

ANNUAL REPORT OF ACCOMPLISHMENTS AND RESULTS

FOR THE

AGRICULTURAL RESEARCH PROGRAM

**SU/AGRICULTURAL RESEARCH AND EXTENSION CENTER
SOUTHERN UNIVERSITY SYSTEM**

PRESENTED TO

**COOPERATIVE STATE RESEARCH EDUCATION AND
EXTENSION SERVICE**

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FY 2001 ANNUAL REPORT OF ACCOMPLISHMENT AND RESULTS

SOUTHERN UNIVERSITY AGRICULTURAL AND EXTENSION CENTER

Southern University Agricultural Research and Extension Center, a newly established campus of the Southern University System, Federal and administers Federal research funds under section 1445 of the National Agriculture Research, Extension and Teaching Policy Act of 1977 as amended. Section 225 of the Agricultural Research, Extension, and Education Reform Act of 1998 required the University to prepare and submit for approval a Plan of Work in order to continuously receive formula funds for its research program. The Plan of Work was submitted in 1999, which was approved, by the USDA/Cooperative State Research, Extension and Education Service (CSREES) for a period of five years, October 1, 1999 to September 30, 2004. This document reports accomplishments and results for fiscal year 2001, (October 1, 2000 to September 30, 2001) consistent with the approved Plan of Work.

PLANNED PROGRAM

The research activities in the Center is organized and presented in four broad research program areas: 1) plant and animal production systems, 2) human, nutrition, health, family and consumer sciences, 3) urban forestry, natural resources and environment, and 4) economics, marketing, policy and community development. Related research projects are identified and conducted as part of each research program and are supported by both formula funds and state match funds.

Research plans for the Center were presented in a Five-Year Plan of Work submitted to USDA/CSREES during the 2000 fiscal year. The plans were presented to reflect the research mission of the Center and are reflective of four of the five national goals established by CSREES. Efforts were made to conduct research to address critical issues in food and agricultural sciences in the state of Louisiana. Planned research programs and associated

national goal are listed below. On-going research projects are also identified with each research program area.

National Goal 1: To achieve an agricultural production system that is highly competitive in the global economy

Research Program: Plant and Animal Production Systems

Research Projects:

- I. Evaluation of Kenaf Crops
- II. Hormonal Control of Rabbits
- III. Value-Added Product Development
- IV. Utilization of Crawfish Waste

National Goal 3: To achieve a healthier, more well nourished population

Research Program: Human Nutrition, Health, Family and Consumer Sciences

Research Projects:

- I Obesity Among African-American Women
- II Textile Materials Development (Multi-Institutional)

National Goal 4: To achieve greater harmony between agriculture and the environment

Research Program: Urban Forestry, Natural Resources and Environment

Research Projects:

- I. Biotechnological Urban Tree Propagation
- II. Biological Responses of Selected Urban Tree Species
- III. Community Forestry

National Goal 5: To enhance opportunities and quality for Americans

Research Program: Economics, Marketing, Policy and Community Development

Research Project: Consumption Pattern for Goat and Rabbit Enterprises

Stockholder Input Process

Stakeholder input was sought at various levels as prerequisite and support for on-going research activities in the Center. Individuals engaged in research participated in several forums where critical issues facing the state of Louisiana were identified and discussed. Focus group meetings in selected Louisiana parishes were held with representatives of community groups and other stakeholders in order to obtain their input and recommendations. Input from these groups was critical to the success realized in the research activities proposed. A survey was administered to a sample of country agents. Through this process critical issues in agriculture and natural resources; nutrition, family and consumer sciences; community and youth development; and workforce preparedness were identified. Some critical issues are reflected in the executive sections of this report.

Program Review Process

Program review has not yet been scheduled, but one is being contemplated for the near future. Plans are underway to make the necessary request for a program review by USDA/CSREES

National Goal 1: To achieve agricultural production systems that is highly competitive in the global economy

Executive Summary

Four research activities were planned and submitted as part of the five-year plan of work approved by USDA/CSREES during fiscal year 2000. These research activities were: and 1) evaluation of kenaf as forage for small animals 2) hormonal control of rabbits, 3) value-added product development of goat and rabbit meat, 4) utilization of crawfish waste,. The nature of the research project conducted was guided by stakeholder input.

The Southern University scientists identified critical agricultural and related issues affecting small farms. The most prevalent ones identified were: 1) limited operating capital, and 2) lack of agricultural technical expertise including management and lack of access to competitive markets. Information gathered revealed that many small producers in the state of Louisiana raise beef and swine for the market and maintains some poultry for home consumption. There is an also a growing number of small-scale producers who are beginning to rear rabbits and goats as alternative sources of both food and income. This trend suggests that research information is needed on production practices, market alternative and nutritional value of these and other commodities. Since there is a gradual shift among small-scale producers from agronomic crops to horticultural crop production, there will be need for further stakeholder input in this regard.

The research generated from research activities described under national goal 1 has been disseminated in professional and scientific journals. A number of presentations have been made by scientists at regional and national meetings. Abstracts of presentations are published in associations' annual meeting proceedings.

National Goal 1: To achieve an agricultural production system that is highly competitive in the global economy.

Overview

Under National Goal 1, fiscal year 2001 accomplishments and results of four projects are reported according to guidelines established by CSREES. These projects are 1) Evaluation of kenaf crops, 2) Hormonal Control of Rabbits, 3) Value-added Product Development, and 4) Utilization of Crawfish Waste. Research results, successes, benefits, description and impact of each project are presented below.

EVALUATION OF KENAF CROPS

a. Research Result (Output Indicators)

The findings emanating from this study appeared in journals and proceedings of professional meetings, conferences, university seminars and local newspapers. Abstracts of presentations are presented in the Proceedings of the Louisiana Plant Protection Association and the Louisiana Association of Agronomists. Presentations were made at the Agricultural Research Scientists Annual meeting, the Association of Agricultural Research Director's 12th Biennial Symposium and at the Louisiana Biomass Council. Abstracts appear in these Proceedings.

b. Successes (Outcome Indicators)

The cultural practices of kenaf have been improved under Louisiana condition. The research findings reveal that kenaf can be harvested (cut) like alfalfa up to four or five times for livestock feed before it is killed by frost. Optimum dates of planting kenaf is mid-May. The highest yield occurs with 70kg/ha of nitrogen fertilizer levels. Optimum harvesting height that would give better ratooning is 30 cm. The regrowth and high protein content demonstrates the feasibility of multiple harvest of kenaf as a forage crop. Higher difference in yield due to irrigation is obtained in the first cutting than the subsequent cuttings. Kenaf is a low input crop. It grows fast, forms quick full canopy, and yields more forage. Kenaf has the potential to be good and is economically viable forage for goats and other small animals.

c. Benefits

Kenaf as a feed for small animal production could potentially enhance the profitability of the livestock industry by decreasing the cost of traditional feed for production of small animals.

Key Theme: Plant Production Efficiency

a. Description of Activity

Researchers at Southern University have studied kenaf as an alternative forage crop for small animal production. In this study, emphasis is placed on assessing the agronomic characteristics of kenaf regrowth capacity after initial harvest, and its potential for a source of animal feed.

b. Impact

The research findings clearly reveal that kenaf has the potential as an alternative feed for livestock. Adoption of this crop by agricultural producers could reduce the cost of feed while enhancing production efficiency. Field day demonstrations have introduced farmers, especially goat farmers to practices of growing kenaf as a forage crop.

c. Source of Federal Funds – Evan-Allen Formula Funds

d. Scope of Impact – State specific

HORMONAL CONTROL OF THE NEST BUILDING OF RABBITS

a. Research Results (Output Indicators)

A publication entitled "Hormone profiles and nest building behavior during the periparturient period in rabbit does" has been submitted to the Journal of Animal Reproduction Sciences, showing that prolactin has little, if any, influence on nest building behavior but a strong influence on milk production. The hormones most likely to influence nest building are estradiol-17 β and progesterone since the levels of these hormones started to change at the time when the rabbits began to prepare the nests.

b. Successes (Outcome indicators)

Contrary to expectations, prolactin was found to have little effect on nest building behavior. As a result, administration of this hormone would not be an effective means to induce nest building in those does that kindle without preparation of an adequate nest.

c. Benefits

The primary benefit of this work will be to provide a foundation for other researchers who are involved in this sort of work.

Key Theme: Animal Production Efficiency

a. Brief Description of Activity:

Researchers carried out a study to elucidate the relationship between the hormones estradiol-17 β , progesterone, prolactin and β endorphin and nest building behavior in rabbit does during the periparturient period. Profiles for estradiol-17 β , progesterone, prolactin, and β -endorphin were generated and have been related to behavioral observations of nest building behavior.

b. Impact

Contrary to expectations, prolactin was found to have little effect on nest building behavior. As a result, administration of this hormone would not be an effective means to induce nest building in those does that kindle without preparation of an adequate nest and thus would not be a suitable intervention for rabbit producers. It was concluded that the hormones most likely to influence nest building are estradiol-17 β and progesterone since the levels of these hormones started to change at the time when the rabbits began to prepare the nests. The results of this work have been submitted to Animal Reproduction Science for consideration for publication. The primary impact will thus be to provide further basic information for other scientists who are carrying out research in this area.

c. Source of Funds - - Evans-Allen Formula Funds

a. Scope of Impact - - International Research Community

VALUE-ADDED PRODUCT DEVELOPMENT

a. Research Results (Output Indicators)

Scientists involved in this study have published and presented their work in scientific journals and at professional meetings and conferences. Two articles appeared in the *Journal of Food Sciences, and Goat Rancher*. Two abstracts were in the *Proceedings of the Annual meeting of the Food Expo (Proceedings of the Institute of Food Technologist)*, and one abstract was presented in the *Proceedings of the Annual Meeting, Southern Section American Society of Animal Science*.

b. Successes (Outcome Indicators)

Value-added patties, sausage and nuggets have been produced from nontraditional products (goat and rabbit meat). Also, defatted muscle proteins were formulated from beef, rabbit and goat hearts and used as stabilizers in beef, goat and rabbit patties. These products were found to be nutritionally sound and highly acceptable and have the potential to impact nutritional status of residence of the state of Louisiana.

c. Benefit

The nutritional products developed from goat and rabbit meat have the potential to enhance the health status of individuals with high incidence of obesity and other chronic diseases. The introduction of these products into the market place could potentially enhance the production and food processing industries.

Key Theme: Adding Value to New Agricultural Product

a. Project Description of Activities

Four components are presented for this research. First, Oat Gum/Beta Glycan will be extracted from oat bran. Secondly, ground meat (rabbit and goat) combined with varying levels of oat gum and oat trim will be formulated into nuggets and patties. Thirdly, to purify rabbit, goat and beef hearts by the aqueous leaching process. Finally, to produce defatted powdered rabbit, goat and beef heart muscle proteins for utilization in value-added meat products, and to investigate the hydration and properties of the meat products.

b. Impact

Thus far, goat and rabbit meat were combined with oat gum and oatrim (effective binders with hypocholestermic properties) and formulated into traditional meat products– patties, sausage and nuggets. The formulated products were found to be texturally enhanced, nutritionally sound (low fat, low cholesterol, and high protein) and were highly accepted by a consumer panel. They offer a healthier alternative than some popular meat products that are formulated with fat and are common in the marketplace. Processing of rabbits, goats and beef hearts into defatted muscle proteins and meat products may also increase the utilization of these nontraditional meats. Powdered goat hearts (surimi) processed in our laboratory was found to be more effective in binding water (increased juiciness) in patties than powdered beef surimi, suggesting that goat heart surimi has the potential to be a stable functional ingredient in meat products. Furthermore, the economic potential of these products to the small-scale producers will be enhanced once these products are stabilized in the market. Studies are underway to address the safety and regulatory measures before products are fully put on the market.

c. Source of Funds - - Evans-Allen Funds

d. Scope of Impact - - State specific

UTILIZATION OF CRAWFISH WASTE

a. Research Results (Output Indicators)

Three (3) patent disclosure documents were filed that subsequently led to the filing of the University's first patent on August 10, 2001. The name of the patent is entitled, "*Method and apparatus for reducing calcium and phosphorous and increasing crude protein in shellfish waste meal.*" Two (2) short articles on crawfish waste as a soil amendment potential and uses as a livestock feed were submitted to the Science & Education Impact: Benefits from the USDA/Land-Grant Partnership Program of USDA/CSREES. One (1) University's undergraduate honors thesis at Southern University was completed and published. The student now is a junior at Stanford University School of Medicine.

b. Successes (Outcome Indicators)

Results indicate that pigs placed on test from the grower to finisher stage of production can utilize crawfish waste meal (CWM). Average daily gain (ADG) wise, CWM in the diets at the levels of 12.5% and 24% did not adversely affect ADG. In goats, results revealed that soybean oil meal (SBOM) in kid goats rations can be substituted by CWM up to 75%. In the soil, it was found that composted CWM had a beneficial effect on plant growth.

c. Benefits

The use of crawfish waste meal in the diets of livestock and use as a soil amendment has a potential to reduce the overall cost of feed and fertilizers. The approach can help to increase the profit margins to farmers. Recycling crawfish waste without polluting the environment could be helpful in some resource management and sustainable agriculture systems. Upon receiving a patent for the crawfish waste patent filed; it should help lead to fertilizers or industrial companies interest in crawfish waste as a value added product from crawfish.

Key Theme: New Uses for Agricultural Product

a. Brief of Description of Activity:

Freshwater crawfish (*Procambarus clarkii*) is a commercially important food product in Louisiana and other coastal areas. Only 15% of the crawfish are edible. The remaining 85% are considered as waste. The waste presents a major disposal problem. To prevent a mounting and severe environmental problem, viable applications of the waste are urgently needed. Between 35–80 million tons of the wastes are produced in Louisiana alone. Researchers at the University are exploring ways to utilize this abundant waste product.

b. Impact

Effectively utilizing crawfish waste meal as a protein supplement could reduce the cost of protein in livestock. The main protein source in livestock is soybean oil meal (SBOM). It costs for approximately \$270 per ton, while crawfish meal can be generally obtained for \$50 or less. This project could provide short and long term economic benefits to the livestock, crawfish and fertilizer industries.

c. Source of Funding: Evans-Allen Funds

d. Scope of impact: Gulf Coast specific

National Goal 3: To achieve a healthier, more nourished population

Executive Summary

To achieve this national goal, two research projects: 1) obesity in African-American young women, and 2) development of textile materials for environmental compatibility and human health safety were conducted by Southern University scientists. These activities were planned around critical issues recognized among the population the University has traditionally served. Obesity, a leading cause of death, affects 30 percent of women, 15 percent of men and 25 percent of adolescents, with highest rates observed among low income and minority groups. Nearly 50 percent of African-American women are overweight. Louisiana is among the top states in the United States with obesity problems among the population. On-going research is examining the relationship between obesity and fat patterning and the development of the risk factors for certain diseases of African-American women. Nutritional interventions are being used to address health problems associated with nutritional deficiencies.

There is a need to create and market value-added products to achieve economically viable production systems. The textile study being conducted at Southern University involves development of fabrics from kenaf which also is being evaluated for its potential as a feed source among livestock. Ongoing research in textile has the potential to impact health care.

Overview

Under this national goal, fiscal year 2000 accomplishments and results of two research activities are reported according to guidelines established by CSREES. These activities are: 1) obesity among African-American young women, and 2) development of textile materials for environmental compatibility and human health safety. Both activities are supported by CSREES formula funds.

TEXTILE MATERIALS DEVELOPMENT (MULTI-INSTITUTION)

a. Research Results (Output Indicators)

The performance goals of this project was to assess the performance of Exxaire (a noel non-woven protective fabric), assess consumer awareness and market potential of new value-added fibers and textile products from non-traditional sources and describe intervention adoption patterns of new textile products among consumers, and to assess the performance of sewn apparel products from kenaf fiber

Exxaire fabric was developed at the TANDEC Center at the University of Tennessee, Knoxville. Tests indicated that this fabric was a suitable barrier fabric and could be useful as protective clothing in the medical profession. Southern University scientists designed a study to assess the comfort of the fabric. Doctor scrubs were developed and mailed to University of Arkansas Pine Bluff to be distributed to Doctors. The doctors were requested to complete a survey comparing the Exxaire scrubs and the traditional disposable scrubs. Although serious follow-ups were made, the response rate was very low and as such, the results were not usable.

The second goal was to assess consumer awareness and market potential of new value-added fibers and textile products from non-traditional sources and describe intervention adoption patterns of new textile products among consumers. The first step was to conduct a statewide survey (Louisiana) to assess consumer knowledge and use of label information. The garment label is the main source of fiber content information for consumers. A random sample of 1,000 subjects was selected from telephone subscribers in five major cities in a Southern State. A mail survey was used to collect data. Findings indicated that consumers mainly used intrinsic cues to evaluate apparel quality. Fiber content, fabric type and yarn type were perceived as important. Country of origin was not perceived as an important indicator of quality. Garment fit and price were perceived to be the most important quality indicators. Gender was significant in the usage of label information, with females looking for fiber content and care symbols more than males. Older and more educated subjects read and followed care instructions. The outcome of this research indicated that regardless of the fiber content, the consumers were always looking for a good price. The implication of this finding is that any value-added products developed from agricultural by-products must be competitive in price with traditional ones.

The second step was to conduct a national survey that was more specific about value-added textile products. The biggest selling point for natural fibers has always been the environment. Finding out if this was important for consumers is very important in determining if such products will sell at all. A national survey has been completed as part of the textile research effort. Preliminary results indicate that respondents in the study were unfamiliar with nontraditional biodegradable fibers such as kenaf, and jute. Their pro-environmental attitudes were slightly positive. The respondents did not feel that textiles contributed significantly to environmental pollution. Respondents involved in the study had slightly negative pro-environmental behavior. When asked to indicate if they considered the biodegradation potential of textiles in purchasing textile products, they indicated that they rarely did. The national study provided background information needed for further success of the research.

Assessment of kenaf products was conducted. Because of limited fabric size, visual evaluation was made of fabrics obtained from Mississippi State University. The results of the evaluation indicated that kenaf is an aesthetically pleasing fabric and has similar characteristics as linen. The roughness of the fiber makes it unsuitable for contact with skin. This finding led to a Capacity Building Research Project that seeks to improve the quality of kenaf yarn for apparel applications.

b. Successes: (Outcome Indicators)

The textile research conducted yielded one refereed paper, and three research abstracts. A total of 4 presentations were made at professional meeting.

Namwamba, G. W. (2000). Use Of Garment Label Information To Assess Product Quality. Business Research Yearbook, Vol. VII, pp. 576-580.

Namwamba, G. W., Dawkins, N. L., Scott, P. L., and McGee, B. B. (2000). Implementing Computer-Aided-Design and Nutritional Analysis in Family and Consumer Sciences. Abstract published in conference proceedings of the 12th Biennial ARD Conference, Washington DC.

Namwamba, G. W. (2000). Environmentalism in the Purchase and Use of Textile Products Among High School Students. Abstract published in conference proceedings of the 12th Biennial ARD Conference, Washington DC.

Wasike, G. N., Scott, P., and Eubanks, G. (1998). Apparel quality indicators: Perceptions of male and female shoppers. Abstract published in the proceedings of the International Textiles and Apparel Association 1998 Proceedings.

A manuscript was submitted to the Clothing and Textiles Research Journal but was not accepted. Preparations are being made to submit it to another journal. A lot of data is available and will be published in the near future.

c. Benefits

The benefits of this project are that the project has contributed to increasing the use of kenaf. Other projects in the university deal with agronomic applications of kenaf. This project has provided new information about potential consumers of kenaf fiber and other value-added textile products. The textile project has the potential to produce new and alternative use of raw material such as kenaf to benefit the textile industry. The project benefits various groups of people including consumers of textile products, medical and other scientific communities, agricultural producers of Kenaf and Cotton: Benefits

Key Theme: Textile Development and Health Care

a. Brief Description of Activity

The U.S. Public increasingly recognizes the need to reduce waste and develop products that have enhanced bio-degradation potential. There is a need to create and market value-added products from agricultural products to achieve economically viable production systems. A study is being conducted at Southern University and A&M College that involves the development of newer textile materials (value-added products) and processes that will improve existing textiles and polymeric materials. The scientist at Southern University is involved in market research and field-testing of the value-added textile products.

b. Impact

Environmental compatibility of products to be produced from kenaf or alternative forms of fabric is a major selling point for many products. It is hypothesized that biodegradable fibers will increase in popularity over time. Results indicated that most consumers considered fiber content to be an important indicator of quality. They perceived natural fibers as being of better quality than synthetics. This implies that consumers will be receptive to value-added fibers from non-traditional agricultural products such as kenaf. Improvement of kenaf fiber for apparel applications will increase the utilization of this multi-purpose crop and thus serve as an incentive for increased production by small-scale farmers. The net result is increased economic development and increased environmentally friendly textile products. It is important, therefore to develop new textile products from non-traditional sources and too characterize these products. This project has great potential to contribute new information in environmentalism regarding textiles products and on performance characteristics of these products.

c. Source of Federal Funds - - Evans-Allen Formula Funds

d. Scope of Impact - - Eleven universities are involved as follows:

Southern University and A&M College
Mississippi State University
Louisiana State University
University of Nebraska
University of Kentucky
Kansas State University
Purdue University
University of Wisconsin-Madison
Auburn University
University of Tennessee – Knoxville

OBESITY, FAT DISTRIBUTION AND CHRONIC DISEASE RISK FACTORS

a. Research Results (Output Indicators)

The results of this research are being applied by students in working in a campus health promotion, disease prevention initiative aimed reducing positive weight gain among college females.

b. Successes (Outcome Indicators)

Nutrition presentations are being presented to several groups including female adolescents, young adults, adults.

c. Benefits

Obesity is the most common nutritional problem in the United States, and its prevalence is increasing in both children and adults. This young adult population could benefit from this study because it is important to lay the foundation for chronic disease prevention by promotion and maintenance of healthy lifestyles.

Key Theme: Human Health and Nutrition

a. Brief Description of Activity

Obesity continues to be a health challenge in the United States. In 1999, an estimated 61 percent of U.S. adults were overweight or obese, and 13 percent of children and adolescents are overweight. Minority populations, particularly African American, Hispanic, and Native American women, are disproportionately affected. Research shows the multiple adverse health consequences of obesity. Overweight and obesity are associated with an increased risk for chronic diseases and is associated with various psychological consequences. Weight gain in early adulthood increases health risks in later life.

This research is studying the influence of obesity, fat patterning and the development of the risk factors for certain diseases in African American women. This has implications for understanding the factors determining the distribution of fat and the consequences in this population. Relative disease risk for type 2 diabetes, hypertension and cardiovascular disease based on body mass index and waist circumference was high for this population. Findings from this research contribute useful information for planning strategies to reduce the overall prevalence of obesity in this population group.

Food intake and physical activity patterns influenced the positive weight gain seen in this population. Irregular dietary patterns, low breakfast consumption, and inadequate physical activity were seen in this population.

Adoption of lifestyle intervention strategies, group support, and increased physical activity are effective for weight loss and yield health benefits in young African American women. Deterrents to the implementation of nutrition intervention programs in this population include time availability, especially class and work schedules.

b. Impact

Adoption of lifestyle intervention strategies, group support and increased physical activity are effective for weight loss and yield health benefits in young adults.

c. Source of Federal Funds: Evans-Allen Formula Funds

d. Scope of Impact: State specific

National Goal 4: To achieve greater harmony (balance) between agriculture (production activities) and (Stewardship and protection of) the environment

Executive Summary

Three projects were planned and are being conducted as part of this national goal. They are: 1) biotechnological approaches in urban tree propagation, 2) analysis of the nature of community urban forestry programs, and 3) biological responses of selected urban tree species.

Micropropagation research has been extensively done in the areas of agriculture and horticulture but is very limited in forestry and urban forestry. One of the limiting factors has been the complexity and more exacting requirements of urban trees for their regeneration and propagation. Micropropagation is a rapid technique for the multiplication of superior families identified with desirable traits such as vigor, shape/form, and resistance to pests and diseases, drought, flooding and other environmental stresses. Micropropagation would overcome problems associated with sexual as well as traditional asexual propagation of urban trees.

Research emphasis will continue in the area of natural resource management and the protection of urban forest health. The Southern University scientists are hoping to generate

useful research information relating to natural resource management systems. Information generated will assist the public in better understanding the global problems that threaten the quality of air, water and soil resources.

Overview

Under this goal, three research activities are involved which are 1) community forestry survey project involving analysis of the nature and success of community forestry programs in selected states, 2) Biological Responses of Selected Urban Tree Species and 3) Biotechnological Approaches in Urban Tree Propagation. All projects are supported by CSREES formula funds.

ANALYSIS OF COMMUNITY FORESTRY PROGRAM

a. Research Results (Output Indicators)

Research involving a community forest project lead to the publication of one peer-reviewed refereed paper in the *Journal of Arboriculture*. One technical paper was published in the proceeding of Society of American Foresters Convention. Three abstracts were published in the ARD Symposiums, and three presentations were made in the regional and national conferences.

Studies involving “*Biological Responses of Selected Urban Tree Species*,” and “*Biotechnological Approaches in Urban Tree Propagation*” have not generated any publishable results. Delay in progress is due primarily to the fact that the tissue culture laboratory has not been fully operational. Most equipment to furnish the lab has been purchased. The primary hold up has been the installation of casework and related facilities.

b. Successes (Outcome Indicators)

The survey results of mid-size cities suggest opportunities exist to enhance public’s appreciation of urban trees and increase support for urban forestry programs. To capitalize on the information generated from this study, we recommended the following: Initiatives to build support for urban forestry programs must pay significant attention to the more commonly recognized benefits of urban trees. For instance, the “aesthetics/visual,” dimension of the program could be emphasized in selecting trees for planting and replacement projects whenever and wherever feasible. Because the amount residents are willing to pay is associated with total household income, a tiered solicitation that takes into account the different income levels in the community might be a more effective tool for seeking support for urban forestry programs than traditional techniques. A majority of the residents is willing to pay at least \$6 per year to protect and preserve the urban

forests. This finding may serve as a basis for revising the \$2 per-capita requirement or criterion for selecting recipients of Tree City USA designation.

c. Benefits

Research products generated and presented will serve as a guide to the private sector and the local and state governments in the formulation of effective community forestry programs. The project develops models to infer the intrinsic values of urban trees and forests and to explain how educational programs have influenced the value people place on the urban forest. A survey will identify unique programs within states, cities or municipalities and provide opportunities for other states, cities or municipalities and provide opportunities for other states, cities municipalities to compare and share their information.

d. Assessments of Accomplishments

The project will meet the performance goals outlined in the Five-Year Plan. We expect to complete the project by September 30, 2002. Specifically the on-going study will complete the survey of the southern states focusing on the following: types of organizations providing informal educational and training programs related to urban and community forestry in selected states; nature, scope and content of urban forestry informal educational and training programs in selected states; partnerships between public and private groups; effective dissemination approaches; source and use of educational and training funds. The resulting information will be published in a compendium.

Key Theme: Other (Community Forestry)

a. Brief Description of Activity

The urban forest is widely viewed as a vital component of the urban infrastructure. It has different functions that provide a myriad of goods and amenities. It helps mitigate many trappings of urban development and can serve as an environmentally sound alternative to traditional technologies by lowering energy consumption, reducing air pollution, and controlling water runoff. Other benefits include physical and mental health and well-being, more aesthetic neighborhoods, and enhanced real estate values. These and other traditional benefits, if realized, can improve the quality of living conditions in urban areas. Despite all these benefits, the public remains less than supportive of conservation, protection, and establishment of urban forests. This concern can be addressed through informal educational and training programs. To understand the nature and success of community forestry programs, the project will identify indicators to measure the effectiveness of informal educational and training programs in selected

states, to develop a compendium of informal and educational training programs in urban and community forestry, and to measure and evaluate the public's perception for preserving urban forests. To date, we have made following accomplishments. A comprehensive review of literature on previous related studies was completed. Two surveys regarding the urban forestry meaning perspectives were completed within a small city (City of Mandeville) and within a mid-size city (City of Baton Rouge). A database of urban forestry councils and organizations in each state covered in the project has been developed. Among the information contained in the database include contact person, address, phone and fax numbers, e-mail, organization's mission statement, types of programs administered, and accomplishments. Initial contact with heads of several of urban forestry councils and organizations had been made. A survey questionnaire has been developed, reviewed by the Institution Review Board of Southern University and has been finalized. This is an on-going project, we will for the next step conduct a survey of selected southern states.

b. Impact

This study will evaluate the perceptions of program providers and participants of informal educational/training programs to help funding agencies, local and state governments, and private industry draw conclusions about the utility of such programs. Information extracted from the study will provide useful insights into contingencies, strengths and weaknesses that should be addressed in designing future informal programs in urban forestry. The study will also seek to develop models to infer the intrinsic values of urban trees and forests, i.e., to explain how informal educational/training programs have influenced the value that people place on the urban forest independent of their current usage of urban forest resources. This survey also intends to identify unique programs within states, cities or municipalities and provide opportunities for other states, cities and municipalities to compare and share their information with one another. Research products generated and presented will serve as a guide to the private sector and the local and state governments in the formulation of effective community forestry programs. The project develops models to infer the intrinsic values of urban trees and forests and to explain how educational programs have influenced the value people place on the urban forest. A survey will identify unique programs within states, cities or municipalities and provide opportunities for other states, cities municipalities to compare and share their information.

c. Source of Federal Funds – Evans-Allen Formula Funds

d. Scope of Impact – State specific

BIOLOGICAL RESPONSES OF OAK SPECIES TO HYPOXIA IN RHIZOSPHERE

a. Research Results (Output Indicators)

Research involving *Biological Responses of Oak Species to Hypoxia in Rhizosphere* led to publication of a full paper “*Impact of Urban Flooding on Physiology and Growth of Urban Trees,*” in Proceedings of the Society of American Foresters (SAF). Additional paper is scheduled for publication in 2002 (in press). Two scientific poster presentations were made in the SAF National Convention and the Southern Regional Arboriculture Meeting. Two research papers are being submitted for publication in the Journal of Arboriculture and North American Forest Biology Workshop 2002. A postdoctoral research report has been developed for submission to the USDA-FS Southern Technical Center in Atlanta for web-based publishing in PDF format. An urban forestry M. S. degree thesis has been developed for publication through the University Microfilms International (UMI) and will be available on Dissertation/Thesis Abstract International in microfilm and PDF format.

Biological Adaptation of Oaks to Hypoxia in Rhizosphere Project: Selection of tree species for the Urban Forest of Southeastern United States have been improved. Recently the Project Director assisted the International Society of Arboriculture, Southern Chapter in publishing a guide for tree selection based on species contribution. Ability of tree species to tolerate adverse site conditions is an important factor in overall rating of the tree species. In recent years, the green industry, municipal arborists, utility arborists, urban foresters have been utilizing site tolerant species to enhance the overall health of urban forest condition. The research findings reveal that Southern Red Oaks and Willow Oaks are negatively affected by soil compaction and flooding. However, both Red oak and Willow oak when fully established can survive soil compaction and flooding at the rate of 65%-70%. The height growth of Willow oaks was reduced by as much as 35%-45%. Reforestation of compacted sites and flooded lands are important practices in remediation of the rhizosphere and ecology of the site. The evaluation of urban tree species in response to soil compaction and flooding have a potential in improving our ability to prescribe specific tree species for specific site condition in urban areas.

b. Benefits

Biological Adaptation of Oaks to Hypoxia in Rhizosphere: The utilization of oak tree species tolerant to soil compaction and/or flooding in the urban areas are vital to the longevity and optimization of benefits derived from the urban forests. Reducing the costs of tree planting, preservation, maintenance, and replacement would help optimizing the benefits. Testing tree species for tolerance to soil compaction and flooding would benefit the overall urban forest management plan for the United States.

c. Assessments of Accomplishments

Biological Adaptation of Oaks to Hypoxia in Rhizosphere: The level of performance indicated by this project is in line with the Five Year Plan of Work performance goal and the PI and research team members are confident that the accomplishments would surpass the expected level of performance. The USDA collaborators, university researchers, and technical experts in

the field of urban forestry have praised this research effort and are looking forward to final recommendations.

Key Theme: Biotechnological Propagation, Natural Resource Conservation, and Tree Selection

a. Brief Description of Activity

Biological Responses of Oaks to Hypoxia in Rhizosphere: The experimental plots have been established. Objective 1, identification and quantification of biological adaptation of Southern Red Oak (*Quercus falcata*) and Willow Oak (*Quercus phellos*) to flooding and soil compaction has been accomplished. Additional data on photosynthesis rates are being collected to substantiate tree species physiological adaptation. The effects of flooding and soil compaction on soil properties are being further evaluated. Due to climatic variations, we are acquiring more seasonal replications to account for seasonal changes and gather more data.

b. Impact

Biological Adaptation of Oaks to Hypoxia: Louisiana Arborist Association, Southern Chapter of the International Society of Arboriculture and the Louisiana Department of Agriculture and Forestry are already utilizing the information compiled from the project results in the form of recommendations. The Society of American Foresters has provided a forum for several hundred urban forestry leaders to attend the PI's research presentation on this project. It is anticipated that a collection of extension brochures would be developed and disseminated to the stakeholders.

c. Source of Federal Funds - - Evan-Allen Formula Funds

d. Scope of Impact - - State specific and potentially the entire Southeast region.

BIOTECHNOLOGICAL APPROACHES IN URBAN TREE PROPAGATION

a. Research Results (Output Indicators)

Research involving ***Biotechnological Approaches in Urban Tree Propagation*** led to the publication of one full research paper in the *Proceedings of Society of American Foresters 2001 National Convention*. The title of the article is "Tissue Culture and Urban Trees - a Review". A project related presentation was also made at the Society of American Foresters 2001 National

Convention. A research paper entitled “Conductive Tissues in Pine Needles” has been accepted by *Microscopy and Microanalysis* for review and publication. A research paper entitled “Biotechnological Approaches in Woody Plant Propagation” is being submitted for consideration for presentation and publication. A graduate dissertation focusing on biotechnological approaches in and environmental effects on urban tree micropropagation is being planned to include a Ph.D. graduate students and with a collaborative efforts of the Urban Forestry Graduate Program at College of Agricultural, Family and Consumer Sciences and the Environmental Toxicology Ph.D. Program at the College of Sciences. A simplified laboratory manual “Urban Tree Tissue Culture” for student training is being developed. Furthermore, the project is developing a step-by-step micropropagation handbook for the state farmers and nursery owners.

b. Successes (Outcome Indicators)

Biotechnological Approaches in Urban Tree Propagation: State of the art Tissue Culture Laboratory was designed by the PI and constructed by the Agricultural Research and Extension Center during 1998-2001. This has provided a long lasting capacity for conducting plant tissue culture research at Southern University. Currently there are very few such laboratories in the State of Louisiana. The necessary tissue culture equipments were integrated to form a functional system for conducting plant tissue culture research. Currently graduate students are being trained in operation and techniques of tissue culture. Research has summarized, reviewed, and developed tissue culture protocols involving different plant tissues, cultural media, and hormone combinations. A collaborative work with the Louisiana State University (LSU) Tissue Culture Laboratory has been initiated through Drs. Z. Ning and M.C. Rush. It is anticipated that this collaboration would enhance the research capabilities of the two Universities. In addition, graduate students can work collaboratively on joint research projects, therefore, eliminating duplication and optimizing resources. The project PIs also provided technical assistance to the national biotechnology and forest conference organizers through SAF.

c. Benefits

Biotechnological Approaches in Urban Tree Propagation: The micropropagation protocols developed by this project can serve as a guide for the private sector and the local and state woodland owners, farmers, crop/fruit growers in fast and mass plant reproduction.

d. Assessments of Accomplishments

Biotechnological Approaches in Urban Tree Propagation: The project is in the data collection and analysis stage. The project has potential to generate more research publications and extension handbooks.

Key Theme: Biotechnological Propagation, Natural Resource Conservation, and Tree Selection

a. Brief Description of Activity

Biotechnological Approaches in Urban Tree Propagation: The research involves in vitro germination, embryo culture, ovule culture, floral culture, tip, bud and leaf cultures and micro cuttings. Several surface-sterilization and media protocols in combination with growth regulators are being assessed for effectiveness. Morphological features of the shooting/rooting process are being examined using light and electron microscope. Photosynthesis, respiration, transpiration, stomatal conductance and distribution of in vitro plantlets are being evaluated.

c. Impact

The ***Biotechnological Approaches in Urban Tree Propagation*** project led the establishment of the Tissue Culture Research Laboratory first time in the history of Southern University. This laboratory serves as a technical facility for training minority students to enable them the skills for future workforce. The laboratory also serves as a recruitment tool. Since the initiation of the laboratory, technical tours have been conducted for potential students, high school teachers and councilors, and student parents. Several laboratory tours have been provided to internal and external review teams and visiting scientists. This laboratory also serves as an extension vehicle for the SU newly formed Agricultural Research and Extension Center. Through the Center, Louisiana farmers, crop growers, and nursery owners can get hand on training in the Laboratory in micropropagation techniques to enhance their crop/fruit/seedling reproductions. The enhanced reproductivities contribute to the economic gains.

d. Source of Federal Funds - - Evan-Allen Formula Funds

d. Scope of Impact - - State specific and potentially the entire Southeast region.

National Goal 5: To Enhance Opportunities and Quality of Life for Americans

Executive Summary

Consumption patterns of goat and rabbit enterprises were the focus of this research area. Many critical issues can be cited as a framework and need for research related to marketing non-traditional food products. Today, consumers select from a vast array of conveniently prepared food products, and wide variety of ethnic and other exotic food products. Researchers feel that the demand and supply of new and exotic foods will continue into the future. However, there are three main issues that support this type research. Firstly, geographic, socioeconomic and demographic factors of the U.S. food consumption patterns are changing. The largest consumers of goat meat in the United States usually have strong ties to Africa, the Middle East, and

Caribbean, while rabbit meat consumers are mainly of European descent. Secondly, real food expenditures per capita have increased, and thirdly, USDA production and consumption data on the selected nontraditional enterprises are either aggregated or undocumented.

The project described under this goal is designed to provide data to assess the marketing outlook for nontraditional meat and their by products. Specifically, it examined whether viable markets currently exist or will exist in the future for goat meat, goat cheese, goat milk, rabbit meat, rabbit roast, rabbit nuggets, and rabbit patties. Data were compiled from a national telephone survey of 1,421 primary grocery shopper/meal prepares in 13 southern states - - Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas and Virginia. The survey provided fine data bases.

Based on empirical analyses conducted, the most likely consumers to use products studied were men, older consumers, college graduates, and those household of at least \$50,000. this marketing information is being disseminated through professional and scientific journals and through research presentations at regional and national meetings and conferences. Additionally, the research has broadened the U.S. Department of agriculture's database, because its data on these products are aggregated making it more difficult to analyze regional differences in consumption or interest in consuming the selected products.

U.S. CONSUMPTION PATTERNS: OUTLOOK FOR GOAT AND RABBIT ENTERPRISES

a. Research Result (Output Indicators)

The scientist involved in this research has published one journal article and four abstracts. Presentations of results were made at professional meetings and conferences. One presentation was made at the Food Distributors Research Society 2000 Annual meeting and two presentations were made at the Association or Research Directors' 2000 Biennial symposium. In the year 2000, a poster presentation was made at the Annual Meeting of the American Agricultural Economics Association. Four manuscripts have been prepared and submitted for review by

scientific journals. And finally, a master's thesis is being developed from portions of the data generated.

b. Successes (Outcome Indicators)

The research result reveal that most likely consumers to utilize nontraditional food products such as goat and rabbit are men, older consumers, college graduates, and those with household incomes of at least \$50,000. The research has broadened the U.S. Department of Agriculture's database on nontraditional food consumption patters.

c. Benefits

Stakeholders in the agricultural industry could benefit from results of this research. With a potential increase in the consumption of goat and rabbit meat by a growing and diverse population, the processing and production industries could be enhanced, affecting job opportunities, economic and community development across the southern region.

d. Assessment of Accomplishments

The Southern University and A&M College Research Program has met the immediate performance goals. However, increased activity in the processing and production industries have not been made as a result of this research effort.

Stakeholder Input

Meetings were held with representative of community groups and with stakeholders themselves in order to obtain their input and recommendation. Input from these groups was critical to the success of this research activity. Stakeholder groups expressed strong interest in enhanced production and broad establishment of markets for the nontraditional agricultural products studies. Critical issues are highlighted in the overview section.

Key Theme: Community Development

a. Description of Activity

This project was designed to provide data to assess the marketing outlook for nontraditional meat and their byproducts. Specifically, it examined whether viable markets currently exist or will exist in the future for goat meat, got cheese, goat milk, rabbit meat, rabbit roasts, rabbit nuggets,

and rabbit patties. Data were compiled from a random telephone survey of 1,421 primary grocery shoppers/meal prepares in 13 southern state (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia) in 1998. The survey provided a rich database on the following:

Behavioral Patterns:

Overall Health Consciousness; Use of Food Labels; Use of Salt; Perceptions of Food Sufficiency

Decision Process

Milk Purchases; Cheese Purchases; Meat Purchases; Experience with Specialty Food

Rabbit and Goat Meat

Incidences of previous purchases; purchase patterns; likelihood of future purchases. Likelihood to try (free samples at grocery stores or as menus at local restaurants); motivations to buy (roasts, patties, nuggets, if meats were packaged with recipes or in marinade)

Goat Milk and Goat Cheese

Incidences of previous purchases; purchase patterns; likelihood of future purchases; motivations to buy (goat milk and goat cheese packaged with recipes for desserts or salads, respectively)

Socioeconomic and Demographic Factors

Number of hours worked outside the home; respondents' age; household size and composition (number of children in the household); educational levels; marital status; religion; household income; race; food stamp participation

b. Impact (Results)

To date, the following activities have been completed.

2000:

- Two papers were presented at the 2000 Association of Research Directors Symposium.
- A poster was presented at the 2000 Annual Meeting of the American Agricultural Economics Association.
- A paper was presented at the 2000 Annual Meeting of the Food Distribution Research Society.
- Four abstracts and a journal article have been published.
- Four manuscripts were submitted for review by scientific journals.
- One master's thesis is being developed from the milk data.

2001:

- A research report was accepted by the Food Distribution Research Society for its 2001 Annual Meeting in Phoenix, Arizona.
- Two of the four manuscripts submitted for publication in 2000 were accepted for publication by scientific journals. These articles will be published in 2002.
- The other two manuscripts are being revised, and will be resubmitted by the end of May 2002
- A research report will be submitted to the Food Distribution Research Society before the July 1st deadline, so that it can be reviewed for possible presentation at the 2002 Annual Meeting to be held in Miami, Florida.

Given the nature of the research project, we have chosen scientific journals and professional meetings which target farmers and the U.S. food marketing sector. These venues allow us to convey consumer data to producers, so that they execute their production and marketing plans more effectively. Additionally, by moving our research from the Baton Rouge campus to Southern University's Agricultural Research and Extension Center, we will be able to work more closely with our stakeholders. For example, our research findings on food label use, and nutritional awareness and knowledge suggest that American Africans, low-income households, or those without high-school diplomas were less likely to use food labels in making food purchasing decisions, or in food preparation. These consumers were also less likely to understand the information on food labels. Armed with these findings, we are now in a much better position to propose nutrition education programs because we now work very closely the extension personnel in the Center. Thus, we will be able to reach more of our in-state stakeholders.

- c. **Source of Funding:** Evans-Allen Formula Funds
- d. **Scope of Impact:** Thirteen southern states including Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, and Tennessee.