irradiation process is somewhat necessary for poultry products and more than 55 percent of the respondents indicated they would support the use of the process. The result shows that about 65 percent of respondents were at least somewhat likely to buy irradiated poultry products and they were willing to pay, on average, an additional amount of $1.34/lb for irradiated chicken breasts. Consumers who are concerned with additives and chemicals were significantly less likely to purchase irradiated poultry products. Older and higher income people, and respondents with young children at home were also found to have significantly lower probability of buying irradiated poultry products than their counterparts in Georgia.

c. Hatch Act, State Matching Funds

d. State Specific

Key Theme: Food Accessibility and Affordability

State Performance Goal: 2-9

a. The demand for chevon (goat meat) in the USA has increased in recent years. Chevon is considered less palatable than red meat from other species by most US consumers. A better understanding of the postmortem characteristics of goat muscle is essential to improve the acceptability of chevon. The ante- and post-mortem practices adopted should produce meat products with superior palatability and also be safe for human consumption. It is imperative that chevon is handled and processed to prevent contamination from all sources.

   Chevon (goat meat) is an ideal resource in the preparation of low-fat meat products, since the fat content is less than 3.5%. Polyunsaturated fatty acid (PUFA) to saturated fatty acid (SFA) ratio is higher in chevon compared with beef, which may be important from the public health point of view. Several trials have been conducted under this project on the acceptability of chevon products such as sausages and jerky. In an effort to further understand the nutritional properties of chevon products, an experiment was conducted to study the fatty acid composition of chevon in comparison with lamb. Meat from ruminants contains high proportions of saturated fatty acids and small amounts of trans-fatty acids, both of which can increase blood cholesterol in humans. However, conjugated linoleic acids (CLA), which are naturally present in ruminant fats, are considered to have a therapeutic effect.

b. Proximate analysis was done using the muscle tissue from loin chops. Analysis of data as a Completely Randomized Design showed no significant differences ($P > 0.05$) in moisture, protein, fat, and carbohydrate percentages between longissimus muscles of sheep and goats. Longissimus muscles from sheep and goats contained 69.0 and 68.3% moisture, 23.4 and 23.4% protein, 4.56 and 4.97% fat, 1.93 and 1.57% carbohydrate, and 1.17 and 1.73% ash, respectively. The ash content in goat longissimus muscles was higher ($P < 0.05$) than that in sheep longissimus muscles. Four major fatty acids, palmitic (16:0), stearic (18:0), oleic (18:1n9), and linoleic (18:2n6), made up 91% of the total lipids in the loin chops of either species. Compared to sheep, goats had a higher level of 18:1n9 and lower levels of 16:0 and 18:0 fatty acids in the loin chops. Loin chops from sheep and goats contained 4.6% and 5.5% polyunsaturated fatty acids, respectively. Compared to sheep, goats had a higher ($P < 0.05$) level of cis-9, trans-11 CLA in the loin chops. No significant differences ($P > 0.05$) were found in the levels of other CLA isomers and trans-fatty acids (18:1t) in the loin chops. Currently, two experiments are under way to study the effects of hydrodyne processing and calcium chloride injection on the palatability of fresh and processed chevon. The results of these studies will be included in the final report of this project. **Chevon is a good source of red meat for the production of further-processed meat foods, because of its superior water-holding capacity and nutritional properties.** The

nutritional properties of chevon, particularly the fatty acid profiles, have not been fully understood. The results of our experiment indicate that chevon may have healthier fatty acid profiles compared with lamb. Products developed using chevon may not only have lower fat content, but also healthier fatty acid profile. Our earlier experiments under this project have shown that chevon products are comparable to beef products in quality characteristics, based on consumer preference trials. **The superior palatability and nutritional properties of products developed using chevon are expected to increase chevon consumption in the US.**

c. NARETPA Funds, State Matching Funds

d. Multistate Research: MD, LA

GOAL THREE
A HEALTHY, MORE WELL-NOURISHED POPULATION

The leading causes of diet-related morbidity and mortality in the United States and in Georgia today include heart disease, cancer, stroke, and diabetes, ranked respectively from most prevalent to least prevalent. Other significant diet-related public health concerns include osteoporosis and obesity. Statistics show that a disproportionate burden of diet-related disease is borne by minority, low income, and educationally disadvantaged persons. Extension faculty have developed many programs and educational efforts to address these issues.

It is estimated that $1 billion could be saved in medical care cost due to complications of diabetes if nutrition education were a routine part of diabetes management. Georgia Extension programs offered a comprehensive diabetes education program. Almost 89% of Georgians who participated in diabetes education programs said those sessions were very helpful for them in learning how to control diabetes by practicing healthy habits.

Comparison of pre and post evaluation shows that 74% of participants who completed the Walk-a-Weigh program improved their overall dietary and exercise habits and adopted a healthier life style.

The Expanded Foods and Nutrition Educational Program (EFNEP) and the Family Nutrition Program (FNP) enjoyed great success and impact on the families involved in the program. County agents had impacts with many local programs targeting families and youth with healthy lifestyle education. 88% of EFNEP graduates had a positive change in nutritional value of their diets. Georgians who graduated from EFNEP saved an average of $14.82 per family per month on food cost.

Key Theme: Human Health, Human Nutrition

State Performance Goal: 3-1

a. The leading causes of diet-related morbidity and mortality in the United States and in Georgia today include heart disease, cancer, stroke, and diabetes, ranked respectively from most prevalent to least prevalent. Other significant diet-related public health concerns include osteoporosis and obesity. Statistics show that a disproportionate burden of diet-related disease is borne by minority, low income, and educationally disadvantaged persons. These groups have higher rates of hypertension, stroke, diabetes, and other diseases than the general population. Most of these diseases also occur more frequently with advancing age. Diabetes is a major public health problem in Georgia. Approximately, 6.9% of the adult population in Georgia had diagnosed diabetes in 2001. For every two persons diagnosed with diabetes, another has not yet been diagnosed. **It is estimated that**

$1 billion could be saved in medical care costs due to complications of diabetes if nutrition education were a routine part of diabetes management.

The University of Georgia Cooperative Extension Service offered a comprehensive diabetes education program. This includes intensive training for County Extension Agents in nutrition issues related to diabetes, a quarterly newsletter focusing on diabetes, the Rite Bite Cooking School written by Extension Specialists and conducted by County Extension Agents, and a diabetes management program conducted locally by County Extension Agents and cooperating hospitals, health departments, or physicians. Provide the Focus on Diabetes CD to those who are affected by diabetes to teach the basics of diabetes self-management. Walk-a-Weigh is a comprehensive social-learning based weight management curriculum written by University of Georgia Extension Specialists and conducted by County Extension Agents. Fitness was emphasized, and walking was an integral part of the program. Recipes which teach lesson concepts were demonstrated and sampled.

Diabetes education programs provided over 4,150 hours of diabetes control and prevention instruction to 2,166 Georgians in 2004. Nearly 45% of the participants were low-income Georgians. Diabetes related extension events such as health fairs reached 848 Georgians in 2004. UGA provided nearly 107,651 contact hours of nutrition education to 66,745 individuals in 2004. Nearly 77% of them were low-income Georgians. Nutrition related extension events and site visits reached 16,620 individuals in 2004. Weight control and nutrition extension programs reached 3,143 Georgians and provided 5,262 contact hours of education. The "Walk-A-Weigh" extension program provided 1,523 hours of nutrition and exercise education to 727 Georgians. Media was a major strategy for public diabetes education in Georgia: diabetes articles in newsletters reached over 16,722 people; radio spots were broadcast to a listening audience of over 1 million people; newspaper columns went to a circulation of over 279,700 readers; and television programs were targeted to over 80,000 viewers; 10 exhibits reached over 1,750 people. · FACS agents organized and facilitated over 7 Diabetes Support Group meetings this year. The Diabetes Life Lines Newsletter had a circulation of 11,750 in Georgia.

b. Almost 89% of Georgians who participated in diabetes education programs said those sessions were very helpful for them in learning how to control diabetes by practicing healthy habits. Most of the participants improved their diabetes management knowledge and planned to adopt recommended practices. For example, all the participants planned to follow a meal plan to control their carbohydrate intake; 72% planned to keep records of their blood glucose values, food intake, medicine doses and physical activity; 48% planned to modify their recipes to cut sugar, fat, and sodium; 53% planned to have their blood pressure checked regularly; and 42% could identify the signs of low and high blood glucose levels.

The comparison of pre and post evaluation data shows that most of the participants who completed the Walk-A-Weigh nutrition and exercise program significantly improved their dietary and exercise habits. For example, 63% made a conscious effort to limit fat to 30% of total calories; 52% of the participants started the habit of doing exercise at least three times a week for 30 minutes at a time; 56% modified recipes to lower fat by using low-fat ingredients; 53% started eating dried beans or peas at least once a week; 49% started eating at least 2 servings of low-fat or non-fat dairy products each day; and 56% started to read nutrition labels to help make healthy food choices.

Comparison of pre and post evaluations shows that **74% of the participants who completed the Walk-a-Weigh program improved their overall dietary and exercise habits and adopted a healthy life style.** The life style changes helped participants to reach weight loss goals and to reduce risk factors. This is confirmed by the clinical and medical data of Walk-A-Weigh participants. Seventy-seven percent of the participants were able to reduce their excess body weight by an average of 4 pounds during six weeks; 48% were able to reduce high blood pressure; and 81% were able to decrease their total cholesterol level.

c. Smith-Lever Act, NARETPA funds, State Matching Funds

d. State Specific

Key Theme: Human Nutrition

State Performance Goal: 3-2

a. It is also important to recognize that hunger exists in Georgia. Almost 15% of the population is at or below the poverty level. As a result, many people lack the quantity and quality of food for adequate nutrition. There is a growing recognition that hunger and food security do not exist in isolation. Poverty and related problems that affect families and communities cause hunger. The societal conditions which sustain the problems of hunger and jeopardize food security are known globally. However, the relationships among the issues that endanger food security and create hunger in a community are often not understood. Hunger compromises the ability to learn because it reduces the ability of a child to concentrate. Undernutrition during pregnancy can result in low birth-weight infants who are more likely to require intensive medical care after birth and special education services and infants with neural tube defects resulting from insufficient folic acid. Nutrition education programs enable families and individuals to make food selection and preparation choices that are consistent with their lifestyle and cultural practices and enhance their health status. These programs enable families with limited resources to get the most nutritional value for their food dollar. In the long-term, nutrition education programs benefit

families and individuals, and therefore society, by improving overall health and well-being.

Under the Expanded Foods and Nutrition Education Program (EFNEP) and the Family Nutrition Program (FNP) following actions were taken. Agents trained paraprofessionals in low-income communities to teach nutrition to hard-to-reach audiences using culturally-appropriate methods and materials. Staff educated families on planning low cost nutritious meals in order to maximize the nutritional value of their diets and decrease the number of families who run out of food before the end of the month. They taught limited resource clients how to modify their diets to decrease the risk of chronic diseases and provided food safety education for limited resource clients. Staff provided nutrition education to teenage mothers in order to increase maternal weight gain and intake of crucial nutrients.

b. A total of **2,014 people graduated from the EFNEP program in FY 2004**. As a result of the EFNEP program, 27% of participating families enrolled in the Food Stamp program. In addition, 16% enrolled in WIC and 11% began participating in the child nutrition program (free and reduced price school lunch.

After completing the EFNEP program: **88% of EFNEP graduates had a positive change in the nutritional value of their diets**; Georgians who graduated from EFNEP saved an average of $14.82 per family per month on food; 75% improved one or more food resource management practices, including planning meals, using grocery lists, comparing prices, and not running out of food; 80% improved nutrition practices such as making healthy food choices, preparing foods without adding salt, reading nutrition labels, and eating breakfast; and among youth participants, 92% reported that they eat a variety of foods as a result of participating in EFNEP. In addition, 61% improved their food preparation and safety practices.

Increases in knowledge and ability to plan menus and choose foods according to the Food Guide Pyramid and Dietary Guidelines were reported by 63% of the participants. Seventy-one percent of the participants indicated that they intended to adopt one or more healthy food and nutrition practices after participating in an FNP nutrition education program. After participating in Family Nutrition Program nutrition education lesson(s): 86% of the participants indicated that they intended to adjust recipes to achieve dietary goals, such as reducing fat, calories, or sodium; 47% of the participants improved their consumption of fruits and vegetables so that they were eating nearer the recommended number of servings of these important foods; 36% of the participants increased the amount of time they spent in physical activity such as walking, while 51% of the participants reduced the amount of time spent in sedentary activities. Family Nutrition Program participants also gained awareness as to the best strategies for stretching food resources, with 78% indicating intent to adopt more beneficial shopping behaviors and food resource management techniques. In addition, 65% of the

participants in a program series actually improved behaviors related to shopping techniques, such as menu planning, using a shopping list, and comparing food prices. There was a significant increase in nutrition knowledge among the 1,685 children who participated in the Family Nutrition Program.

c. Smith-Lever Act, State Matching Funds

d. State Specific

Key Theme: Human Health, Human Nutrition

State Performance Goal 3-2

a. Leading causes of diet-related morbidity and mortality in the U.S. today include hypertension, heart disease, cancer, stroke, diabetes, osteoporosis, and obesity. Research has shown strong and consistent patterns of relationship between diet quality such as rich in fruits and vegetables and lowered risk of a number of chronic diseases. The U.S. Dietary Guidelines and the Food Guide Pyramid, as well as other national disease prevention recommendations, advise individuals to consume five or more servings of fruits and vegetables each day. 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. As a result of the increase number of chronic diseases, nutrition education programs are needed. The primary benefit of implementing a Nutrition Program for clients with chronic diseases is that the information and resources help to improve their quality of life, while reducing the economic costs associated with chronic diseases.

   A **Nutrition Program to address the chronic diseases was continued**. Major components of the program are the Dietary Guidelines for Americans, Food Guide Pyramid, Hypertension Resources, Heart Disease Resources, Cancer Resources, Diabetes Resources, Obesity Resources, Exercise Resources and various nutrition, diet and health resources. Curriculums were adopted, exhibits were designed and purchased, resources were purchased, and publications were written and published.

b. **Campus and county-based employees reached a reported 12,773 clients**. Programs were implemented at schools, churches, home and other sites on basic nutrition, diet, exercise and chronic diseases. All of the programs focused on improving nutrition and health. One (1) county agent and six (6) program assistants reported that 10% or 1,311 clients improved their nutrition behavior, 13% or 1,699 clients changed their eating habits and exercising more, 10% or 1,234 clients are practicing healthy lifestyles. In addition, there are 2,042 clients that the county-based employees are regularly working with. By working with

these 2,042 clients, county-based employees identified 24 current nutrition and health related issues and concerns in their counties that they are working to address. In addition, county-based employees indicated that they implemented 10 nutrition programs and activities in their counties this year.

c. NARETPA funds, Smith-Lever Act, State Matching Funds

d. Multistate Extension: FL

GOAL FOUR
GREATER HARMONY BETWEEN AGRICULTURE AND THE ENVIRONMENT

University faculty continue to work diligently in the area of agriculture and environmental harmony. Each year brings more pressure to increase understanding and to find new solutions. The work documented in this report highlights some of those accomplishments in agricultural waste management, soil quality, and sustainable agriculture.

The issue of water -- quality, quantity, regulations, use and availability -- is at the top of the agenda of almost all city, county and state governing bodies. Trying to anticipate future needs and resources, they call on experts in agriculture and environmental sciences at the University of Georgia and Fort Valley State University. The state of Georgia instituted state-wide water use restrictions in 2001 for the first time in history. Georgia, Alabama and Florida are currently in legal disputes over water rights of major rivers.

Georgia has adopted the Nutrient Management Plan as the method to address non-point source pollution from animal feeding operations. Over 180 nutrient management planning specialists have been certified. The Georgia nutrient management planner program has been implemented with little cost to the farmer representing a potential savings of more than $1 million to Georgia producers.

Weather is one of the most important variables that affect agriculture. With increasing economic pressures, farmers and growers need to be able to make informed decisions based on local conditions. The Georgia Automated Environmental Monitoring Network has grown from nine stations in 1992 to 60 stations in 2004.

Lime mud is a by-product produced by pulp mills. Significant amounts of lime mud are produced each year and most of this product typically ends up in private landfills. Extension efforts are changing this trend. Just one program in Georgia has diverted over 23,000 tons of lime mud from the landfill in the last year.

Georgia Master Gardeners collectively provided over 140,000 hours of volunteer education and service last year. Their work was estimated to have a dollar value of more than $2.6 million. Today the Extension Master Gardener program continues to grow and provide service to the citizens of Georgia.

Turfgrass managers need site-specific water conservation practices. These Best Management Practices (BMPs) require in-depth scientific information. Crop and soil scientists developed a plan in conjunction with the Golf Course Superintendents of America to develop such BMPs for golf courses.

Environmental education programs and agricultural awareness programs are critical to prepare today's young people to understand and support sound practices that protect our environment while maintaining the safe and bountiful food and fiber system enjoyed by American's today. Georgia Extension is doing its part to prepare today's youth to be decision makers of tomorrow.

Key Theme: Agricultural Waste Management, Nutrient Management, Water Quality

State Performance Goal 4-1

a. **Georgia has adopted the Nutrient Management Plan as the method to address non-point source pollution from animal feeding operations**. Animal Feeding Operation and National Pollution Discharge Elimination System regulations are administered by the Georgia Environmental Protection Division. The EPD and Georgia Department of Agriculture approached the UGA Cooperative Extension Service to bring the expertise and experience of the Land-Grant University to the AFO/CAFO program in Georgia. Extension took on the task of developing a 14-16 hour training program for county agents as well as private agricultural and environmental professionals.

b. Over 180 nutrient management planning specialists have been certified to date, of whom the majority are county Extension agents. These specialists have written and submitted more than 175 plans to the State for permitting and approval. The Georgia nutrient management planner program has been implemented with little cost to the farmer. Several studies around the nation have concluded that nutrient management plans usually cost from several hundred dollars up to more than $10,000 per plan. NRCS continues to support similar data, with the average national cost being recently presented as around $6,000 each. **This represents a potential average savings of more than $1 million, and potential high of around $1.75 million to Georgia producers.**

c. Smith-Lever Act, State Matching Funds

d. State Specific

Key Theme: Sustainable Agriculture

State Performance Goal: 4-1

a. Energy is a limited resource in this country and the world. Recent increases in energy prices, especially for liquid fuels, have drawn attention to the need to find ways to use energy in more efficient ways. Research is being done to determine viable alternative energy sources including energy crops produced on farms, but much energy can be conserved by implementing practices that require less energy

to accomplish the same production level. Many times, energy conservation practices can save producers money while also using less of our natural resources. An example is the more efficient use of agricultural and residential irrigation. If water can be applied in a more efficient way, less water will need to be pumped, which not only conserves water, but energy for pumping as well. Both of these resources are increasingly in short supply.

Extension specialists in the Department of Biological and Agricultural Engineering and in the College of Family and Consumer Sciences have combined efforts to **educate agricultural producers and rural residential consumers concerning ways they can reduce water and energy usage while maintaining production levels.** Programs have been developed and implemented in the areas of agricultural and residential irrigation efficiency, efficient application of fertilizers and pesticides, efficient heating and ventilation of poultry and other livestock facilities, energy conservation on dairies, energy conservation in peanut curing, energy conservation in row-crop production including precision agriculture, and energy conservation in rural housing.

b. Approximately 3,000 people attended meetings and 1,000 one-on-one contacts (phone or personal visit) were made in 2004 where energy conservation was the purpose of the meeting or contact. As a result, savings have occurred in electrical usage, diesel, gasoline, and LP gas. If all these forms of energy are converted in terms of electrical energy, the equivalent estimated savings would be 70 million kilowatt hours of electricity or approximately $3.5 million.

c. Smith-Lever Act

d. State Specific

Key Theme: Global Change and Climate Change, Weather and Climate

State Performance Goal: 4-10

a. This project seeks to **improve livelihood security and agricultural productivity in the Sahel-Sudan region of West Africa**, a region characterized by chronic food insecurity and severe environmental degradation. Rural households largely depend on rain-fed crop production and pasture availability for their livelihood, and are therefore most vulnerable to the region's increasingly variable climate.

This project addresses this situation by exploring how recent advances in climate prediction (i.e. seasonal rainfall forecasts) can be used to increase households' adaptive capacity and the production potential of rain-fed agriculture in the Sahel-Sudan region. We have five objectives: 1) To develop methods that best explain and interpret forecasts for farmers; 2) To test different intervention strategies to assist farmers in developing improved methods to manage agricultural resources

in response to climate forecasts; 3) To provide feedback to climate forecast and communication organizations on forecast needs; 4) To implement newly developed forecast products as appropriate for farm-level use; 5) To integrate and coordinate with other programs related to improving agriculture in the Sahel-Sudan.

b. During the first phase of the project (1998-2001) we found that farmers did respond to climate information by adjusting cropping choices and land use decisions. But their ability to optimally respond to forecasts is hindered by resource limitations. Climate information dissemination must be complemented by an integrated package of policy supports and technical advice on crop and variety choice, different levels of input application, or rainwater conservation technologies. During the second phase of the project (2002-2005) we are seeking to determine how climate forecasts can be packaged with other kinds of information, including crop modeling results, and how different kinds of intermediaries (radio broadcasting, agricultural extension, farmer-to-farmer networks etc.) can be used in supporting farmers' resource management decisions. As a result of experimental implementation of different communication approaches and evaluations by quantitative and qualitative research methods, we are fine-tuning a model of forecast dissemination and farmer support that will be made available to national and regional institutions. Simple decision support systems are also being developed to provide farmers with additional options for making crop management decisions. The project has developed close partnerships with and among meteorological and agricultural research institutions, non-governmental organizations, and providers of technical services in Burkina Faso and in West Africa. We have provided them with opportunities for field research, publication in scientific journals, participation in stakeholders' consultation and international conferences, and intensive short-term training at the University of Georgia. This has resulted in greater technical capacity and commitment to collaborative, participatory research approaches and to a demand-driven research agenda by these institutions.

c. Hatch Act, State Matching Funds

d. Mulitstate Research

Key Theme: Weather and Climate

State Performance Goal: 4-10

a. Information technology and advanced computer software are now common tools in use by researchers, extension agents and educators. However, due to the complexity of these computer tools and programs, there is a **need for intensive training in order to facilitate an efficient use and application towards specific agricultural or environmental problem.**

The College of Agricultural and Environmental Sciences, in collaboration with the International Consortium for Agricultural Systems Applications (ICASA), University of Florida, Iowa State University and the International Center for Soil Fertility and Agricultural Development, organized a two week training program to familiarize scientists, extension agents, educators and others with a comprehensive computer model for the simulation of crop growth and yield, soil and plant water, nutrient and carbon dynamics and their application to real world problems. The workshop was held from May 17 through May 26, 2004 on the Griffin Campus of the College of Agricultural and Environmental Sciences.

b. The workshop was attended by 44 international participants from more than 20 countries. Specifically the workshop provided training on the **Decision Support System for Agrotechnology Transfer**, a computer software package that consists of more than 20 different computer models that predict yield for agronomic crops as function of weather and soil conditions and crop management. Due to the success of this workshop another training workshop is planned for May, 2006.

c. Hatch Act, Smith-Lever Act, State Matching Funds

d. Multistate Integrated Research Extension: FL, IA

Key Theme: Weather and Climate

State Performance Goal: 4-10

a. Weather is one of the most important variables that affect agriculture, including traditional row crops, fruits, vegetables, the green industry, and livestock. With the increasing economic pressures, farmers and growers need to be able to make informed decisions based on local conditions to be able to increase production, optimize the use of natural resources and reduce the environmental impact. In Georgia and other states across the US, the National Weather Service is the main federal agency responsible for providing local weather conditions and weather forecasts. However, most of the **weather observations are conducted at major airports, which are not very representative for local conditions where agriculture is being conducted**

In the late 80's the College of Agricultural and Environmental Sciences initiated a study to investigate the need for the development of an automated weather station network to target agricultural and environmental applications. A workshop held in the early 90's brought several state and federal agencies together. The outcome of the workshop resulted in the establishment of a pilot network of automated weather stations, which were installed on the agricultural experiment and branch stations located across the state. Weather information is transmitted via dedicated

telephone lines and modems to the CAES campus in Griffin, where the data are processed and disseminated.

b. The **Georgia Automated Environmental Monitoring Network has grown from nine stations in 1992 to 60 stations in 2004**. Through improvements in information and telecommunication technologies users can retrieve the current weather conditions for all stations from the internet at www.Georgiaweather.net. This information is updated at least once an hour, while some sites are updated more frequently, especially in the greater Atlanta metropolitan area. In addition users can retrieve a summary of the weather records for the last four and 30 days, as well as long-term daily temperature and rainfall records. The weather site is now one of the most popular web sites in the College. The number of requests for weather data and related information reached more than 170,000 for the month of September, with more than 850 visitors per day. Users not only include farmers and growers, but also many others who are affected by local weather conditions, such as construction companies, the heating and air conditioning industry, lawyers, teachers in K-12 education, sporting events and many others.

c. Hatch Act, Smith-Lever Act, State Matching Funds

d. Integrated Research and Extension

Key Theme: Agricultural Waste Management, Soil Quality

State Performance Goal: 4-11

a. Lime mud is a by-product produced by pulp mills during the pulping process. **Significant amounts of lime mud are produced each year and most of this product typically ends up in private landfills.** The pulp mills were interested in finding alternative uses for this product, and the high calcium carbonate content of the lime mud makes it useful as an agricultural lime. Because the mills need to conserve landfill space, they can provide the lime mud at a low cost, which also benefits farmers by saving them money.

b. Research from the University of Georgia, Auburn University, and Clemson University demonstrates that lime mud could be used agriculturally. UGA biological and agricultural engineers wrote an Extension Service bulletin called "Land Application of Pulp Mill Lime Mud." The extension bulletin has been used in counties near pulp mills to educate farmers and others on lime mud use and use is reported to have increased. The lime mud has been applied to both row crops, pastures and hayfields. Estimates are that 19,000 tons of lime mud have been land applied during the 2004 growing season in the Bulloch and Evans County area, diverting this amount from the landfill and saving farmers about $380,000. The bulletin is currently being used to develop a land application program in the Early

County area by working with area cooperatives. **This program estimates it will divert 23,000 tons of lime mud per year from the landfill.**

c. Smith-Lever Act, State Matching Funds

d. Multistate Extension: AL, SC

Key Theme: Water Quality

State Performance Goal: 4-2

a. In the 2003 Master Gardener Annual Report, 2,152 Georgia Master Gardeners collectively provided 141,911 hours of volunteer education and service around the state. Their work was estimated to have a dollar value of more than $2.5 million. Today the Master Gardener program of the UGA Cooperative Extension Service continues to grow and provide volunteer education to the citizens of Georgia. In 2004, a **new kind of Master Gardener advanced training** was held on the UGA Griffin Campus **to improve the capacity and knowledge base of participating Master Gardeners on water issues.** The training was sponsored by a grant from the Southern Region Water Quality Program and conducted by Extension specialists from Alabama, Georgia and Tennessee. The intent was to prepare the Master Gardeners so that they would consider and incorporate water issues as a part of their volunteer educational programs.

b. With the number of contact hours that master gardeners log each year, they will greatly increase the number of citizens who learn about how they are impacting water. The advanced training gave the participants a better appreciation of how landscape practices can benefit and degrade water quality, ways to minimize pesticide chemical use and how to better manage soils for environmentally healthy landscapes. They were prepared to train other citizens about these water issues as well.

c. Smith-Lever Act, State Matching Funds

d. Multistate Extension: AL, TN

Key Theme: Water Quality

State Performance Goal: 4-2

a. **Stormwater is a leading non-point source pollution source in the urban and surburban areas.** New Environmental Protection Division requirements are calling for more public participation in resolving issues of urban non-point source pollution. One best management practice to reduce stormwater runoff from home

landscapes is to create features within the landscape that have aesthetic appeal as well as function in the landscape to reduce stormwater and the pollution loads that move with stormwater. Rain gardens provide a means of capturing stormwater and allowing it to infiltrate into soil to supply water for plants and recharge groundwater while being attractive and desirable features in landscapes. The public has not been very aware of this practice or had a good understanding of what rain gardens are.

b. With this in mind, the Clean Water Campaign, a UGA biological and agricultural engineer and a Cherokee County Extension Service agent **created an educational program for the metro Atlanta area on do-it-yourself rain gardens for homeowners.** Workshops provided homeowners guidelines on constructing rain gardens in their yards and landscapes. The workshops also gave these homeowners a better understanding of the pollution that can result from uncontrolled urban stormwater. Workshops were held in Cherokee, Clayton, North Fulton, South Fulton, Cobb, Gwinnett, Dekalb and Rockdale during the winter of 2004. The city of Alpharetta also hosted a Rain Garden Workshop. There were about 290 participants for all of the workshops.

c. Smith-Lever Act, State Matching Funds

d. State Specific

Key Theme: Water Quality

State Performance Goal: 4-2

a. As a direct result of the signing of Georgia House Bill 579, the Georgia Soil and Water Conservation Commission has started **installing water meters on over 21,000 permitted wells being used to irrigate over 2.2 million acres**. The farmers have some control over the installation of the meters, but there are many questions related to this process. These include; how will the collected data be used?, how can I stop the installation?, will they only be installed on center pivots?, and can I use them for any other purpose? The bulk of these questions are directed to the local County Extension Agent who may or may not have good answers for all of the questions concerning the installation of the meters.

   A multi-agency team was formed to provide information on meter installation, irrigation, water use, water conservation and cost share programs. The team hosted 7 workshops in conjunction with County Extension Agents with an average attendance of 35 persons. The workshops were held across South Georgia in Mitchell, Terrell, Turner, Lowndes, Laurens, Appling and Bulloch Counties. The team provided information to County Extension Agents, NRCS personnel, Soil and Water Conservation District personnel, and general citizens. The team provided information on the policy behind the need for

water metering, the use of various methods such as conservation tillage to conserve water, physical methods for conserving water, data and analysis of data collected from a UGA program conducted by Dr. Jim Hook and Kerry Harrison (See 2003 Impact Statement – "Agricultural Water Use: How much is actually being used in Georgia?"). Other presentations included how the meters would be installed, who would install them, what cost would be associated with the meters, and how to get their irrigation system analyzed for efficiency. The participants also received information on State and Federal cost-share programs that are available for retrofitting their existing systems to make them more efficient.

b. This series of workshops was designed and delivered to make the County Extension Agent, NRCS Field Personnel, farmers and citizens more knowledgeable of different ways to conserve one of Georgia's most critical "commodities". Through the use of the meters being placed on the wells, the modification of irrigation systems to make them more efficient and the use of practices such as conservation tillage, farmers can reduce agricultural water use. Participants included 75 farmers with direct control of irrigation use, 100 agency personnel (UGA, NRCS and Soil and Water Conservation Districts) working directly with farmers and 35 general citizens. Much of the information presented to the participants can be directly applied to their particular irrigation system to assist them in conserving water on their farm and thereby protecting and conserving the ground and surface water resources in Georgia. For example, from the numbers on record at the GA Dept of Natural Resources, if we could average a reduction in the water used for irrigation by 1 acre-inch over the 2.2 million acres being irrigated that would be a reduction of 59 billion gallons of water annually. The practices and methods presented in these workshops could help in this type of water use reduction. Additionally, improving or upgrading irrigation systems, and using conservation practices could potentially save thousands of dollars annually in electricity and fuel costs.

c. Smith-Lever Act, State Matching Funds

d. State Specific

Key Theme: Soil Quality

State Performance Goal: 4-2

a. Because of assumed relationships between soil texture and permeability, percolation rates for clayey subsoil horizons of soils in the Georgia Piedmont are estimated to be too low for successful installation of onsite wastewater management system drainfields. Thus, most drainfield trenches in the Piedmont are installed in loamy horizons that occur deep in the soil below the more shallow clayey horizons. Recent data for Piedmont soils at a few locations suggest that because of structural characteristics, the shallow clayey horizons have

permeability acceptable for onsite system installation. If this is generally true across the Piedmont, **onsite system drainfields could be installed at a shallower depth which would reduce installation costs, enhance wastewater treatment, and allow use of many soils with seasonal water tables and/or deep clayey horizons.** A research project was initiated to evaluate saturated hydraulic conductivity and percolation rate of major horizons for common soils in the Georgia Piedmont.

b. Data from hydraulic conductivity measurements for major horizons of soils from all landscape positions indicate that because of structure differences, shallow clayey horizons have percolation rates as high as or higher than deeper loamy horizons. In fact, the deep loamy horizons often have percolation rates that are unsuitable for onsite system drainfield installation. **Results from this study have resulted in shallow installation of onsite system drainfields being accepted as a standard practice by many County Boards of Health.** This change in regulatory policy will increase the area of soils suitable for onsite systems and will help reduce potential environmental degradation from their use in Georgia.

c. Hatch Act, State Matching Funds

d. State Specific

Key Theme: Water Quality

State Performance Goal: 4-2

a. Georgia counties and municipalities seeking increases in wastewater discharge capacities must complete a state-mandated watershed assessment prior to receiving NPDES permits. UGA's Biological and Agricultural Engineering Department work with local officials, county and city planners, consulting engineers and stakeholders to develop a **watershed management plan for projected growth.**

b. UGA is serving rural areas and small counties and municipalities with high quality data collection of water, biological and physical habitat assessments, spatial data analysis, land use development and demographics. Public education meetings are held to inform and educate local stakeholders about the historical and current health and integrity of the watershed they live in as well as seek input on the development of the management plan itself. **The completed assessments are comprehensive in that they cover physical, biological, chemical and ecological constituents and link this information to stakeholder involvement.**

c. Smith-Lever Act, State Matching Funds

d. State Specific

Key Theme: Nutrient Management, Soil Quality, Water Quality, Sustainable Agriculture

State Performance Goal: 4-15

a. Alternate cultural practices that will protect, improve, and maintain soil fertility are required for sustainable vegetable production. Leguminous and non-leguminous, green manure and cover crops will be used as a substitute for inorganic nitrogenous fertilizers. These options could provide economic and productive sustainable system. Environment friendly research methods that produce quality produce will be developed for exotic vegetables.

   In the production of agronomic crops, legumes are used regularly as a source of nitrogen. Use of legume cover crops as a N source have not found similar application in vegetable production. In addition, the utilization of leguminous and non-leguminous cover crops in a mixture has not been thoroughly researched. Georgia vegetable farmers need information of this kind so they can improve their income, better protect the environment, and insure farm land usage now and for the future.

b. **Results of this ongoing study indicate that a legume cover crop could conceivably be an effective N source in vegetable production.** Plant dry matter, fruit number, total yield and LAI of eggplant were similar in legumes as in N fertilizer. It is indicated in this study that leguminous cover crops are an effective N source in supporting plant dry matter, fruit number, total yield and LAI of eggplant.

c. NARETPA Funds, State Matching Funds

d. State Specific

Key Theme: Agricultural Waste Management

State Performance Goal: 4-6

a. Georgia currently ranks as the number one poultry producing state, producing more than 1.4 billion broilers, 13 million breeder hens, 12.0 million commercial layers, and 13 million replacement pullets. **Growth of Georgia's poultry industry has resulted in nearly 3 million tons of litter and manure produced annually.** Poultry litter and manure has value as a fertilizer and soil amendment when applied appropriately. Proper utilization of this material as a fertilizer is critical for the protection of the environment and the future of poultry production in the state.

Educational programs and materials for the implementation of nutrient management plans for poultry producers have been utilized in 2004. Nutrient management trainings have been provided for poultry farmers, county agents and poultry company personnel utilizing updated NMP Cd's and a phosphorous index calculator.

b. More than 20 presentations and 10 training sessions were conducted for poultry audiences for this program in 2004. Over 300 individuals received training in this subject area in 2004. In addition, two refereed journal publications, four extension bulletins, and five news letters were produced in 2004 for this program area.

   As a result of the efforts of this program area, poultry growers all across Georgia are implementing NMP programs for their farms. The NMP program will assist some 500 Georgia poultry producers comply with state and federal CAFO regulations in 2005 and 2006.

c. Smith-Lever Act, State Matching Funds

d. State Specific

Key Theme: Sustainable Agriculture

State Performance Goal: 4-7

a. **Many communities in Georgia and throughout the U.S. are turning to the use of conservation easements to help stem the loss of farmland** to urban and related developments. A conservation easement is a voluntary legal agreement between a land owner and the easement holder that places restrictions on development of the land in exchange for monetary compensation to the land owner. Active efforts and programs to preserve farmland through purchase of conservation easements are underway in several Georgia counties including Carroll, Fulton, Habersham and Oconee counties. There is also state-level interest in preserving farmland and other green space primarily through the Georgia's Land Conservation Partnership focusing on conservation easements. When public tax dollars are used in PACE (purchase of agricultural conservation easement) programs, this prioritization involves targeting protection of farmland that is most highly valued by the general public.

b. A UGA agricultural and applied economist **analyzed how public preferences and values for a PACE program in Georgia are affected by different attributes or characteristics of farmland the program would preserve**. Respondents placed a high priority on using conservation easements to preserve farmland relative to other types of protected land uses in Georgia. Respondents also viewed farmland protection as being consistent with protection of the environment. Results indicated that willingness-to-pay to protect farmland is

highest for prime farmland near urban areas used to produce crops for human consumption.

c. Hatch Act, State Matching Funds

d. State Specific

Key Theme: Sustainable Agriculture

State Performance Goal: 4-7

a. Georgia is one of the fastest growing states in the nation in terms of population growth and in terms of land used for development. Atlanta is the most sprawling major metropolitan area in the U.S. when measured by population density and also ranks near the top in number of miles driven per day. Growth and sprawl are huge issues in Georgia. These trends have large potential impacts on the financial condition of local governments in Georgia.

   The cost of providing county government services relative to the revenues provided by different land uses has been studied in twelve counties in Georgia. This work shows the dollars received per dollar spent for residential development, commercial and industrial development, and farm and forest lands. **Research has also been performed on the economic costs and benefits of farmland and green space preservation.** A training program for county and municipal officials was put together with other UGA faculty and staff. Finally, an active speaking program and several op-ed pieces published in the Atlanta newspaper have served to educate many people. Over 1500 Georgia elected officials and citizens have participated in smart growth training or heard specialists speak on the topic of the economics of growth and land use. Many more have read the newspaper columns. The research shows that residential development costs county governments money on average in every location where it has been studied. On average, residential development provides $0.77 in revenue for every $1.00 the county government has to spend on services (not including local schools). Increased residential development leads to increased taxes on existing (and new) residents and hurts the financial condition of both the county government and, especially, the public school system. The funding mechanism for Georgia's public schools may well be unsustainable.

b. Several counties have adopted more balanced growth plans after learning of these results, including more commercial development and abandoning ideas of just being a "bedroom" community. Other counties are trying to design better standards and zoning for residential development, to increase revenue streams, decrease service costs, or both. Several counties are studying and developing transferable development rights programs to both preserve farmland and make their future residential development less of a financial drain. Such changes benefit

all residents and business owners in a community by lowering their future tax burden and by creating a more pleasing place to live.

c. Hatch Act, Smith-Lever Act, State Matching Funds

d. Integrated Research and Extension

Key Theme: Weather and Climate

State Performance Goal: 4-7

a. Turfgrass managers need site-specific water conservation practices. These Best Management Practices (BMPs) require in-depth scientific information**. A successful holistic, science-based BMP approach to turfgrass water conservation requires that turf managers have access to the best science and practical information to actually make "best" decisions.** UGA crop and soil scientists in Griffin developed a plan in conjunction with the Golf Course Superintendents of America to develop BMPs for golf courses, a means to integrate BMPs developed by experienced turf managers and environmental groups, and multiple educational delivery methods. Phase I focuses on laying a basic foundation for understanding water properties and water relationships in the atmosphere, plant, and soil. An on-line course is now offered through the GCSAA on "Water-Atmosphere-Turfgrass-Edaphic / Soil-Relations for Efficient Water Management." Phase II is the development of a detailed document on "BMPs for Turfgrass Water Conservation." Phase III is presentation of an on-going seminar (repeated annually) to golf course superintendents or consultants who are developing BMPs documents for their specific sites. This is followed by a 60-day interactive list-serve period while the documents are developed. Ideas from this experienced group are used to strengthen the original document. Phase IV involves using the information packages for other uses such as templates for state water conservation plans, formal instructional programs, other areas of turfgrass management, etc.

b. In 2004, Georgia and Arizona used the template in discussions with the state Department of Natural Resources to allow a BMP approach to water management rather than a rigid regulation approach. Impact from this overall program is expected to be very substantial science. This type of information is necessary if BMPs are to move from theory to implementation of specific sites. The information currently does not exist in the form of a single source package. Once the material is developed, it becomes the classic package for others to use. It can be easily adapted to incorporate the latest scientific results.

c. Hatch Act, Smith-Lever Act, State Matching Funds

d. Multistate Integrated Research and Extension

Key Theme: Agricultural Waste Management

State Performance Goal: 4-7

a. The continued growth in human population has created a corresponding increase in generation of biosolids, end product of wastewater treatment plants. The annual production of biosolids in the United States is projected to increase sharply to 47 million tons within the next decade. Land application is becoming a major means for biosolids disposal because of its beneficial effects on agricultural productivity of soils. However, **biosolids often serve as a sink for anthropogenic organic chemicals that cannot be degraded during the wastewater treatment processes.**

b. A UGA crop and soil scientist and agricultural engineer collaborated to investigate the fate of Nonylphenol, an endocrine disruptor, in biosolids compost. A variety of anthropogenic organic chemicals were detected in biosolids from Georgia wastewater treatment plants. Nonylphenol, an endocrine disruptor, was detected up to 1,000 parts per million in several biosolids from wastewater treatment plants servicing cities with heavy industry. The safest approach to avoid potential detrimental effects of biosolids-associated anthropogenic organic chemicals to the environment is to ensure that the compounds are adequately degraded before biosolids land application. A recent pilot laboratory-controlled composting study provided further evidence that nonylphenol can be effectively degraded during composting. **The success of this research will not only have significant economic impact on wastewater treatment plants in the United States and world-wide but also have tremendous environmental impact.**

c. Hatch Act, State Matching Funds

d. State Specific

Key Theme: Biological Control
State Performance Goal: 4-8

a. A significant detriment to successful production of high-quality blueberries in Georgia is the fungus Monilinia vaccinii-corymbosi. It transmits infection through the stigma-style route of entry of open flowers, causing mummy berry disease in the developing fruit. Laboratory studies have shown the bacterial biocontrol agent Bacillus subtilis effectively controls this plant disease if deposited directly on the stigmatic surface of the flower. Using conventional spray-application methods, however, it has not been possible in the field to adequately deposit the agent onto small diameter stigmas.

b. UGA **biological and agricultural engineers have successfully incorporated electrostatic forces of attraction to increase the mass-transfer of sprays carrying the viable bacterial biocontrol agent onto stigmatic surfaces of blueberry for field spraying.** The electrostatic method provided the improved biofungicide delivery requiring only 1/8 the spray volume.

c. Hatch Act, State Matching Funds

d. State Specific

Key Theme: Water Quality

State Performance Goal: 4-9

a. Contamination by animal manure has become a major issue in Georgia and our entire country. Due to concentrations of animals, excessive amounts of manure are being disposed of on land. The U.S. Environmental Protection Agency and the Georgia Environmental Protection Division have revised their water quality regulations governing concentrated animal feeding operations, but omitted certification requirements that could assist in assuring water quality. The decision to avoid potential short-term inconveniences may be expected to negatively impact the long-term success of eliminating pollutants from waters.

   The use of certified specialists to develop nutrient management plans is an important monitoring technique. A nutrient management plan is the primary planning document for determining appropriate practices to manage manure at the CAFO and for developing strategies and practices to prevent pollutants from entering waters. Certification is a technique that uses independent experts to ascertain that minimum standards are met. A certification process serves as an ongoing quality control component to help assure environmental regulators, producers, and the public that high-quality management plans are being developed.

b. **An analysis of certification of operators, facilities, and lagoons shows an opportunity to delineate practices to reduce potential contamination problems.** The voluntary certification of persons and facilities including applicant training, examination, and the investigation of qualifications can help reduce the denigration of waters. The absence of this certification may be expected to present state regulators with inferior and inadequate nutrient management plans. State staff evaluating NPDES applications will need to assume the monitoring duties that could have been handled by independent specialists under a certification program.

c. Hatch Act, State Matching Funds

d. State Specific

Key Theme: Water Quality

State Performance Goal: 4-9

a. **A study was conducted to estimate the changes in aggregate recreation use and associated changes in recreation expenditures within the Tennessee Valley Authority (TVA) region over a 30 year study period as a result of proposed changes in TVA reservoir system operating conditions.** The TVA region is composed of seven states including Georgia. Three recreation user groups were included in the analysis: public access site users, commercial patrons, and shoreline property owners. Because economic impact analysis is concerned with the effects of Anew@ or external money brought into an economy, this study focused on estimating changes in expenditures in August, September, and October under management alternatives for individuals who live outside of the TVA region or, for permanent residents of the region, the reallocation of travel days normally spent outside of the TVA region as a result of changes in operating conditions. Four main inputs were used to calculate changes in recreation expenditures under each alternative: 1) mean per person per day expenditures attributable to recreation; 2) baseline recreation use in 2002 based on primary data; 3) population growth rates from 2003 through 2030; and 4) percent change in number of visitor trips or days lived at a TVA reservoir or tailwater residence in response to proposed changes in operating conditions.

   To estimate changes in recreation use and associated expenditures as a result of changes in operating conditions, projected recreation use under no change in operating conditions was calculated by applying population growth rates for 2003 through 2030 to baseline recreation use estimates for each user group by TVA economic subregion. Percent changes in number of visitor trips or property owner living days based on econometric trip and owner day response functions were applied to these projected use estimates to calculate the change in recreation use from 2003 through 2030 under each management alternative. Mean expenditures per person per day estimated from primary and secondary data were applied to the projected change in recreation use estimates to calculate the projected change in expenditures from 2003 through 2030 as a result of changes in operating conditions for each user group by TVA economic subregion.

b. Results show the overall sensitivity of recreation expenditures in the TVA region from external sources to changes in reservoir operating conditions affecting various reservoir and tailwater purposes including power generation, navigation, lake-based recreation and river-based recreation. Estimated changes in recreation expenditures in the TVA region in 2004 during August, September and October range from -$9.8 million for alternatives emphasizing commercial use and

production including power generation to $13.2 million for alternatives emphasizing reservoir-based and river-based recreation.

c. Hatch Act, State Matching Funds

d. Multistate Research

Key Theme: Sustainable Agriculture, Water Quality

State Performance Goal: 4-9

a. Calibration and evaluation of crop models often require good data for crop growth and development, yield and yield components, and management practices. However, the dynamics of the agricultural technology, such as new varieties that are released, is not matched with the frequency by which field experiments can be conducted to obtain the required data crop model calibration. As a result, there is now a lack of cultivar coefficients that represent both new and recently released varieties. Especially for Georgia, an accurate prediction of irrigation water use is needed to help improve yield predictions and contribute to the resolution of the tri-state (Alabama, Florida and Georgia) water dispute.

b. **UGA biological and agricultural engineers used an optimization procedure to estimate the cultivar coefficients for widely-grown peanut varieties in the southeastern USA as well as for new and recently released varieties.** At the same time, we evaluated the performance of the Decision Support System for Agrotechnology Transfer Cropping System Model in simulating irrigation applications and its impact on yield in farmers' fields in southwest Georgia. Results showed that an optimization procedure can successfully be used to derive cultivar coefficients for crop models from typical information provided by crop variety trials. The on-farm evaluation showed that the peanut crop simulation model can be a useful tool for estimating farmers' irrigation applications and its impact on yield. Potential users of this decision support system include policy makers, planners, and regulators that deal with water issues.

c. Hatch Act, State Matching Funds

d. Multistate Research

GOAL FIVE
ENHANCED ECONOMIC OPPORTUNITIES AND QUALITY OF LIFE FOR AMERICANS

Many internal and external problems impact the quality of life of Georgia citizens. Efforts to improve quality of life are a high priority of our faculty. The Georgia 4-H Program has continued to demonstrate large impact on the youth of Georgia. The development of leadership skills continues to serve as a cornerstone of the 4-H educational program.

Family resource management goals are increasing more important. Georgia ranks third highest in bankruptcy cases in the nation. 1 out of 43 households filed for bankruptcy in a recent 12 month period. Consumer education is needed to help limited resource and low-income families make wise choices in the marketplace. Extension faculty provided unbiased, researched-based information to help Georgian of all ages to maximize limited financial resources, set financial goals and plan spending to achieve goals.

Extension faculty provided free tax preparation assistance through the Consumer Financial Literacy Program (CFLP) to low income families in rural areas. Saving to these families averaged $104 per family.

Consumer Apparel and Textiles Programs were conducted to help low income and limited resource families improve their decision-making skills when making apparel and textiles purchases. Over 200 low-income participants participated in just one program alone designed to help families generate extra family income with apparel and textile knowledge.

Georgia's senior adult population will nearly triple by the year 2025. This segment of the population is seeking to remain independent as long as possible. Extension faculty provide educational programs which allow seniors to meet their changing life needs in life skill areas like housing, financial management, health and nutrition. Readership surveys of one Senior Sense newsletter revealed that 65% prepared healthy recipes they learned from Extension information. Most seniors who read the newsletter cited improved dietary habits.

Georgia Extension continues to be the one largest single source of required community-based education for Georgia child care providers. Child care that is affordable, accessible, and of high quality is not available to many Georgia parents needing it. Extension provided nearly 55,000 educational contact hours to nearly 20,000 child care providers, parents, and others last year.

From parenting education to avoiding telemarketing fraud, Extension faculty continue to have great impact on the daily lives of Georgia citizens.

Key Theme: Family Resource Management, Impact of Change on Rural Communities

State Performance Goal: 5-1

a. During the 12-month period ending Sept. 30, 2001, 1 of every 43 households filed for bankruptcy in Georgia. **Georgia ranks the third highest in bankruptcy cases in the nation** (American Bankruptcy Institute). The personal saving-rate for the United States is at the lowest level in history, suggesting that Georgians and other citizens are not saving adequately for future needs. Families need to know how to plan their finances, cope with lack of adequate income effectively, control cash flow, manage credit and debt wisely, insure adequately, contribute to savings/investments regularly, pay necessary taxes but no more, prepare to retire at current living level, and pass assets to heirs. Limited resource families, particularly, are faced with economic uncertainty, and it is often difficult for these families and individuals to make wise consumer choices in the marketplace and meet basic needs.

   UGA faculty provided unbiased, research-based information to help Georgians of all ages to maximize limited financial resources, set financial goals, and plan spending to achieve goals. Specialist promoted via the media and educational programs desirable financial behaviors such as eliminating debt, saving for life goals, electronic filing of income taxes, avoiding frauds and scams, and investing for long-term goals. Peer Financial Counseling Train the Trainer Program was conducted to provide financial management education to college students.

   Nearly 68,860 contact hours of consumer education were provided to 14,728 Georgians to help them better manage their financial resources and protect themselves from consumer fraud. The Consumer Financial Literacy Program provided 6,665 contact hours of education to 3,584 Georgians in selected counties. Nearly 57% of them were low-income Georgians. Free tax assistance was provided to 1,400 low-income Georgians in 47 counties to file federal and state income tax returns.

   Specialist partnered with the Georgia Consortium for Personal Financial Literacy to assemble a statewide coalition to launch a statewide campaign to promote the savings habit called Georgia Saves. Nine workshops were conducted across the state to train 150 volunteer wealth coaches. Nearly 190 hours of education was provided to 613 Georgia Savers. Media was a major strategy for public financial management education: 25 exhibits reached to 8,574 viewers; articles in newsletters reached to 2,233 people; 18 radio spots were broadcast to a listening audience of more than 624,000; 58 newspaper columns went to a circulation of almost 930,650; and 6 television programs were telecast to more than 725,000 viewers.

b. **Free assistance provided by the Consumer Financial Literacy Program (CFLP) staff in selected rural counties helped 1,400 low-income families to**

save an average of $104 per family for tax preparation fees paid in the previous year. The use of direct deposit tax filing increased from 24% in 2003 to 49% in 2004 by the Georgians who received CFLP free tax filling service. The use of direct deposit helped them to receive tax refunds quickly and avoid costly refund anticipation loans. The total value of the tax refund money of Georgians who received the free tax filing service of CFLP is more than $1.4 million. The Georgia Saves program guided 28,173 Georgians to save $58,523 in 2004.

Of the participants who participated in consumer education extension programs, 98% said those extension programs were helpful to learn about consumer skills and financial management practices. Most of the participants planned to improve their financial management practices. For example, 92% planned to keep track of their spending; 90% planned to play their bills on time; and 94% planned to start an emergency saving fund. Of the participants who completed the First Account extension program in Dekalb County, 82% improved their knowledge about basic banking concepts. The First Account program helped 123 un-banked individuals become bank customers during the first half of 2004. More than 88% of the college students who participated in the Peer Financial Counseling Program said that it helped them to learn financial management practices. Most of the students who participated in the program planned to improve their personal financial management practices. For example, 79% planned to consider the cost of using credit cards; 91% planned to order a copy of their credit reports; 82% planned to pay more than minimum amount on their credit cards; and 68% planned to take steps toward debt recovery.

c. Smith-Lever Act, State Matching Funds

d. State Specific

Key Theme: Family Resource Management, Impact of Change on Rural Communities, Jobs/Employment

State Performance Goal: 5-2

a. Self-management skills are the foundation of employee marketability. They begin with setting personal goals which include the enhancement of one's appearance and health. Appropriate work apparel, grooming and hygiene, proper diet and exercise practices all contribute. While initial goals are being determined and achieved, progress can be made toward developing skills needed to competitively interview for and hold a job. In Georgia, more than one million persons live below the level of poverty. According to Georgia DHR, 123,671 Georgians received TANF in 2001. Georgia ranked 23rd in the U.S. in per capita income for 1999 at $27,324 and has a higher poverty rate for both individuals (14.7%) and children (22.8%) than the U.S. overall (Source: U.S. Census).

Faculty participated in local collaboratives to address the needs of low-income families. They provided basic skills education to working poor individuals through either direct education or train-the-trainer programs targeted to social service and adult education providers. Specialist taught life skills to low-income individuals and families. They created community awareness of poverty issues with the poverty simulation.

More than 1,500 contact hours of workforce preparedness education were provided to 1,239 Georgians. More than half (57%) of the training participants were low-income or at-risk audiences. The Surviving Tough Times extension program, targeted to individuals experiencing a reduction in hours or lay-off, provided important information about surviving on less resources for more than 100 unemployed workers. Seventeen poverty simulation workshops were conducted for nearly 1,000 community leaders and service providers. This simulated "month" in poverty informs participants of the realities faced by working poor families. Work force preparedness and consumer education information was provided by media to thousands of Georgians.

b. **A majority (88%) of the people who participated in the Surviving Tough Times extension program said the program helped them to gain knowledge and skills to manage a period of unemployment.** Most of the participants learned to make correct consumer decisions. For example, 98% of the participants planned to identify at least one way to reduce their spending; 91% planned to reduce household utilities to lower their bills; and 97% of the participants planned to pay basic living expenses and credit obligations before spending money on anything extra.

   Of the participants in workforce preparedness education, 54% planned to update their resumes, and 57% planned to devote their attention to finding jobs. **Nearly 80% of the community leaders and service providers who participated in the poverty simulation workshop said it helped them to better understand and relate to the issues and problems faced by working poor families.** For instance a program participant said, "It was quite simply, a paradigm-shifting experience. While I've never been one of those who say poor people bring all their problems on themselves, I did undergo a major change in how I view the struggle of the poor." Fifty-one percent of the participants in the poverty simulation workshop developed a more positive attitude toward people living in poverty and planned to better serve the needs of the people living in poverty. For example, 91% planned to view people living in poverty differently to better serve their needs; 77% planned to work with other related community resources to assist people who live in poverty and seek out information that can be used to address poverty issues in their community.

c. Smith-Lever Act, State Matching Funds

d. State Specific

Key Theme: Family Resource Management

State Performance Goal: 5-2

a. Limited resource families, particularly, are faced with economic uncertainty, and it is often difficult for these families and individuals to make wise consumer choices in the marketplace and meet basic needs. Cost of clothing continues to rise and limited resource families are faced with making even more decisions. **Consumer education is needed to help limited resource families purchase clothing wisely**, plan so number of purchases are reduced, care for and repair clothing to extend the use life, and use skills and time to make limited clothing dollars provide more or better quality. Self-management skills are the foundation of employee marketability. With the recent changes in welfare reform, many clientele are forced into the job market; therefore, the need for self-improvement, personal development, and how to select appropriate dress for a job interview becomes critical to enhancing their success.

   Consumer Apparel and Textiles Programs were conducted in eight counties to help low-income and limited resource families improve their decision-making skills when making apparel and textiles purchases. These programs focused on apparel selection, care performance, interpreting labels and recent developments in textile fibers. **Over 200 low-income participants attended a Made-at-Home Show in Twiggs County which was designed to help families find ways to generate extra family income**. One Apparel and Textiles In-service Training was designed for program assistant to provide up-to-date information on recent trends and issues in apparel, textiles and related areas. Personal Development Programs were conducted in eight counties and focused on self-management skills to enhance employee marketability skills, such as appropriate work apparel, grooming and hygiene, Clothing Safety and Textiles Awareness Programs were conducted utilizing exhibits during Ag Showcase and Agricultural Sunbelt Exposition and fairs.

b. Program Assistants' knowledge was enhanced through in-service training. They adopted one or more recommended practices and conducted programs in their individual counties. Limited resource individuals adopted one or more recommended practices to avoid buying clothing on impulse. Farmers and individuals increased awareness to protect their families from unreasonable risk of injury from unsafe clothing and personal protective equipment. At least 10 limited resource individuals enhanced their personal appearance and participated in job interviews.

c. NARETPA Funds, State Matching Funds

d. State Specific

Key Theme: Aging

State Performance Goal: 5-3

a. Georgia's senior adult population will nearly triple by the year 2025, with the largest rate of increase among those over 85 years of age (US Census population projections). Many seniors will remain healthy and vital to much older ages resulting in opportunities for volunteering, nontraditional jobs and recreation; there will also be increased demand for specialized services in housing, education, health and nutrition. Seniors are seeking to remain independent as long as possible and frequently choose personal care homes for assisted living as it becomes necessary.

   Faculty provided educational programs which allow seniors to meet their changing life needs in housing, financial management, health and nutrition and family care giving. They offered seniors opportunities for community involvement as volunteers.

   Family and consumer sciences extension programs provided 26,760 contact hours of education to 31,963 senior citizens in 2004. Of the seniors who participated in family and consumer sciences extension programs, 76% were in nutrition and food safety educational programs; 7% were in financial management and consumer education programs; and nearly 11% were in weight control, diabetes and chronic disease prevention programs. Nutrition, food safety, and diabetes education programs reached 263 personal care home providers. The Seniors Taking Charge nutrition and health extension program provided 547 hours of education to 512 senior citizens in 2004. The newsletter, "Senior Sense," designed for senior citizens reached over 9,000 individuals.

b. Nearly 93% of the seniors who participated in Foods and Nutrition education programs said those programs were helpful in learning healthy nutrition concepts and meal planning practices. Most of the participants developed their food and nutrition knowledge and said that they plan to adopt healthy dietary practices. For example, 50% planned to drink calcium fortified orange juice at least three times a week and to include at least one new fruit or vegetable in their diet; 81% planned to eat whole grain cereals; 55% planned to eat at least five fruits and vegetables each day; and 58% planned to eat low-fat snacks and desserts.

   Ninety-two percent of the seniors who participated in food safety education programs said those programs were helpful to learn food safety and sanitary practices. The majority of the seniors who participated in the program said that they plan to apply safe food handling practices. For example, 92% planned to reheat liquid leftovers to a rolling boil and solids to 165 degrees Fahrenheit before serving; 85% said that they plan to keep raw meats separate from other foods to

prevent bacteria spreading from one food to another and all of them said that they plan to rinse vegetables well with running cool water before they are eaten.

Ninety percent of the seniors who participated in the Diabetes Education program said that it was very helpful for them to learn how to manage diabetes. At the end of the training, most of the participants planned to apply recommended practices for controlling their diabetes. For example, 90% of the participants planned to have their blood pressure checked regularly; 100% of participants planned to have their A1C tested at least twice a year and to follow a meal plan to control portions and intake of carbohydrates.

A readership survey with the Senior Sense newsletter subscribers revealed that 65% of them had prepared the healthy recipes they learned from the newsletter. Most of the seniors who read the Senior Sense newsletter cited improved dietary habits.

c. Smith-Lever Act, NARETPA Funds, State Matching Funds

d. State Specific

Key Theme: Child Care / Dependent Care

State Performance Goal: 5-4

a. **Child care is the third highest household expense for most families of young children (after shelter and food).** According to DHR, the cost of care ranges from $68 to more than $100 per week per child. Child care that is affordable, accessible, and of high quality is not available to many Georgia parents needing it. Most child care in Georgia and nationwide is only of marginal or poor quality. High staff turnover, poor quality environments, and lack of training and experience in child care staff contribute to low quality care. According to the Center for the Child Care Workforce, the average hourly wage of a Family child care provider, a Child care worker, and a pre school teacher is respectively $4.82, $7.42, and $9.43. Many parents seek the least expensive source of care, not understanding the benefits of high-quality early care and education.

   Extension helped ensure high-quality child care by: organizing and presenting local and regional training workshops and conferences for child care professionals; providing self-study courses for caregivers who cannot attend in-class training sessions; providing print information on child development for child care professionals; providing consumer information to help parents identify quality child care; and collaborating with employers and community leaders to ensure the availability of consistent, high quality child care as a vital part of community infrastructure.

Extension is one of the largest single sources of the required community-based education for Georgia child care providers. Extension provided nearly 55,000 educational contact hours to 19,168 child care providers, parents, and others in 2004. Extension provides this training at approximately 1/4th the cost of utilizing consultants and other agencies. Two Early Childhood Institutes (ECI) were conducted in Georgia in 2004. The ECIs are full-day training conferences covering a wide range of topics. Three Child Care Self-Study courses were provided to 407 child care providers.

Extension collaborates with numerous other organizations, including child care resource and referral agencies, technical colleges, and the Georgia Association on Young Children to ensure that high-quality community-based training is available for child care providers. Extension is a partner in grant projects to support professional development for child care providers. 13,458 hours of early brain development education were provided to 3,845 child care providers and parents. Of the program participants, 68% were low-income, at-risk clients. Media efforts have been undertaken to increase awareness and child care knowledge: A total of 25 exhibits have reached 5,510 clients; 1,516 newsletter articles have reached more than 39,300 readers; 77 radio spots have been broadcast to a listening audience of nearly 2.1 million; 114 newspaper columns have gone to a circulation of almost 1.8 million; and 6 television shows has targeted 1 million viewers.

b. The comparison of pre and post-test results indicates that 88% of the child care providers who participated in the self-study courses improved their child development knowledge. Almost 98% of the child care providers who participated in child care training programs indicated that the programs they completed helped them improve their child care knowledge and skills. Comparison of pre and post-test results shows that 54% of the participants improved their child care knowledge. The comparison of pre and post-test data confirmed that the child care providers who completed the training significantly improved their early brain development knowledge. Participants mean knowledge test scores improved from 75% to 81%. Those who participated in Early Brain Development workshops program said that they intend to adopt recommended early brain development child care practices. For example, at the end of the program, all the participants intended to expose children to new experiences regularly; to play music and sing songs with children; and 63% planned to encourage parents to breastfeed infants. Of the child care providers who completed the 1-2-3-4: Counting and So Much More training workshop, 77% intended to give parents ideas for encouraging young children's math skills. The majority of the participants in child care extension programs expressed their intent to adopt practices that will improve the quality of child care. For example, 97% planned to expose children to a variety of sensory materials; 96% planned to model positive ways to cooperate and share with others; 95% planned to expose children to a free art opportunities and materials and to display children's art at their eye level; and 92% planned to read aloud to children every day. 96% of the child care providers who completed the Teaching Basic Health and Safety

training workshops said that the classes helped them learn how to teach basic health and safety concepts to young children. Most of the child care providers who completed this training planned to reinforce basic safety concepts in their child care center or home. For instance, 98% planned to teach how to dial 9-1-1 in an emergency situation; 96% planned to provide children with age-appropriate opportunities to recognize and respond to emergencies; and 98% planned to help children overcome their fear of emergencies by teaching them about community rescue workers and their equipment.

c. Smith-Lever Act, State Matching Funds

d. State Specific

Key Theme: Children, Youth and Families at Risk

State Performance Goal: 5-7

a. **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, in addition to targeting specific at-risk groups and behaviors.

   In Georgia, Family and Consumer Sciences **Extension initiated two New Community Projects** in Candler and Colquitt Counties in 2003. These New Community Projects integrate the children, youth, and families at risk (CYFAR) programming philosophy into the University of Georgia Extension programs. The total cost of the USDA funded project is $500,000 for the five-year period.

   The Candler County CYFAR project is "Building Our Youths Skills" (BOYS). It provides educational and enrichment opportunities to help increase academic success and leadership development, while supporting parents, teachers, and community leaders in creating a safe, healthy, and nurturing environment for 31 low income pre-adolescent males. The program provided 50 tutoring and enrichment sessions during the 2003-2004 school year. The Colquitt County CYFAR project is called "Voz de la Familia" or "Voice of the Family." This project is a comprehensive family centered community outreach program especially designed to help migrant farm workers build healthy, strong, and self-sufficient families for rural Georgia. "Voz de la Familia" is a collaborative program of the University of Georgia Cooperative Extension Service, Ellenton Farm Workers Health Clinic, Moultrie Technical College, and Communities in Schools. There were 19 families in the "Voz de la Familia" program.

The Missouri Community Action Poverty Simulation workshop was presented to nearly 1,000 community leaders and service providers to help them better serve the needs of the people living in poverty. Nearly 52% of the Georgians reached by Family and Consumer Sciences Extension programs in 2004 were audiences estimated to be at risk (low-income, illegal activity, or lack of school success).

b. Candler County BOYS after school program, 55% improved their language skills, 45% improved their science skills, 31% improved their math skills, and 38% improved history skills during the academic year. Eighty-six percent of the children in the BOYS program improved their reading grade equivalency and 78% improved their math grade equivalency. Nearly 41% of the children improved their overall academic skills. In addition to academic skill improvements, 48% of the children improved their life skills as reported by the teachers.

The comparison of the Colquitt County "Voice of the Family" program participants' type of housing before and after the program indicates that there was an economic development among the participants. For example, at the beginning 10% of the families lived with relatives or friends. Compared to this, only 5% of the families lived with friends or relatives at the end of the program year. 5% of the families became homeowners. Evaluation data indicates that the "Voice of the Family" program participants had increased their confidence in their ability to use banks and started banking with insured financial institutions. The comparison of children's report card data for 2002/2003 and 2003/2004 school years indicates that the children who participated in the "Voice of the Family" program significantly improved their reading skills and reduced absenteeism slightly during the school year.

Fifty-one percent of the community leaders and service providers who participated in the poverty simulation workshop realized the problems and constraints faced by the people living in poverty and developed positive attitudes towards them. Many participants said the workshop was an eye opener. For example a participant said, "It was great! I thought I understood the problems of poverty, but I was really, truly, enlightened. Every city, county, and federal official should experience this simulation." As a result of the workshop most of the participants planned to help people living in poverty. For example, 85% of the participants planned to view people living in poverty differently to better serve their needs; 83% planned to share this information with others in their community; and 72% of the participants planned to work with other related community resources to assist people who live in poverty. One example was materialized in Athens. Several individuals who participated in the training workshop from Athens, Clarke County realized the transportation difficulties faced by the people living in poverty. They met with the local government officials to request free bus transportation for those who needed to go to polling stations on election day. In this way, the poverty simulation workshop empowered those living in poverty to execute their democratic rights.

c. Smith-Lever Act, State Matching Funds

d. State Specific

Key Theme: Children, Youth and Families at Risk

State Performance Goal: 5-7

a. Parents and society share a stake in the development of children. Fostering the development of children into competent adults and productive citizens is the key to enhancing the world that we live in today. Parenting skills/knowledge are needed today more than ever. In recent years there has been an increase of single parent homes, this has lead to the increase of families and children living at or below the national poverty level. Successful individuals build thriving and effective communities. Families that understand developing a child starts from day one to adulthood realize that **building strong families through healthy communication, shared activities, and economic improvement is a continuing and vital concern for all.**

The Fort Valley State University Cooperative Extension Program uses a grass-roots effort to endorse family and economic resiliency in the state. Healthy families build positive individuals that promote a quality workforce and caring communities. Our human development programs focus on nurturing the individual for strong and effective communities that will help ensure economic security. The initiatives developed for the Family Life Program focus on providing educational programming to strengthening the family unit by informing parents, caregivers and professionals with the most up-to-date and researched based concepts of positive development, family coping strategies and basic life skills. Also, for our youths and children the Youth Take Charge Curriculum, Basic Parenting Curriculum and Life Skill classes have been implemented.

b. **By striving towards the goals the Fort Valley State University Cooperative Extension Program, the Family Life Area has worked with 1000 youth.** There has been one (1) Family Life Conference, presented at two (2) Childcare workshops and 18 presentations to adults on Family Life information. There were 46 youth and children presentations from the Youth Take Charge Curriculum, Basic Parenting Curriculum and Life Skills information. With the assistance of one county agent and six program assistants the FACS staff worked with 1028 families and 10,309 children and conducted 156 group programs and activities.

The positive development information has provided children with ways of increasing self awareness and self confidence to become caring and responsible adults for a thriving community. The youths affected by the various curriculums and lesson plans used were informed of life skill training and coping skills of

today’s world. Parents, caregivers and other professionals have been informed on improving their parenting skills.

c. NARETPA Funds, State Matching Funds

d. State Specific

Key Theme: Youth Development/4-H

State Performance Goal: 5-8

a. **4-H'ers need projects that will afford them the opportunity to educate their peers and become more aware of the need to protect our natural resources.** Under the guidance of a UGA biological and agricultural engineer, a Colquitt County 4-H'er designed a competitive project to use the EnviroScape surface water model to teach her peers about the importance of non-point and point source pollution. She also learned the basics about how pollution originates in different parts of the watershed model (urban, construction, recreational, roads, ditches, farm, and industry). Additionally she was taught how all parts of a watershed are interconnected and how pollution from one source can directly impact all users in the watershed. The 4-H'er learned to use "The Pristine Lake," which demonstrates how lakes are polluted.

b. **The young lady shared her knowledge with 125 other students, organized a Rivers Alive clean-up in her community** and won district and state competition in the Environmental Science project. The clean-up resulted in 382,727 pounds of garbage being removed from local rivers and streams.

c. Smith-Lever Act, State Matching Funds

d. State Specific

Key Theme: Leadership Training and Development

State Performance Goal: 5-8

a. The Georgia Cooperative Extension Service has been challenged during the past several years with decreased funding. In order to meet budget cuts many of our experienced county Extension agents have opted for early retirement. This has resulted in a majority of our county faculty having less than 15 years experience, most without any significant training in leadership development.

   In response an advisory committee of experienced County Extension Agents designed a new training initiative to prepare future Extension leaders. The

"Extension Academy for Professional Excellence" is **a professional development opportunity for a select group of early- to mid-career Extension faculty who are dedicated to fulfilling Extension's mission and have demonstrated potential as future leaders of the organization**. Objectives of the program are: to develop personal leadership skills, to enhance the ability of Extension professionals in effectively working with people in the community and state, to cultivate resources and relationships within the community, to strengthen Extension's position as an integral component of the county, state and university.

In 2003 an advanced leadership development training program was held for district staffs, program leaders and Extension professional association representatives. Evaluations indicated the objectives of the program at that session were successfully met. In early 2004 the charter class of 27 participants was formed, consisting of mid-career professionals nominated by district staffs. Selection was based on building a diverse, representative group who demonstrated a commitment to the Extension mission and organization. Participants who accepted the nomination agreed to represent Extension as ambassadors by reflecting excellence, and promote the program to potential participants through personal invitation. They may also be called upon to serve as instructors for future classes. The program consisted of two sessions. The first session was included: "Understanding Leadership, Team and Self", "Group Problem Solving", "Aligning Your Future" which focused on development of a personal action plan, and "Group Analysis of Key Principles".

b. Evaluations from the August session indicated a high level of effectiveness for each of the sessions, with the majority of participants ranking each session 5 of 5. Some comments included: "Each session was well planned and I feel that this session really kick started my desire for professional improvement. It has helped me to step outside of the box." "Very good information." "Thank you - this program has made me want to be a better leader." "Excellent program!!... Thank so much for providing this opportunity!" "Thankful for opportunity to participate." All participants but one responded that they would recommend the experience to their colleagues. One person said "maybe, if it applies to them". A needs survey was conducted to determine the focus of the content for the second session. As a result topics focused on: "Working with Community Leaders and Advisory Groups", "Working with Public Officials", "Understanding Georgia", and "Marketing Extension Success". Parts of the Southern Region Advisory Leadership (SEAL) curriculum were used, providing strategies for building effective advisory groups and developing advocacy. Participants completing the program were honored during a recognition program at the conclusion of the session.

c. Smith-Lever Act, State Matching Funds

d. Multistate Extension: NC

Key Theme: Leadership Training and Development

State Performance Goal: 5-8

a. The Cooperative Extension System in Georgia and throughout the Southern United States has faced an era of economic scarcity. This has resulted in a reduced workforce and a clustering of CES staff and services. Extension Educators excell in subject matter disciplines; however, few are professionally trained in management competencies and styles of leadership for a learning organization such as CES in these changing times. The lack of such competencies leads to employee dissatisfaction, burnout and turnover.

   The Managerial Assessment of Proficiency (MAP) program was implemented in Georgia and throughout the Southern Region. The MAP program assesses 12 managerial competencies, 2 leadership styles and 8 values/drives. These three day workshops introduce participants to the concept of leadership development, followed by the assessment process. Interpretation of MAP scores (strengths and weaknesses of each participant) are discussed followed by each participant developing a learning plan to increase their competency levels.

b. **MAP assessment workshops have been conducted in Georgia and throughout the southern region. Follow up skill building seminars, known as EXCEL, have been conducted in a regional basis**. Five major workshops were conducted throughout the southern region involving 100+ participants. Prior year programs have established a 28%-38% increase in competency levels and reduced turnover rates for Extension organizations.

c. Smith-Lever Act, State Matching Funds

d. Multistate Extension: Eight southern region states.

Key Theme: Youth Development/4-H

State Performance Goal: 5-7

a. Unemployment and lack of necessary financial resources in the home is an unfortunate situation that many children and families in America face. Several studies have indicated that children become stressed out when their parents or legal guardian take out their financial problems on them. Children are negatively affected when they become the recipient of an adult's stress. When children become the recipient of an adult's stress, they find ways to cope with that stress. Many adolescent and teenagers seek the advice of their peers to help them through these challenging times. Unfortunately, many of those children receive advice that encourages negative or illegal behavior that can make the situation

worst than the one that they are trying to cope with. **Youth that engages in negative or illegal behavior increase their chances of not being successful in life.** More youth are at-risk, left unsupervised, lack social skills, are recorded criminals, and live in poverty than ever before in the history of America. (National Coalition on Poverty Journal, 2002). It is critical to create and implement youth programs that meet the needs and challenge the strengths of all youth that live in Georgia.

The 4-H and Youth Program is specifically designed to meet the needs and challenge the strengths of at-risk youths living in Georgia. The components of this program are 4-H Sprouts, 4-H, and Youth Development of Life Skills. These program components focus on initiating success by empowering the minds of our youth to a higher level of thinking through Leadership, Entrepreneurship and Science-based educational projects, activities, and programming for youth between the ages of 6-18. These programs are designed to expose at-risk youths to a structured and educational system in which all participants are empowered to achieve excellence by diversifying their knowledge and to plant seeds of prosperity in their minds that will help them to create a prosperous future of financial independence for themselves by creating entrepreneurship opportunities in their communities. The 4-H Sprouts, 4-H, and Youth Development of Life Skills Programs focus on the national and international subjects and principles of 4-H Programming.

Through the 4-H and Youth Development Program, the 4-H and Youth Development Specialist worked with: 856 youths and 705 adults. Implemented two (2) Summer Residential Camps, facilitated ten (10) 4-H Sprouts Science Club Meetings, seven (7) 4-H Sprouts Leadership Club Meetings, ten (10) 4-H Sprouts Entrepreneurship Club Meetings, attended fifty-five (55) Youth Development Meetings, implemented one (1) multi-state co-sponsored educational workshop, and did thirty-three (33) Presentations. One (1) county agent and six (6) program assistants worked with 1,028 families, 10,309 children and conducted 156 group programs and activities.

b. Programs were implemented in Elementary Schools, Junior High Schools, High Schools, Community Centers, Camp John Hope, Boys and Girls Clubs of America, 4-H offices, and Churches. All of the 4-H Sprouts, 4-H, and Youth Development of Life Skills Program components focus on engaging the minds of all youth participants with: Knowledge of the benefits of Science technology, decision making skills, and a variety of self marketing skills that will prepare them to engage future social and economical challenges. The 4-H and Youth Development Specialist reported that 11% of youth participants increased their knowledge of science technology, 13% of youth participants acquired strategies to enhance their ability to make good decisions, and **43% of youth participants learned entrepreneurship education based on pre and post testing** results of each respected area. By working with youth and family clients, county-based

employees identified 9 youth based initiatives related issues and concerns in their counties that we are working to address.

c. NARETPA Funds, State Matching Funds

d. State Specific

Stakeholder Input Process

The University of Georgia College of Agricultural and Environmental Sciences (CAES) in cooperation with the College of Family and Consumer Sciences and the Warnell School of Forestry, have many opportunities to collect stakeholder input.

The College of Agricultural and Environment Sciences established a liaison program about eight years ago. There are approximately 200 organizations and industries to which a faculty member (tenured or non-tenured) is assigned as a liaison. The faculty member may serve as a resource person, board member, attend board meetings or meet individually with members, in order to learn what is happening in that organization and/or industry. The CAES Dean meets with these liaisons once a year for a report. If there are important issues surfacing which need to be considered for action he ask for input.

The county faculty in the field are very active gathering input for the college. They do this in a variety of ways; advisory committees, being active with organizations and industries in their county, one-on-one input with clientele and by monitoring phone calls and office visit content for any trends. Every county is required to have an advisory committee in place and to meet with that committee at least twice a year. The membership of the committee must be reflective of the local population and knowledgeable of community issues appropriate for the University to address. County programs must develop county issues for the purpose of developing local Extension programs that have impact. This process offers a great deal of stakeholder input into the state program planning process. This is the best source of information from our end users.

Each CAES department also has individual methods for collecting input. Some departments have advisory committees, other are active in the industry's major organizations and other collect data from individual contact with industry representatives..

The College of Agricultural and Environment Sciences has an overall advisory council. The College of Agricultural and Environment Sciences Advisory Council was created in 1996 by consolidating the State Extension Advisory Council and the Georgia Agricultural Experiment Stations Research Advisory Board. This was done to reflect changes in the college and to help our stakeholders understand the equal importance of all functions of the College (teaching, research, and extension). The council seeks stakeholder counsel and advice to ensure that the programs of the College are responsive to the needs of Georgia residents. The Council members work closely with College faculty, staff and administrators in reviewing ongoing programs and identifying and planning high priority future programs.

The CAES Dean also meets with a coalition of approximately 50 agricultural commodity groups and agribusinesses known as the "Ag Round Table". The group meets quarterly with the Dean to provide discussion and input for the College.

Finally, the CAES Dean meets quarterly with key leadership within the state, including Georgia's Secretary of Agriculture, the Georgia Farm Bureau President and other key agricultural leaders.

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 has a college-wide advisory board for teaching, research and extension programs.

Annually, county-based professionals and para-professionals complete and submit survey instruments used to measure clientele needs for programs and services offered at the local 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 meetings, media reports and other data to gauge emerging issues and evaluate their relative value to identified needs of clientele. Active partnerships with community-based organizations also provide useful perspectives on issues and opportunities which may be integrated into research and extension programs.

University administrators also provide valuable input for program development and implementation as both 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.

The University of Georgia and Fort Valley State University Extension administrators, department heads, and district program leaders meet annually in a week long planning conference to share needs assessment, program results and programming ideas. The annual Extension Program Planning Week conference allows for the collaboration necessary to develop complementary and/or joint programming that meets the needs of the citizens of Georgia.

Program Review Process

Extension programs participate in a review process in which issues and programs are reviewed for continued support. Individual and departmental Plans of Work are reviewed the Program Development Team during annual and bi-annual programming cycles. Research projects continue to participate in a merit and/or scientific review process as required. Each project is peer reviewed by both internal and external reviewers.

There have been no significant changes in the review processes described in the Plans of Work submitted for Research and Extension programs of the University of Georgia or Fort Valley State University.

Evaluation of the Success of Multi-state and Joint Research/Extension Activities

The University of Georgia continues to make progress on its integrated research and extension programming. A very large percentage of the documented accomplishments in this report credit an integrated effort.

All of the state level faculty of the University of Georgia are administratively housed within an academic department. A large percentage of these faculty hold a joint research and extension appoint. This structure encourages a high level of integrated work.

The last few years have seen a great increase in county faculty becoming involved in integrated activities. Several integrated accomplishments in this report involve county faculty. This trend continues to increase.

As stated in the FY2003 report, The University of Georgia has increased its participation in Multi-state efforts during recent program cycles. Budget cuts continue to increase the need for multi-state collaboration. Not always evident in a report of accomplishments are the many activities in which Georgia utilizes the out-of-state expertise in subject areas not well supported by current Georgia faculty.

There are many examples of multi-state accomplishments within this report. They are documented as multi-state and identify the states involved. The following are examples of multi-state and research/extension collaborations that are found in this report.

- Southern Region Small Fruit Consortium is a four state collaboration with outstanding impact. By combining resources, collaborative research has been conducted and shared across state lines. With no one state having resources to have major impact, this collaborative effort has had great success. In Georgia alone the work of the consortium has been substantial in an $8 million increase in blueberry production in the last two years.

- The Center for Agribusiness and Economic Development was formed as a college wide Center jointly funded by Research and Extension. The Center concept allows for appropriate College Faculty to be matched with emerging food and fiber business opportunities. A dedicated staff of economist and data analyst provided support for the Center projects. Many individuals in Georgia's agriculture community increase their profitability using the resources of this center.

- The work on tropical spiderwort, a noxious, exotic, invasive weed has become a serious effort in many agricultural production areas. Integrated efforts in multiple crops are well documented in this report. Integrated efforts with peanuts alone have the potential to save Georgia growers more than $13 million annually.

- The Ag Water Pumping Program has provided the state with a comprehensive examination of water use amounts for Georgia farmers. This has integrated effort has provide valuable information for Georgia, Florida and Alabama. Scientists and extension specialist have traveled more than 500,000 miles to make almost 40,000 field visits to 860 fields during the last five years.

- Several irrigation management efforts are showing success. All of these efforts are both integrated and involve multiple states. Some of the efforts such as the reported "EASY Pan" project have advanced to the creation of small startup businesses. Over 500 units of the EASY Pan are now in use across the southeast. The Agrotechnology Transfer Cropping System Model is being used in simulating irrigation applications and its impact on yields. Potential users of this decision support system include policy makers planners, and regulators that deal with water issues.

- The management of animal waste and the development of required management plans for producers in Georgia is a major concern. Research and Extension scientists and county agents have come together in collaborative efforts in all parts of Georgia, from in-house composting research in poultry to assisting local farmers write and submit over 150 required nutrient management plans.

- The thirteen southeastern states with the exception of Texas have one or fewer full time State Extension Equine Specialists. This small group of faculty have joined together across state lines to develop an educational website called www.HorseQuest.info. This site has been very successful and has helped to ease the daily work load of phone calls and repeatedly answering the same questions pertaining to equine care and management. Only 3 percent of the time has a user had to ask a unique question that was not already searchable in the system. The site has already won two national awards.

- Alabama, Georgia and Tennessee have partnered together to prepare Master Gardeners to incorporate water issues as a part of their volunteer educational programs. A new kind of Master Gardener advanced training has been implemented to improve the capacity and knowledge base of these volunteers on water issues.

- Several integrated research and extension efforts are documented in this report that addresses a balanced population growth plan that supports sustainable agriculture. As one of the fastest growing states in the nation, faculty are helping small communities plan for the future.

- The environmental management systems project (EMS) is the work of nine states to create a national framework and process for implementing environmental

management systems for local producers. Georgia, which produces two million tons of poultry litter annually, is the lead state for work on poultry systems.

- Georgia is working with all the states in the southern region as it currently gives leadership to the Managerial Assessment of Proficiency (MAP) program. This managerial competency assessment and its development component, EXCEL have been implemented in workshops throughout the southern region through the multistate efforts of Extension specialists.

The following three exhibits in the following three pages include expenditures for the University of Georgia as it relates to:

- Multi-state Extension Activities
- Integrated Activities (Hatch Act Funds)
- Integrated Activities (Smith-Lever Act Funds)

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution University of Georgia, College of Agricultural and Environmental Sciences
State Georgia

Check One: X **Multistate Extension Activities**
___ **Integrated Activities (Hatch Act Funds)**
___ **Integrated Activities (Smith-Lever Act Funds)**

Actual Expenditures

Title of Planned Program/Activity	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Goal 1	1,296,582	1,228,447	1,288,171	1,283,927	1,274,193
Goal 2	351,223	349,019	348,944	347,795	345,158
Goal 3	0	0	0	0	
Goal 4	8,766	8,711	8,709	8,680	8,615
Goal 5	291,419	289,591	289,529	288,575	286,387
Total	1,947,990	1,875,768	1,935,353	1,928,977	1,914,353

Director Date

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
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Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution University of Georgia, College of Agricultural and Environmental Sciences
State Georgia

Check One: ___ **Multistate Extension Activities**
X **Integrated Activities (Hatch Act Funds)**
___ **Integrated Activities (Smith-Lever Act Funds)**

Actual Expenditures

Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Goal 1	823,177	825,723	828,187	822,638	823,132
Goal 2	103,617	103,937	104,247	103,549	103,611
Goal 3	5,756	5,774	5,792	5,753	5,756
Goal 4	184,207	184,777	185,329	184,087	184,197
Goal 5	34,539	34,647	34,749	34,516	34,537
Total	1,151,296	1,154,858	1,158,304	1,150,543	1,151,233

Director Date

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Check One: ___ **Multistate Extension Activities**
___ **Integrated Activities (Hatch Act Funds)**
X **Integrated Activities (Smith-Lever Act Funds)**

Actual Expenditures

Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Goal 1	1,392,813	1,384,074	1,383,777	1,379,219	1,368,762
Goal 2	155,839	154,861	154,828	154,318	153,148
Goal 3	9,740	9,679	9,677	9,645	9,572
Goal 4	282,458	280,686	280,626	279,702	277,581
Goal 5	107,140	106,468	106,445	106,093	105,290
Total	1,947,990	1,935,768	1,935,353	1,928,977	1,914,353

Director Date

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