ANNUAL REPORT OF ACCOMPLISHMENTS AND RESULTS

for

The Agricultural Research Program

Southern University and A&M College
Agricultural Research and Extension Center
Southern University System

Presented to

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FY 2002 ANNUAL REPORT OF ACCOMPLISHMENT AND RESULTS

SOUTHERN UNIVERSITY AGRICULTURAL RESEARCH AND EXTENSION CENTER

Effective July 1, 2001 the Southern University Agricultural Research and Extension Center, a newly established campus of the Southern University and A&M College System, assumed administrative responsibilities for the 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 requires 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, and 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 2002, (October 1, 2001 to September 30, 2002) consistent with the approved Plan of Work.

PLANNED PROGRAM

The research activities in the Center are 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 matching 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 goals 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:

1. Evaluation of Kenaf Crops
2. Hormonal Control of Rabbits
3. Value-Added Product Development
4. 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:

1. Obesity Among African-American Women
2. Textile Materials Development

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

Research Program: Urban Forestry, Natural Resources and Environment

Research Projects:

1. Biotechnological Urban Tree Propagation
2. Biological Responses of Selected Urban Tree Species
3. Community Forestry

National Goal 5: **To enhance opportunities and quality of life for Americans**

Research Program: Economics, Marketing, Policy and Community Development

Research Project: Consumption Pattern for Goat and Rabbit Meats

Stakeholder Input Process

Stakeholder input was sought at various levels as prerequisite and support for on-going research development 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 are on-going with representatives of community groups and other stakeholders in order to obtain their input and recommendations regarding research program objectives and direction. Input from these groups was critical in the development process of the various research programs and related projects. Stakeholder input was critical to the success realized in the research activities reported. A survey was administered to a sample of county 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 summary sections of this report.

Program Review Process

Program review has not yet been scheduled, but one is being contemplated during the next cycle of reviews by CSREES. Plans are underway to make the necessary request.

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 (1) evaluation of kenaf as forage for small animals (2) hormonal control of rabbits, (3) value-added product development of goat and rabbit meat and (4) utilization of crawfish waste as an alternative protein source in animal feeds. The nature of the research projects 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 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 alternatives 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 is 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. Efforts are being made to repackage results of research activities for dissemination through the Louisiana Cooperative Extension Service and through one-on-one activities involving scientists. For example, two beef cattle demonstrations have been conducted with relative success.

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

Overview

Under National Goal 1, fiscal year 2002 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 Results (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 date 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 practice of growing kenaf as a forage crop.

c. Source of Federal Funds: Evans-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 published in Animal Production Science Journal**,** 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-17β 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. The Journal in work relative to this project has a broad circulation of scientists and rabbit producers.

Key Theme: Animal Production Efficiency

a. Brief Description of Activity:

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

d. 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. Articles appear in the *Journal of Food Sciences, and Goat Rancher*. Abstracts appear in the *Proceedings of the Annual meeting of the Food Expo (Proceedings of the Institute of Food Technologist)*, and an abstract is presented in the *Proceedings of the Annual Meeting of the Southern Section of the 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 a high incidence of obesity and other chronic diseases. The introduction of these products into the marketplace 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, there will be purification of rabbit, goat and beef hearts by the aqueous leaching process. Finally, the scientists seek to produce defatted

powdered rabbit, goat and beef heart muscle proteins for utilization in value-added meat products, and 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 a 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 short articles on crawfish waste as a potential soil amendment and an alternative source of protein in livestock feed were submitted to the Science & Education Impact: Benefits from the USDA/Land-Grant Partnership Program of USDA/CSREES. One undergraduate honor 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). CWM in the diets at the levels of 12.5% and 24% did not adversely affect average daily gain (ADG). The results further 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 agricultural systems. Receipt of a patent for the crawfish waste should stimulate industrial interest in adding value to this product.

Key Theme: New Uses for Agricultural Product

a. Brief Description of Activity:

Freshwater crawfish (Procambarus clarkii) is a commercially important food product in Louisiana and other coastal areas. Only 15% of the crawfish is edible. The remaining 85% is 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 B80 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), which sells 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

NEW TECHNOLOGIES FOR THE UTILIZATION OF TEXTILE MATERIALS

a. Research Results (Output Indicators)

Kenaf was extracted from stems through biological and chemical retting. The bacterial retted and chemical retted kenaf fibers were blended with cotton in varying percentages of the 10/90, 25/75 and

50/50 kenaf/cotton blend fibers. Yarns were spun using the rotor and ring methods at the USDA-ARS-Southern Regional Research Center in New Orleans, Louisiana. Physical testing of these samples is underway. The testing will determine whether any modifications are necessary on any of the pre-spinning processing parameters before any additional quantities are produced. Currently, the extraction of kenaf fiber from stems through biological and chemical retting is underway. Due to previous findings, we have developed more efficient and improved procedures for extracting and processing kenaf fibers.

The new digital printing laboratory was set-up next to the textile technology laboratory. Print designs were developed using U4ia and Photoshop software. Sample fabrics were printed suing the Encad Digital Fabric System. Color determinations were made using a handheld spectrophotometer with CIE-lAB values. Colorfastness to laundering and crocking were conducted. Several studies in digital printing have been carried out. Color change during processing digitally printed fabrics has been documented. Further experiments are underway to improve colorfastness of digitally printed fabrics. The following studies have been completed.

- Determination of Dimensional Stability of Knitted and Woven Fabrics Using Accelerated Testing and Computer Imaging Procedures
- Effect of Steaming Time on Colorfastness to laundering of Digitally Printed Cotton Change of Color Intensity of Digitally Printed Cotton Fabrics Due to Steaming

b. Success (Outcome Indicators)

The work completed during the reporting period has resulted in several presentations, abstracts and a refereed paper. Completed presentations are indicated below. Four abstracts were accepted at the 13th Biennial ARD Research Conference in April 2003. Several papers are planned for submission to other professional organizations.

Refereed Publication

Namwamba, G. and Dixon, D.L. (2003). Colorfastness to Crocking and Laundering of Digitally Printed Cotton Fabric, Journal of Cotton Science, January 2003 (Submitted Dec. 2002)

Oral Presentations

Nawamba, G. and Dixon, D.L. (2003). Colorfastness To Crocking And Laundering of Digitally Printed Cotton Fabric. Beltwide Cotton Conference, January 2003, Nashville, TN.

Refereed Abstracts and Poster Presentation

Zang, T., Chen, Y., Namwamba, G., Dixon, D., and Kimmel L. (2002). Chemical Treatment for Improving Kenaf Spinnability American Association of Textile Chemists and Colorist Review. (Abstract)

Chemical Treatment for Improving kenaf Spinnability American Association of Textile Chemists and Colorist Conference, Charlotte, NC - October 2002 - (Poster presentation)

Namwamba, G.W., Dixon, D.L., Ghebreiyessus, Y., and Zhang, T., Kimmel, L., (2002). Bacterial Retting and Fiber Softening of Everglade Variety Kenaf for Apparel Applications. Poster presented at American Kenaf Society Conference, Memphis, TN.

Abstracts Submitted to the International Textiles and Apparel Association Juried Design Competition

Namwamba, G. (2002). Tropical Heat-Kanga (a digitally printed fabric and original design).

Namwamba, G., Scott, P., Dixon, D., Jackson, B. (2002). Summer Splash (African inspired outfit made from digitally printed fabric with original design).

Research Presentations/Posters/Abstracts that have been accepted for presentation
Oral Presentations

Devona L. Dixon and Grace Wasike Namwamba (2003). Effect of Steaming Time on Colorfastness to laundering of Digitally Printed Cotton Fabric. (Presentation at the ARD 13th Biennial Research Symposium).

Grace Wasike Namwamba and Devona L. Dixon. (2003). Change of Color Intensity of Digitally Printed Cotton Fabrics Due to Steaming. (Presented at the ARD 13th Biennial Research Symposium).

Poster Presentations

Namwamba. G.W., Dixon, D.L., Ghebreiyessus, Y., Chen, Y., and Zhang, T., Kimmel, L. (2003). Bacterial Retting and Fiber Softening of Everglade Variety Kenaf for Apparel Applications. (Presentation at the ARD 13th Biennial Research Symposium)

Devona L. Dixon and Grace W. Namwamba. (2003). Determination Dimensional Stability of Knitted and Woven Fabrics Using Accelerating Testing and Computer Imaging Procedures. (Accepted for presentation at the ARD 13th Biennial Research Symposium.

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 material 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. 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 to develop new textile products from non-traditional sources and to characterize these products. This project has the potential to contribute new information in environmentalism regarding textile products as well as 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 B Knoxville

OBESITY, FAT DISTRIBUTION AND CHRONIC DISEASE RISK FACTORS

a. Research Results (Output Indicators)

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

b. Successes (Outcome Indicators)

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

Accomplishments include a comprehensive review of literature on previous related studies, a survey instrument, surveys of small and mid-size cities regarding the urban forestry meaning perspectives and indicators of willingness o pay, database of urban forestry councils and organizations in each state in the south, and a comprehensive survey of urban forestry programs in the states of Louisiana, Mississippi, Georgia, and Florida. The project has produced three refereed papers published by Journal of Arboriculture, USDA Forest Service/National Association of State Foresters, and Chinese Journal of Urban Forestry. In addition, one technical paper and three abstracts were published in conference proceedings. Seven presentations were made in the regional and national conferences.

b. Successes (Outcome Indicators)

The survey results of mid-size cities suggest opportunities exist to enhance the 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 project could be emphasized in selecting trees for are willing to pay is associated with total household income, a tiered solicitation the 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.

Refereed Publications

Qi, Yadong. 2003. Introduction to Urban and Community Forestry in the United States: History, Accomplishments, Issues, and Trends. Chinese Journal of Urban Forestry (In press)

Lorenzo A.B., C.A. Blanche, Y. Qi, and M. Guidry. 2000. Assessing residents' willingness-to-pay to preserve the urban forest: A small city case study. Journal of Arboriculture, Vol. 16(6):319-324.

Qi, Yadong, J. Favorite, and A.B. Lorenzo 1998. Foresters/Southern University. ISBN 0-9662108-0-8. 50 pp.

Proceedings

Qi, Yadong, A.B. Lorenzo, and Barbara McDonald. 2000. Minority meaning perspectives of urban foresters and nature areas. Proceedings of the Society of American Foresters 1999 National Convention. Pp 574-575. ISBN 0-939970-81-3.

Lorenzo A.B. and A.J. Wells,. "Valuation of property value near urban parks: A case". The Twelfth Biennial ARD Research Symposium Program and Abstracts. P124-125. April 19-21, 2001. J.W. Marriott, Washington, D.C. p95.

Lorenzo A.B. and Kit L. Chin. AA Noval approach for determining intrinsic value of urban forests:, ARD 1997 Research Symposium. October 1-4, 1997, San Antonio Marriott River Center, San Antonio, TX. P62.

Lorenzo, A.B. Chin and S.M. Zadri. 1997. Urbanization and preservation of urban forests. A poster presented at the 1997 ARD Research Symposium, San Antonio, Texas, October 1-4, 1997.

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 or municipalities to compare and share their information.

d. Assessment 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 the 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

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.

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

c. Scope of Impact - State specific

BIOLOGICAL RESPONSES OF SOUTHERN RED OAK (*Quercus falcata*) and Willow Oak (*Quercus phellos*) TO HYPOXIA IN RHIZOSPHERE

a. Research Results (Output Indicators)

Hypoxia caused by flooding significantly decreased average photosynthetic rate (Pn) of both Southern Red Oaks (*Quercus falcata*) and Willow Oaks (*Quercus phellos*). Average Pn of Southern Red Oaks decreased by 32% and Willow Oak decreased by 18% during flooding. Flooding significantly reduced the transpiration rate (Tr) of Southern Red Oaks and Willow Oaks. Tr of Southern Red Oaks reduced by as much as 42%, while Tr of Willow Oaks reduced by as much as 28%. Stomatal Conductance (Sc) of both Oak species reduced significantly by flooding. Southern Red Oaks Sc reduced by as much as 50 % and Willow Oaks Sc reduced by as much as 30%. Cyclic flooding significantly decreased the height growth rate (HGR) of both Southern Red Oaks and Willow Oaks. HGR of Southern Red Oaks decreased by an average of 60%, while Willow Oaks HGR decreased by 33%. Cyclic flooding significantly decreased the diameter growth rate (DGR) of both Southern Red Oaks and Willow Oaks. DGR for Southern Red Oaks were reduced by an average of 40% while Willow Oaks DGR decreased by 25%. Soil chemical properties were significantly changed under flooding conditions when compared to control plots. Soil biological activities were significantly reduced under flooding conditions for both Southern Red Oaks and Willow Oaks. In general, Willow Oaks were significantly more tolerant of hypoxia resulting from flooding conditions in the rhizosphere.

b. Successes (Output Indicators)

Research involving Biological Responses of Oak Species to Hypoxia in Rhisosphere led to publication of two full articles (*Indexed in AGRICOLA*). One additional paper is scheduled for publication in Oct 2003. Three scientific presentations were made at the Society of American Foresters (SAF) National Convention, Mississippi Urban Forestry Conference, and the Louisiana Urban Forestry Meetings in 2002 and 2003. One manuscript is being developed for publication in the *Journal of Arboriculture* and *Journal of Forestry*. A book chapter is being contributed for publication in the *Gulf Coast Climate Change Assessment* (in press). The results of this study are being posted on the Urban Forestry Web site: http://www.treelink.org.

A postdoctoral research poster has been developed for presentation by A. Negatu and K. Abdollahi at the 2003 Association of 1890 Research Directors (ARD) in Atlanta Georgia (in proceedings). An Urban Forestry M.S. Graduate Thesis was developed and is scheduled for publication by the University Microfilming International (J.M. Ashiru, M.S. Thesis, Directed by K.K. Abdollahi, 2003). A research abstract is being posted at the USDA-FS Southern Technical Center in Atlanta for web-based publishing in PDF format. Several presentations were made to the Louisiana urban and rural communities.

Several presentations were made pertaining to flooding and its consequences to the public during a State wide conference entitled A *National Fire plan and Large Scale Watershed Project Workshop* in November 2002 (www.urbanforestry.subr.edu). The results are also scheduled to be presented

during a National Urban Forestry Conference for Minority and Underserved Communities in Louisiana on June 18-20, 2003 in Baton Rouge, LA (www.urbanforestry.subr.edu/nucfac).

a. Benefits

Biological Adaptation of Oaks to Hypoxia in Rhizosphere Project: Selection of tree species for the Urban Forest of Southeastern United States has 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 utilization of oak tree species tolerant to soil compaction and/or flooding in the urban areas is 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.

b. Assessment of Accomplishments

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 the final recommendations.

Key Themes: Biological Adaptation, Flooding, Urban Forest, Tree Selection, Natural Resource Conservation, Stress Tolerance, Arboricultural Practices, Carbon Sequestration, Soil Compaction, Soil Flooding, Wetlands, and Hypoxia.

a. Brief Description of the Activities*:* Biological Responses of Oaks to Hypoxia in Rhizosphere:

Data collection and analysis on the field project established four years ago are near completion (Sept 2003). All the stated objectives of the project have been achieved. In addition, several new objectives were identified in the course of data analysis and are being completed to lay the foundation for a follow up study on carbon sequestration and soil microbiology under urban forest flooding condition. Hypoxia caused by flooding significantly decreased average photosynthetic rate (Pn) of both Southern Red Oaks (*Quercus falcata*) and Willow Oaks (*Quercus phellos*). Average Pn of Southern Red Oaks decreased by 32% and Willow Oak decreased by 18% during

flooding. Flooding significantly reduced the transpiration rate (Tr) of Southern Red Oaks and Willow Oaks. Tr of Southern Red Oaks reduced by as much as 42%, while Tr of Willow Oaks reduced by as much as 28%. Stomatal Conductance (Sc) of both Oak species reduced significantly by flooding. Southern Red Oaks Sc reduced by as much as 50 % and Willow Oaks Sc reduced by as much as 30%. Cyclic flooding significantly decreased the height growth rate (HGR) of both Southern Red Oaks and Willow Oaks. HGR of Southern Red Oaks decreased by an average of 60%, while Willow Oaks HGR decreased by 33%. Cyclic flooding significantly decreased the diameter growth rate (DGR) of both Southern Red Oaks and Willow Oaks. DGR for Southern Red Oaks were reduced by an average of 40% while Willow Oaks DGR decreased by 25%. Soil chemical properties were significantly changed under flooding conditions when compared to control plots. Soil biological activities were significantly reduced under flooding conditions for both Southern Red Oaks and Willow Oaks. In general, Willow Oaks were significantly more tolerant of hypoxia resulting from flooding conditions in the rhizosphere.

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 by the Southern University Agricultural Research and Extension Center and the Urban Forestry Program. It is anticipated that the implementations of the recommendations from this project would have positive economic impact on the state conservation efforts, nursery operations, arboricultural industries, and overall urban forest management of Louisiana and the region. Several news articles published in the last two years are testimony to the impact of the project on the public perception of urban forestry in Louisiana and Mississippi and the impact on the local, state, and community stakeholders.

Other Impacts:

- 3 Scientific presentations were made
- 5 presentations were made to Arborists nationwide.
- 1 graduate M.S. theses was developed by an urban forestry graduate student
- 5 undergraduate research assistants and many graduate students have been trained on this project
- Louisiana Arborist Association are utilizing the results
- International Society of Arboriculture, Southern Chapter and State of Louisiana are utilizing the recommendations
- The Society of American Foresters is publishing the results
- The Louisiana Urban Forestry Council (LUFC) will be publishing some of the results
- Baton Rouge Green a nationally recognized non-profit organization is using the results of this study to better manage its planting of oak trees.

- The project web site has been visited more than 1200 times.
- 25 communications regarding this project have been received from scientists, arborists, and general public.

Publications:

Abdollahi, K.K., Z.H. Ning, D. Collins, and A. Negatu. 2001. **"Impact of Urban Flooding Physiology and Growth of Urban Trees"**. In Proceedings of the Society of American Foresters (SAF) National Conference.

Abdollahi, K.K., Asebe Negatu, Zhu Hua Ning, and D. Collins. 2003. **"Biological Responses of Southern Red Oak and Willow Oak to Hypoxia in Rhizosphere."** In: Proceedings of the Society of American Foresters National Conference. (manuscript accepted)

John .M. Ashiru 2002. **"Impact of Flooding and Soil Compaction on Physiology and Growth of Oak Trees".** Master Thesis. Southern University and A&M College. Thesis Directed by K.K. Abdollahi.

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

d. Scope of Impact: State (Louisiana) specific and potentially the entire Southeast

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. 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*:* A state of the art Tissue Culture Laboratory designed by the PI, was constructed in 2001. The laboratory has enhanced our capacity to conduct plant tissue culture research at Southern University. Currently, there are very few such laboratories in the State of Louisiana. The necessary tissue culture equipment is 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. The research project has summarized, reviewed, and developed tissue culture protocols involving different plant tissues, cultural media, and hormone combinations. Collaborative work with the Louisiana State University (LSU) Tissue Culture Laboratory has been initiated. 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

A state-of-the-art Tissue Culture Laboratory was designed by the PIs and constructed by the Agricultural Research and Extension Center. This has provided a long lasting capacity for conducting plant tissue culture research at Southern University. Currently there are very few such a Laboratories in the State of Louisiana. The necessary tissue culture equipments were acquisitioned and integrated to form a functional system. Currently graduate students are being trained in operation and techniques of tissue culture. Research has summarized, reviewed, and developed tissue culture protocols involving deferent cultural media and hormone combinations. A collaborative work with the Louisiana State University Tissue Culture Laboratory has enhanced 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. The project has generated 6 publications and 2 presentations.

b. Impact

The 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 will contribute to the economic gains.

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 of 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 it's 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 preparers in 13 southern states - - Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas and Virginia.

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

a. Research Result (Output Indicators)

The scientists involved in this research 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 of 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.

- A paper titled "**Factors Influencing Consumption or Willingness to Consume a Variety of Goat Meat Products**" was Goat Meat Products" was presented at the annual meetings of the Food Distribution Research Society in October 2002. The paper will be published in the March 2003 issue of the Journal of Food Distribution Research.
- A Paper titled "**An Economic Analysis of Consumer Demand for Goat Cheese in the Southern United States**" will be presented in the Competitive Paper Section for Undergraduate Student at 13th Biennial Association of Research Directors' Symposium in April 2003 by Monica Cavalier, an agricultural economics major.
- A Paper titled "**An Empirical Investigation of Factors Influencing Consumption of Goat Milk**" will be presented in at 13th Biennial Association of Research Directors' Symposium in April 2003.
- Roy Hawkins, a graduate of agricultural economics and graduate student at University of Illinois, will be using the survey data on beef, chicken and pork for his master's thesis.

b. Successes (Outcome Indicators)

The research results reveal that the 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 patterns.

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 have 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; households size and composition (number of children in the household); educational levels; marital status; religion; households income; race; food stamp participation

b. Impact (Results)

To date, the following activities have been completed:
Year 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.

Year 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 that 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 suggests 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.