Alcorn State University
Report of Accomplishments and Results

Evans-Allen Formula
Funded Research

FY 2002

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FOREWORD

Since 1871, Alcorn State University has sought to serve the needs of non-served and underserved segments of the population of Mississippi, including limited-resource farmers and rural residents. More than twenty years ago, three objectives were developed for the University's research program: (1) to increase the income of limited-resource farmers; (2) to improve the quality of life for rural residents; and (3) to protect and improve the environment. These objectives remain as valid today as when they were first instituted. As the reader will learn in the following report, the five national goals set by USDA are are very synchronous with the three research objectives of Alcorn State University.

Stakeholder involvement is essential to conducting research which meets the stated objectives and which has meaning to an intended target audience. Alcorn administrators and scientists seek opportunities to react with potential end-users of research, and their comments and observations are given serious consideration in prioritizing Evans-Allen research projects and in allocating funds.

We hope that this annual report will present a clear picture of the scope and impact of Evans-Allen research at Alcorn State University. Over the years, we have seen positive impacts from the efforts of our scientists. It is our intention to continue to be a positive force for change on the landscape of rural Mississippi.

Submitted by:

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GOAL ONE: An agricultural system that is highly competitive in the global economy

Overview

Executive Summary

While Mississippi is known as a major producer of poultry, timber, cotton, soybeans, rice and catfish and has a significant beef cattle industry, the clientele of Alcorn State University seldom possess the land or capital to invest in these enterprises which require a large scale to yield significant profits. Therefore, research must show them how to be more efficient and productive on the land which they already own. Alternative crops which produce a high income per acre have been promoted with good success by our cooperative extension counterparts. Research has enabled them to take these crops to the producers and show evidence of their potential. Such enterprises are sweet potatoes, goats, swine, fruit crops and medicinal crops.

Alcorn scientists also give emphasis to value-added production. If a farmer can make a good profit from growing peppers, why can he not make more by converting the peppers into a piquant sauce? Sweet potatoes can be the main ingredient in baked goods and other food preparations.

Key Themes

1. <u>Animal Production Efficiency</u>

The project, "Effect of Nutrition and Suckling on the Release of Reproductive Hormones in Cattle" continues with Holstein dairy cattle. A second trial to evaluate the effects of injecting GnRH 48 hours after PGF2 was completed and data collected. Laboratory and statistical analyses are pending. A research trial to evaluate the effects of early versus conventional breeding of post-pubertal Holstein heifers on conception rates and sex of the offspring was in the phase of data collection. A plan for a research trial to evaluate the effects of exogenous progesterone on the survival of embryos transferred to Angus recipient heifers was developed for later

implementation. The impact of these three projects will improve production efficiency in the livestock industry by increasing the conception rate and manipulating the sex of the offspring. The expected scope of income will be multi-state/multi-national - wherever cattle are grown. $89,172 of Evans-Allen funds were used for the support of this project.

2. Diversified/Alternative Agriculture

While this is one of the earliest areas of interest for scientists at Alcorn State University, focus has shifted somewhat from vegetables to medicinal and nutraceutical plant crops. Different agronomic practices were used to evaluate yield potential and quality of catnip, feverfew, valerian and peanut. This thrust has had a positive impact in a short period of time. Due to production practices and economic budgets developed by researchers, several limited-resource farmers in Mississippi have begun production of some of these types of crops. A cooperative has been formed to facilitate marketing. Scope of this project is regional. $46,705 of Evans-Allen funds were used for the support of this project.

3. Plant Production Efficiency

The first of two projects which fall under this classification is entitled, "Low Input Sustainable Production of Fruits and Nuts." This project is the latest in an ongoing effort to promote fruit and nut crops for small farmers. Highly adapted cultivars of peach, nectarine, plum, and pecans have been identified for Southwest Mississippi soils and growing conditions. Several farmers have visited the orchard and attended field days to learn more about this enterprise. Pecan production, once an important source of income for small farmers, can make a come-back using management practices developed at Alcorn State University; however, better marketing outlets need to be developed. The scope of this project is specific to Southwest Mississippi. $87,814 of Evans-Allen funds were used to support this project.

The second project dealing with plant production efficiency bears the title of "Optimizing Mississippi Delta Sweet Potato Profitability Using Spatial Technology." Sweet potatoes are being vigorously promoted as an alternative crop for Mississippi farmers. Soil and moisture variations within a field can cause corresponding variations in yield of sweet potatoes. Spatial technology involving remote sensing and global positioning systems can identify areas within a field that require some treatment that differes from the norm which would increase yields within those areas. A 2.72. acre plot was harvested after a 120 day growing period. The sweet potatoes were graded and evaluated for quality. Results indicated higher yield during the 2002 growing period as compared to the 2001 period. This is attributable to precision applications of fertilizer, pesticides and irrigation which were made possible by spatial technology observations. Replication of this trend will be sought during the coming year. When this technology is verified, commercial producers will see an increase in yields and profits through its broad-scale applications. Scope of this project covers all areas where sweet potatoes are grown in general, but more specifically, Mississippi delta soils in Mississippi, Arkansas and Louisiana. $114,111 of Evans-Allen funds support this research.

4. Risk Management

This key theme area is represented by a project entitled "Evaluation and Development of Farm Management and Risk Reducing Strategies for Small Agricultural Producers." During this period, the following objectives were accomplished. 1. A field survey was conducted to determine farm and risk management practices that are currently used by small farmers in Mississippi and to what extent these practices are guided by economic and managerial principles. Results from an analysis of the data suggest that farm and risk management practices are quite similar among farmers in the survey. A majority of the farmers do not formulate specific strategies to protect against price and production risks. In addition, age, farm size, education level, and farm income have no significant effect on how producers manage production and risk on their farms. 2. Information from the field survey was also used to determine how small farm producers access and use institutional credit, information technology, and other productive resources in spreading production and marketing risks. Results indicate that only an insignificant proportion of farmers use institutional credit, information technology, and other productive resources to hedge against production and marketing risks. Most producers do not fully understand the application of financial risk management strategies even though they are aware that such strategies exist. Sixty percent of the farmers feel that farm price fluctuation is the riskiest factor, followed by increasing production cost, uncertainties in farm programs, and variability in crop yield. According to a majority of farmers, changes in land lease arrangements or changes in environmental regulations are less risky factors affecting their farm management practices. No more than 20 percent of the farmers seek assistance from financial institutions or governmental agencies when confronted with financial risk. 3. Additional field surveys were conducted this past period in four Delta counties. Additional field surveys were also initiated in three selected Southwest Mississippi counties. Data from these surveys will be used to determine the degree to which market and technological changes have affected management, production and economic opportunities of small farmers in the Delta and Southwest Mississippi counties. Results from this study will impact the understanding of the characteristics and risk management needs of small limited-resource farmers in Mississippi and provide information for future efforts to assist this socially disadvantaged farm group. Scope of this project covers all areas of the state where limited-resource farmers are found. $63,606 for Evans-Allen funds were expended in support of this research.

5. Small Farm Viability

A project entitled "Analysis of the Economic Performance of Small Farm Marketing Strategies" seeks to investigate the economic performance of current and potential marketing strategies for small farmers in Mississippi. Three survey instruments were pretested and/or finalized to assess the following: 1. The current procurement practices of Mississippi food retailers regarding organic, natural and specialty value-added products that may be produced by in-state small farmers; 2. The wholesale trade of selected vegetable products; and 3. The current economic and market profile of small farmers in Southwest Mississippi. The retail

survey instrument was mailed to a random sample of 320 retail stores operating in the state. The response rate was approximately 17 percent. The wholesale survey instrument was addressed to the entire population, but yielded a low response rate. Results are preliminary at this time. At conclusion, these studies are expected to identify profitable in-state markets for small farmers. The scope of this study is state-wide. $107,893 of Evans-Allen funds were expended in support of this project.

GOAL TWO: A Safe and Secure Food and Fiber System (None)

GOAL THREE: A Healthy, Well-nourished Population

Overview

Executive Summary

Good health is a basic human need which, in part, defines quality of life. Basic human needs have been a topic of research at Alcorn State University for many years. This includes such specifics as food, clothing and shelter. Ample literature exists to show that good health and good nutrition are highly correlated. Consumption of high-fat high-cholesterol diets has a remarkably negative effect on coronary health; however, certain food items show a correcting effect on this condition. Soy protein is one such ingredient. High- fat diets are characteristic of Mississippi and other southern states. This is especially true for minority populations in the area, and they are at higher risk of diabetes, hypertension, hypercholesteremia, and related phenomena.

These problems could be alleviated to some extent by minor and pleasant changes in the diet.

Key Theme

1. <u>Human Nutrition</u>

A project entitled "Development of Low-Fat, Low-Cholesterol Recipes Using Soybeans As An Alternative Protein Source" is in its fourth year at Alcorn State University. Accomplishments during this reporting period include: 1. Completed institutional testing with five of the

developed soy recipes at various communities and at two different test sites. All of the five recipes received an average score of seven and above. 2. Two graduate students will be completing their theses by Spring 2003, using information from the soybean consumption survey. 3. We are in the process of trying to market a soynut cookie which was developed from this project. A sensory evaluation was conducted at the university with 80 faculty, staff, and students to determine its acceptability. Furthermore, taste- test sessions with this recipe will be conducted at various communities and various locations. A series of meetings was held with food specialists at Mississippi State University to determine marketing strategies and nutrient analyses for the soynut cookie. This research will impact soybean production by creating new markets for soy products and will produce favorable impact on the health of product consumers, especially among minority groups. Scope of this product is national. $84,309 in Evans-Allen funds was expended on this project.

GOAL FOUR: Greater Harmony Between Agriculture and Environment

Overview

Executive Summary

The first result of domestication of plants and animals was modification of the environment. The first farmers soon learned that yields could be increased by irrigation and organic fertilizers such as animal manure.. Later generations used animals and then machinery to till the soil without regard to effects of wind and water erosion. Increasing human population on the earth dictated that productive forest lands be removed so that crops or livestock could be grown in its place. Recent generations have come to rely on harsh chemical fertilizers and pesticides to promote short-term gains in yield and profitability at the expense of the environment. Concentrations of pesticides such as DDT or atrazine in intensively farmed regions have polluted both ground and surface water, to the detriment of humans and wildlife. Mega-concentrations of swine and poultry pour phosphates into the environment. As a cumulative result of all these past practices, we are now faced with global climate changes which threaten society on earth

as we know it. What are we to do? Just as this situation did not come about over night, it will not be resolved over night. There is no one "grand formula" to solve all the ecological problems of the planet. Rather, the solution lies in many little formulae, each of which addresses a single opportunity for positive change. Research scientists at Alcorn State University have accepted the challenge to examine problems in this region and develop solutions. Previous research at this institution identified the dairy industry in Mississippi and adjacent areas of Louisiana as being a primary phosphate polluter of the Gulf of Mexico. Working with extension and NRCS personnel, more effective methods of waste treatment were put into effect which greatly reduced phosphate run-off from the offending dairy farms.

KEY THEME

One project addressed environmental concerns during the reporting period, "Use of Azadirachtin Extract as Broad Spectrum Pesticide for Vegetables." Azadirachtin, the active component of extract from tissue of the neem tree, was studied.. Neem extract has long been recognized as a natural insecticide in tropical regions where it grows. Research has revealed more efficient means of extracting the azadirachtin from the neem tissue by use of different solvents. These solutions were then tested on selected species of insects, both in the laboratory and in the field. Two manuscripts have been prepared for publication as a result of this study, (1) Insecticidal and Antifeedant Activities of Neem Seed and Callus Extract Against Larvae of *Manduca sexta*; and (2) Use of Azadirachtin Extract as a Broad Spectrum Pesticide for Vegetables. By using biologically friendly means of pest control, both producers and consumers will benefit. Cost-effective and safe means of controlling insect pests will provide cheaper and safer sources of food and will protect the environment by reducing the amount of chemical pesticides now being used. Scope of this project is national and international, wherever vegetables are grown. $31,944 of Evans-Allen funds were expended on this research.

GOAL FIVE: Enhanced Economic Opportunity and Quality of Life for Americans (none)

STAKEHOLDER INPUT PROCESS:

As previously stated, Alcorn State University scientists are keenly aware of the needs of our clientele. We consult with them on a regular basis and in many ways. This process is of great necessity if research is to have an impact. Following, are examples of means of communication by which interested parties help to shape research plans and projects.

A. Consultation with extension personnel who meet regularly with producers and rural residents. Extension personnel hold "town meetings" to get stakeholder input. Research personnel also attend these events.

B. Stakeholders visit research sites for direct interaction with scientists. Such visits may take place at field days or on less formal occasions.

C. Input from public officials. Many elected and appointed public officials serve as intermediaries between their constituents and the university. On a number of occasions they have called attention to existing problems, which were then addressed by research scientists.

D. Input from employees of other USDA agencies. We enjoy a collegial relationship with scientists of other USDA agencies or employees who possess a science background. Interchanges with these persons give helpful insights into research opportunities and have led to establishment of joint efforts in a number of cases, although few of these are supported by formula funding.

PROGRAM REVIEW PROCESS

There have been no significant changes in the program review process since the Five-year plan was submitted.

EVALUATION OF THE SUCCESS OF MULTI- AND JOINT-ACTIVITIES:

Multi- and joint-activities continue to allow scientists at Alcorn State University to interact with colleagues on a national scale. These activities give them access to facilities, data

banks, and other helps that would not have been otherwise available. These contacts have led to

a much broader scope of research and to more benefits for the stakeholders. The Five-Year Plan of Work gives a partial listing of these activities (see Sections 3 and Several new collaborations were subsequently developed in FY 2001. No new collaborations were developed during FY 2002.

The effectiveness of multi- and joint-activities may be assessed by asking questions such as the following ones:

1. Did the planned programs address the critical issues of strategic importance including those identified by stakeholders:

   These issues were adequately addressed in most instances. Evolving collaborations sometimes gave rise to new opportunities.

2. Did the planned programs address the needs of under-served and under-represented populations of the state?

   The answer to this question is an emphatic "yes." As stated in the previous report, the target population of small family farmers and rural residents in Mississippi is strongly a minority population who have been under-served and under-represented for many years. Our work has enabled a significant segment of this group to advance to a higher rung on the economic ladder and to enjoy a better quality of life.

3. Did the planned programs result in improved program effectiveness and/or efficiency?

   Overall, the programs were fairly successful in this area. While the programs did a fairly good job at describing outcomes, impacts are harder to predict. More thought and effort should be devoted to this phase of study.

4. Did the planned programs describe the expected outcomes and impact?

   An affirmative answer to this question is indicated by the fact that scientists are more aware of the need to consider stakeholder input and to distribute the results of research to them by various means (field days, publications, cooperation with extension personnel, etc.) We now reach a much larger target audience than in the past since our research has been expanded to off-campus locations. In times of a tight economy, it becomes

necessary to produce results with less operating capital. This requires much thought as to the setting of goals and priorities. A large-scale survey among clientele should be conducted to delineate the effectiveness of research and technology transfer. Such a survey

could point the way to future research directions.