MAFES RESEARCH

HIGHlights

Volume 67, Number 4

FALL 2004

ANNUAL REPORT 2004

Mississippi Agricultural and Forestry Experiment Station

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from the DIRECTOR

This issue of Highlights is the 2004 annual report for MAFES. It includes a brief look at each of Mississippi's research and extension centers and the MAFES branch stations associated with each of the centers. There's also a profile of each of the Mississippi State University departments with MAFES responsibilities.

The activities reported on in this issue are not all of the work involving MAFES scientists, but they are representative of the projects where MAFES personnel provide leadership or are the major participants.

The focus of research at Mississippi State and the nation's other land-grand universities is on finding ways to improve the quality of life in both rural and urban areas. To accomplish that mission it takes cooperation with other universities and government organizations, private businesses, and individuals. While MAFES scientists are at the forefront of the projects mentioned in this report, other individuals and organizations in both the private and public sectors help make possible their success.

Cooperation across disciplines within the Division of Agriculture, Forestry and Veterinary Medicine at Mississippi State also is an important part of successful research, education and outreach programs at the university. Because of that cooperation and the need to get the message out to our alumni, partners at other schools and agencies, and the general public, we will launch a new publication early next year. It will cover all the activities of the Division, including the accomplishments of our students and alumni.

This will be the last issue of MAFES Research Highlights, a publication that began in 1973 as the successor to Mississippi Farm Research, which began publication in 1938. During the past 66 years, Farm Research and Highlights were the voice of Mississippi State's agricultural research program.

Our new publication, Mississippi Landmarks, will continue to report on MAFES activities, as well as the work of the MSU Extension Service, the College of Veterinary Medicine, the College of Agriculture and Life Sciences, the College of Forest Resources, and the Forest and Wildlife Research Center.

We hope you enjoy the expanded coverage and look forward to hearing your comments.

Vance H. Watson
Director

Volume 67, Number 4 FALL 2004

MAFES RESEARCH HIGHlights

MISSISSIPPI AGRICULTURAL AND FORESTRY EXPERIMENT STATION

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Central Mississippi Research and Extension Center

Bob Ratliff

The Central Mississippi Research and Extension Center was established in 1988 to serve the needs of the central and southern areas of the state with research, technology and educational programs to improve the economic well-being of agricultural producers, industry and other rural and urban inhabitants.

The center is part of a partnership among Mississippi State University, Hinds Community College, MAFES, the Mississippi State University Extension Service and Alcorn State University. Through this partnership, the center is helping identify and solve high-priority problems faced by Mississippians in its service area.

The center is located at Hinds Community College in Raymond and provides oversight to a staff of extension specialists and the personnel of three MAFES branch stations.

The Brown Loan Branch Experiment Station, located southwest of Raymond, includes approximately1,700 acres. Research at the branch focuses on beef cattle, forages, cotton, soybeans, corn and conservation management.

Beef cattle programs at Brown Loam include research with animal breeding, nutrition, grazing management, heifer development, artificial insemination synchronization, forage systems and stocker management. Beef cattle numbers at the branch peak at about 1,200 head, consisting of spring and fall breeding herds of 450 cows and about 400 stockers grazed each year. Row crop research is conduced on cotton, corn, soybeans and wheat to address problems and develop technology for the major crops of Mississippi's brown loam soil areas.

The Truck Crops Branch Experiment Station, established in 1938, is located south of Crystal Springs. Work on the station's 175 acres concentrates on production of field-grown and greenhouse vegetables, tree fruits, muscadines, pecans and ornamental crops.

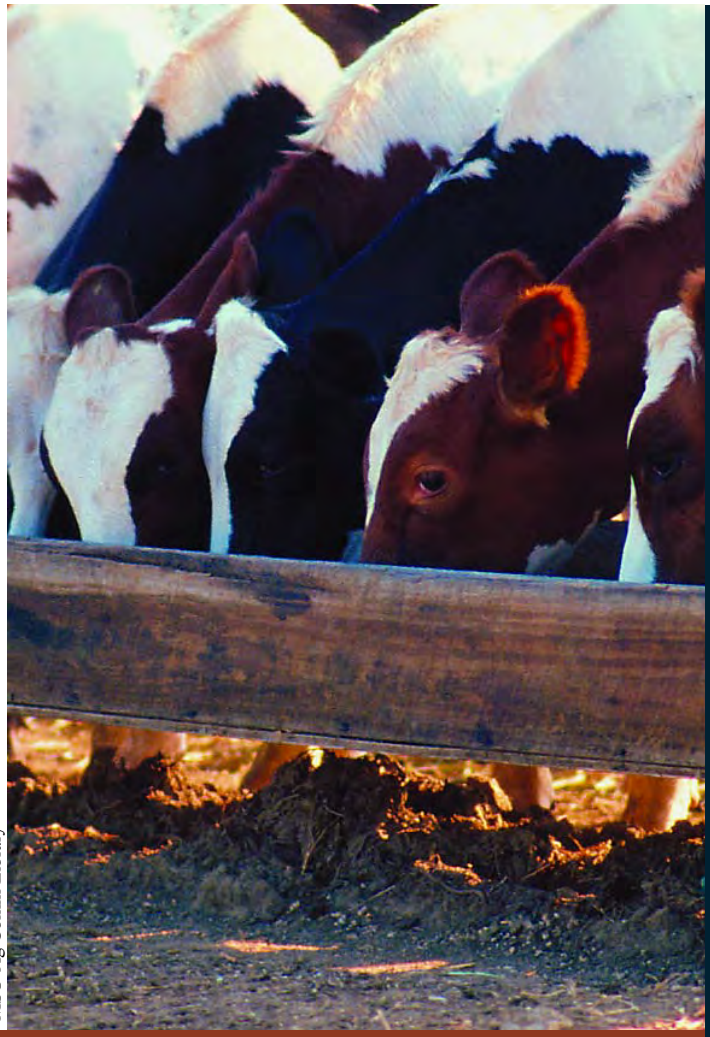
Current vegetable research programs include field variety trials and fertilization studies with water-

melons, staked tomatoes, squash, peppers and other potential alternative vegetable crops. Greenhouse research represents a portion of the vegetable research effort and includes comparisons of forced-air heating systems; variety trials with tomatoes, cucumbers, and peppers; bumblebee pollination; and biological control of greenhouse insect pests and diseases. The station is one of 26 sites in North America that conduct All America Vegetable Selection Trials.

Fruit research at the station includes cultivar and cultural practice evaluation for blueberries, muscadines, grafted pears and Asian persimmons.

In 2004, the Truck Crops Station hosted its 26th Fall Garden and Flower Fest, the South's most extensive fall vegetable and ornamental garden demonstration. A two-acre vegetable garden contains 40 species of vegetables and an extensive herb garden. One acre of annual and perennial flowers and shrubs and trees has been developed around a central gazebo area. Attendance at the annual event totals approximately 4,000 adults and 3,000 youth.

The Coastal Plain Branch Experiment Station is located on 1,175 acres in Newton County and is the site of one of two MAFES dairy herds. The station's primary research mission is in dairy and forage research. The research herd consisting of 175 registered Holstein cows is one of the top DHIA herds in the state. The research programs emphasize dairy management, nutrition, heat stress, animal health, reproductive physiology and year-round forage systems.



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For more about the work of the Central Mississippi Research and Extension Center, visit www.msstate.edu/dept/cmrec.

Bob Ratliff

CENTERS

Coastal Research and Extension Center

Marco Nicovich

The Coastal Research and Extension Center is Mississippi State University's "southern exposure," linking residents of the coastal region to the university. The center's mission is to conduct research and education programs aimed at developing a better understanding and use of renewable and nonrenewable resources in south Mississippi. Its applied research and educational programs with biological, physical and social systems focus on enhancing the quality of life of residents of Mississippi and other Gulf states.

The center's research facilities include the South Mississippi Branch Experiment Station in Poplarville, the Seafood Processing Laboratory in Pascagoula, the Coastal Aquaculture Unit in Gulfport, the Beaumont Horticultural Unit in Perry County, and the McNeil and White Sand Units in Pearl River County.

Horticulture research at the center includes a project with sunflowers, zinnias and other species for use as cut flowers by florists. Work also is under way with mechanization in ornamental horticulture and to determine the influence of irrigation, fertilization and weed control practices on plant production. Studies also are under way with blueberries, blackberries, muscadines and other fruits, vegetables and ornamental plants.

Christine Coker

USDA

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Livestock research at the center's facilities focuses on the problems associated with beef cattle production in the heat and humidity of south Mississippi. Current projects include work with the effects of supplements on intake and digestibility of low-quality southern forages, feeding systems to minimize cost of gain for beef cattle in south Mississippi and the use of ultrasound for selection of replacement beef heifers.

In the seafood area, development of value-added items for Mississippi producers is under way, as well as work with new processes to improve the safety and quality of Mississippi seafood and testing of food products for Mississippi manufacturers. Current projects include work with fresh catfish fillets and oysters for extension of shelf life. Also, a new rapid chill depuration system has been developed for seafood and is currently being tested.

Entomology research at the center focuses on both urban and commercial insects. A Formosan Termite Field Test Facility has been established at the McNeill Unit to study the highly destructive pest. There are currently Formosan termite infestations in 19 south Mississippi counties.

Economic research at the center focuses on seafood and horticultural production systems. In the seafood area, projects include an evaluation of recirculating saltwater shrimp production systems and a study of the economic impact of Mississippi's seafood industry. Economists at the center also are evaluating consumer preference for various horticultural products, including types of cut and potted plants.

A natural predator of mole crickets, the Larra bicolor wasp, was recently discovered for the first time on the Mississippi Gulf Coast by an entomologist at the center. The tiny insect is beneficial in controlling species of burrowing mole crickets that destroy turf grass. Work is under way to determine if the wasp can help protect the Coast's lawns and golf course greens.

For more about the work of the Coastal Research and Extension Center, visit www.msstate.edu/dept/crec/crec.html.

Christine Coker

CENTERS

Delta Research and Extension Center

Marco Nicovich

The work of the Delta Research and Extension Center focuses on research and extension activities for cotton, rice, soybeans, corn and catfish. MAFES scientists and Extension specialists work cooperatively to solve crop and aquaculture production problems and transfer new information and technology to area producers.

The center is located at the Delta Branch Experiment Station in Stoneville. The crop research area covers about 1,650 acres, including about 200 acres of federally owned land. Field plots occupy about 1,200 acres, with soil types ranging from very fine sandy loams to heavy clays. About 275 acres are in catfish research ponds, and the Delta Experimental Forest covers 2,660 acres of state land.

Well-equipped laboratories, offices, shops and greenhouses provide work space for the staff of more than 30 research scientists and 100 support personnel, as well as for USDA Agricultural Research Service field research activities.

A recent study by agricultural economists at the center has shown that on a 1,000-acre farm, costs per acre can be significantly reduced with no-till or conservation tillage compared with conventional tillage.

Soybean and rice breeding programs are conducted at the center. Research with early soybean varieties conducted the past 5 years has been widely accepted by growers as an alternative production

system, especially on nonirrigated fields. A rice breeding line developed at the center has shown better performance than current popular varieties and may soon be ready for release.

Delta Center scientists are working with GPS/GIS technology as part of a site-specific farm management system as a way to save on inputs such as plant-growth regulators, fertilizer and insecticides. During the past 3 years, savings on those inputs have been observed using this management system.

Plant pathologists at the center are working with nematode control in cotton and to identify resistance of rice varieties and breeding lines to sheath blight. Rice research at the center also has resulted in updated fertilization recommendations for the Delta's silt loam soils.

MAFES weed scientists at the center recently developed a reference guide for adjuvants, which includes terminology, registered users and selection considerations.

The National Warmwater Aquaculture Center is located at the Delta Center. Research at the facility includes a variety of fish-health projects, including work with vaccines and nutrition studies.

A new prototype catfish harvesting seine, which incorporates modifications recommended by the National Marine Fishers Service, was recently developed, constructed and tested by researchers at the aquaculture center.

An environmental management system to reduce pollutant discharge from catfish ponds has been evaluated over the past 3 years at the center. Overall, it appears the system is effective for effluent management and can be used in catfish ponds with no detrimental effects on fish production.

Jim Lytle

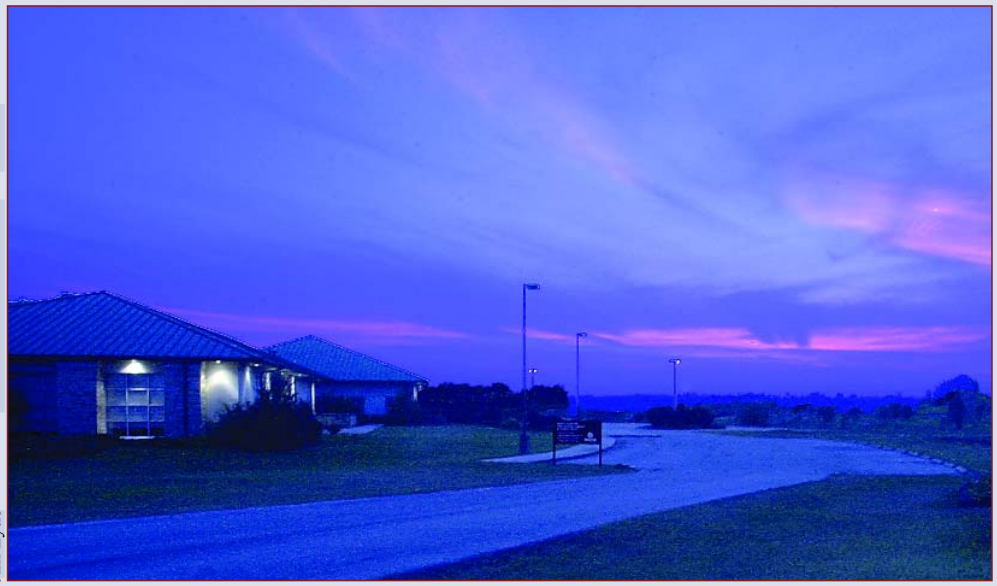
Bob Ratliff

For more about the work of the Delta Research and Extension Center, visit www.msstate.edu/dept/drec/.

Marco Nicovich

Bob Ratliff

Hiram Palmertree North Mississippi Research and Extension Center



Jim Lytle

The North Mississippi Research and Extension Center serves a 21-county area from the center's headquarters in Lee County. The center is home to the state's oldest producer advisory group, which met for the 51st time in 2004. Four research locations are administered by the center: the Northeast Mississippi Branch Experiment Station in Verona, the North Mississippi Branch Experiment Station in Holly Springs, the Pontotoc Ridge-Flatwoods Branch Experiment Station in Pontotoc County, and the Prairie Research Unit in Monroe County.

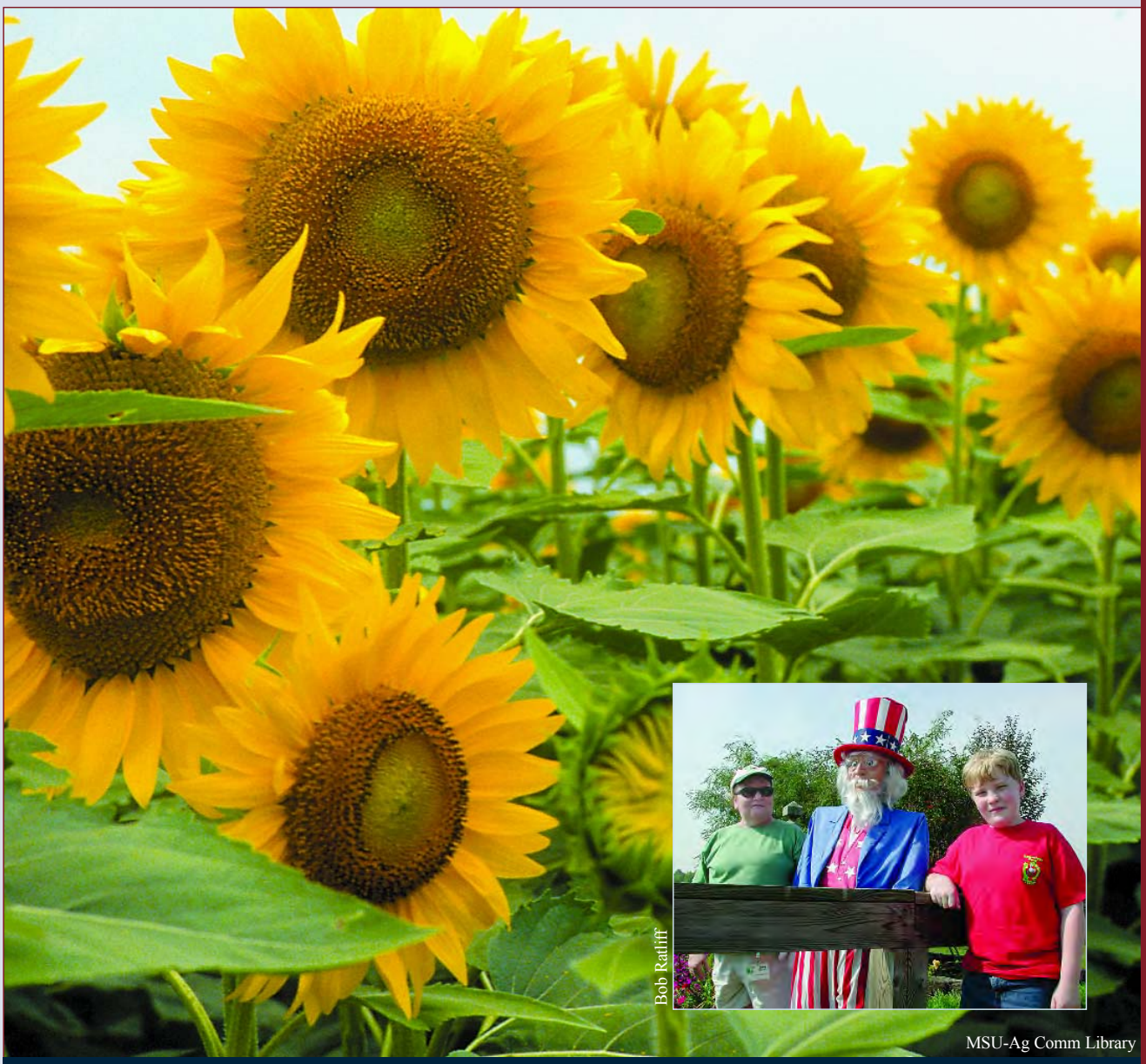
Research in support of the area's major agronomic crops is conduced at the Northeast Mississippi Branch. Current research includes evaluation of herbicide-and insect-tolerant crops and the evaluation and development of conservation tillage systems for corn, cotton and soybeans, with the goals of minimizing soil sediment loss, enhancing yields and reducing production costs.

The center's Horticulture Unit also is located at the Northeast Mississippi Branch and conducts research with vegetables, flowers and other horticultural crops. A current project is studying the suitability of various types of flowers for commercial cut-flower production. Several varieties of sunflowers have been evaluated and found to have potential in the Mississippi environment and to be of acceptable quality for use by florists.

Projects with corn, cotton and soybeans are a major part of the work at the North Mississippi Branch, with an emphasis on cotton production for the hill section of the state. USDA/ARS soil and water research also is conducted at the branch. The current focus is on measuring minerals moving into groundwater from fertilizer applications and mineral loss from ground application of various levels of poultry litter.

Sweet potatoes are an important crop in Pontotoc and surrounding counties, and the work of the Pontotoc Ridge Flatwoods Branch includes a sweet potato breeding program and other research in support of the area's sweet potato industry. A current project is addressing the needs of the area's producers for pest management systems for controlling weeds and insect pests. Cotton, corn and soybean variety trials also are conducted at the branch, and a USDA/ARS project with poultry litter as a fertilizer source cotton is currently under way.

Livestock research is the primary focus of the Prairie Research Unit. Evaluation of new and promising forage crops is one phase of the work at the unit. In addition, a current study is measuring the effect of cattle stocking rate density on bacterial content of runoff water. The study is being conducted in six bermed paddocks covering a total of 4.1 acres in an established pasture of mixed common bermudagrass and fungus-infected fescue.



Bob Ratliff

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For more about the work of the North Mississippi Research and Extension Center, visit msucares.com/nmrec/index.html.

Marco Nicovich

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Jim Lytle

DEPARTMENT *of Agricultural Economics:*

Market Opportunities and Business Management

A focus of research in the Department of Agricultural Economics is marketing issues related to Mississippi crops.

A current project involves research into the markets for fee-access hunting and recreational activities. The project includes an analysis of the market value of hunting/fishing-based amenities, such as provision of lodging, food, guides, etc., to determine whether the added revenues generated by these services is sufficient to offset the costs. The project also includes an analysis of whether government programs such as the Conservation Reserve Program and Wetland Reserve Program can be used to lower the cost of providing wildlife habitat and fee-access hunting.

Photos by Marco Nicovich

Another project by the agricultural economists is an analysis of the financial requirements and economic costs and benefits of generating electricity using methane produced from cow manure. The research is being conducted on a dairy farm in central Mississippi. The goal is to determine whether the electricity cost savings and revenues generated from the sale of excess electrical power will compensate the dairy farm for investments in facilities and equipment used in generating electricity. The results of the study will provide valuable information for livestock producers seeking to determine if generating power from animal waste will benefit them economically.

Personnel in the department also are researching whether advertising the health benefits and location of origin of sweet potatoes has a significant impact on consumer demand. The results of the research will help Mississippi sweet potato producers and packers with identifying significant target markets and marketing strategies.

Current research in the department also includes a USDA-supported project to conduct nationwide studies on ways to improve the federal crop insurance program and a study of the feasibility of a national aquaculture risk management program.

For more about research in the Department of Agricultural Economics, visit www.agecon.msstate.edu/.

DEPARTMENT
of Animal and Dairy Sciences:

Marco Nicovich

Applying New Technology

Research goals in the Department of Animal and Dairy Sciences include work with beef and dairy cattle and swine to obtain new scientific knowledge that can be used by producers to provide wholesome, economical and gratifying products for consumers.

The department also has an equine research program that focuses on reproductive research.

Current projects in the Department of Animal and Dairy Sciences include work with biophotonics imaging technology to look at livestock from the single-cell level all the way up to the entire animal. The research is being conducted in the Facility for Organismal and Cellular Imaging, or FOCI.

Biophotonics is the science of generating and harnessing light to image, detect and manipulate biological materials. The technology is sophisticated, but it is being used to address such basic problems for the livestock industry as Salmonella in hogs.

MAFES researchers in the department also are studying various aspects of livestock production, including problems associated with heat stress in dairy cows. Their work with tunnel ventilation, which uses water-filled cooling cells and large fans to cool dairy barns, has shown the value of the systems. As a result, dairy producers in the state are using commercially available tunnel ventilation systems.

Animal and dairy science personnel also are working on projects aimed at providing consumers with high-quality meat products. Included in that research area is a recently completed project that developed 97 percent fat-free ground beef patties. Current genetic research in the department is examining the genes responsible for marbling, tenderness and other favorable traits in beef.

For more about research in the Department of Animal and Dairy Sciences, visit www.msstate.edu/dept/ads/.

DEPARTMENT *of Biochemistry and Molecular Biology:*

A Better Understanding of Plants and Animals

MAFES research during the past year in the Department of Biochemistry and Molecular Biology has been concentrated in the areas of plant and animal stress response, plant development, and plant molecular biology and microbiology.

Stress response research is divided into two different areas: work with plants and with animals. In the plant area, scientists in the department are working to isolate and characterize genes responsible for producing heat-shock proteins from a variety of plants. Comparison of the proteins from heat-tolerant and non-tolerant plants should reveal their function during periods of high temperature stress. The scientists also have found a unique proteinase involved in providing corn resistance to attacks by certain caterpillar varieties. In addition, researchers in the department are working out the details of how an immune system modulator can help prepare animals to better respond to the stress caused by disease organisms.

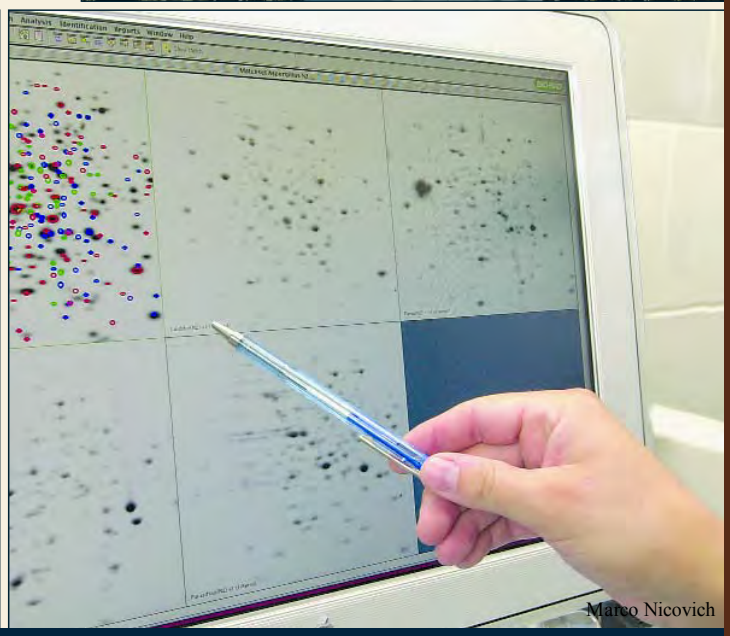
Plant development research includes work to better understand the development of cotton fiber by examining specific cotton genes and the elements that control those genes. They recently identified a DNA sequence that causes expression in fiber cells.

In the area of plant molecular biology and microbiology, MAFES scientists are using the new technology of proteomics to analyze the differences in protein composition between aflatoxin resistant and susceptible corn lines. Work also is under way with genetic manipulation of plant genes to improve lipid production as part of efforts to develop diesel fuel from plants.

MSU-Ag Comm Library

Fred Faulk

Greg Word



Marco Nicovich

For more about research in the Department of Biochemistry and Molecular Biology, visit www.msstate.edu/dept/biochemistry/.

Jim Lytle

Marco Nicovich

DEPARTMENT of Entomology and Plant Pathology:

Protecting Mississippi

Research in the Department of Entomology and Plant Pathology emphasizes protecting Mississippi's crops, environment and people.

During the past year, research efforts have been focused on insect pests and plant diseases that have recently moved into the state or that may soon reach the Midsouth.

Sweet potato insect pest management research in the department has resulted in the identification of two types of flea beetles and a white grub species not previously found in Mississippi's sweet potato crop. As a result, insecticides have been evaluated to help provide the best possible recommendations for control of flea beetles and root pests.

Exotic insect species under study in the department include the cactus moth, the citrus leaf miner and an Asian species of ant, Pyramica hexamera, found for the first time in Mississippi during the past year. MAFES plant pathologists also recently completed an extensive survey of nursery stock for Sudden Oak Death disease. The disease, which can damage many species of landscape plants, has not been found in the state, even though Mississippi nurseries have received stock from suppliers in California and other states where the disease is found.

Recent research in the department has demonstrated how forestry practices can protect valuable forest resources from insect pests. One study has documented the ability to reduce the impact of bark beetle infestations in pine stands with proper thinning. Another project has demonstrated the value of proper thinning in hardwood stands, which lead to the development of a prototype for a new integrated pest management computer program to deal with damage caused by the cottonwood leaf beetle.

MAFES scientists in the Department of Entomology and Plant Pathology also are continuing their work with projects to protect cotton, corn, soybeans and other row crops from insects and disease. An important part of that work is research with new varieties, such as Bt cotton varieties, and new production practices, including ultra-narrow-row cotton.

Marco Nicovich

For more about research in the Department of Entomology and Plant Pathology, visit www.msstate.edu/entomology/ENTPLP.html.

DEPARTMENT
of Food Science, Nutrition and Health Promotion:

Research for Healthy Lives

The department that had been Food Science and Technology expanded its name and its scope during 2004 after receiving new faculty members in the areas of nutrition and heath promotion.

Food safety is a major focus in the department, and current research includes work in the areas of marine and aquaculture seafood. Scientists in the department also are working to develop methods for rapidly detecting food-borne pathogens in muscle foods.

The department has a long tradition of research with dairy products, especially those related to Mississippi's dairy industry. Current research includes work with improving the sensory properties of low-fat dairy products.

The Dairy Manufacturing Plant is engaged in teaching, research and service to dairy processing plants and related industries and is self-supporting.

Manufacturing and sale of cheese and other dairy products is a by-product of the teaching and research program. Sales of these products enable the department to maintain a modern, functioning dairy processing plant in which to conduct research on milk and milk products.

Development of new commercial food products from Mississippi crops and improving the processing methods used with traditional foods are ongoing projects in the department.

Evaluations of food products are carried out in the department's James E. Garrison Sensory Evaluation Laboratory.

During 2004, scientists in the health promotion area completed a national study of health teachers and their current teaching practices regarding eating disorders. Youth obesity and eating disorders are focus areas for the health promotion area.

The department's nutrition projects include work with the Coordinated Approach to Child Health program. The program seeks ways to improve the health of children in K-2 schools by focusing on comprehensive school health education, including nutrition.

Megan Bean


Marco Nicovich


Jim Lytle

For more about the Department of Food Science, Nutrition and Health Promotion, visit www.msstate.edu/dept/fst/.

DEPARTMENT *of Plant and Soil Sciences:*

Marco Nicovich

Research Touching All Mississippians

As one of Mississippi State University's largest departments, Plant and Soil Sciences is home to research projects ranging from work with turf grass for the home lawn to studies of new varieties of every row crop grown in the state.

During 2004, researchers in the department released Highlander, a new variety of eastern gamagrass. A native of the Southeast, eastern gamagrass is a warm-season and conservation species, and the Highlander variety has improved seed germination and superior yield and persistence compared with currently available varieties.

In addition to work with development of new varieties, Plant and Soil Sciences turf researchers are working on projects dealing with the environmental impacts of golf courses and residential lawns. An important goal of ongoing research is the determination of rates of off-site movement of pesticides and nutrients once they are applied to turf on golf course fairways or residential lawns. In fact, Mississippi State is part of a small group of universities working to develop valid research protocols upon which such studies will be based. The expected long-term benefit of this work will be "best management practices" that turf managers can use to minimize environmental impacts of agrochemical runoff.

MAFES weed scientists are working with the GeoResources Institute to evaluate applications of remote-sensing technologies to control weeds in soybeans, corn, cotton and other row crops, with the goal of adapting the technology to provide significant savings for producers.

U.S. Department of Labor funding is allowing MAFES horticulturists to study various aspects of mechanization for greenhouses. A project that began in 2004 is examining the use of radio frequency identification devices for inventory control and management of plants in commercial nurseries.

Crop modeling research with cotton is under way by MAFES scientists in the department. The study of how solar radiation levels, temperature, carbon dioxide levels, moisture supply and soil nutrient levels combine to influence how cotton plants grow and develop has contributed to crop models designed to make prediction of potential cotton yield.

Another current project is a cooperative effort with the Civil Engineering Department to develop a comprehensive water quality model for the St. Louis Bay estuary and watershed in south Mississippi. Supported by the Mississippi Department of Environmental Quality, the purpose of the study is to integrate specific information on soil parameters, land use changes over time and other information to improve the understanding of how best to protect the region's water quality.

Two projects just recently funded in the department include an effort to map the genome of pine trees, which is receiving a $1.6 million National Science Foundation grant, and rice water management work funded in part by the Mississippi Rice Promotion Board.

Bob Ratliff

Marco Nicovich

Marco Nicovich

For more about research in the Department of Plant and Soil Sciences, visit www.msstate.edu/dept/pss/public_html/pspage.html.

Megan Bean

DEPARTMENT *of Poultry Science:*

Supporting a Major Mississippi Industry

Megan Bean

Marco Nicovich

Megan Bean

MAFES personnel in the Poultry Science Department are actively involved with research that increases the scientific knowledge related to poultry and poultry production.

Current research support for Mississippi's poultry industry includes work with nutritional needs, waste management, reproduction and bird health

A significant amount of the research conducted in the department focuses on the nutritional needs of commercial broilers and how changes in their diets affect weight gain and other factors. The information generated by this research is important in helping the poultry industry formulate feed rations.

Current research projects in the Poultry Science Department include a series of experiments to define the effects of social interaction among chickens in flocks and how they impact the birds' well-being. The project already has demonstrated that laying hens that are normally housed in cages become extremely upset if isolated from other nearby chickens, actually causing more distress and physiological stress than any other known factor. As a result, experiments are under way to determine the ideal density for commercial broilers.

Evaluations of the growth and yield of broilers from different genetic strains also are being conducted in the department. Since each strain of broiler has been selected to excel in a specific area of growth or yield, it is important to know the specific responses of each strain to a host of nutritional and management factors. MAFES poultry scientists are working closely with primary breeders and the commercial broiler industry on these studies.

In addition, the department's personnel are engaged in research with litter use, basic microbiology issues specific to poultry production, and processing, food safety, disease and physiology.

For more about research in the Department of Poultry Science, visit www.msstate.edu/dept/poultry/.

SOCIAL SCIENCE:

Helping others provide service

Chance McDavid

Marco Nicovich

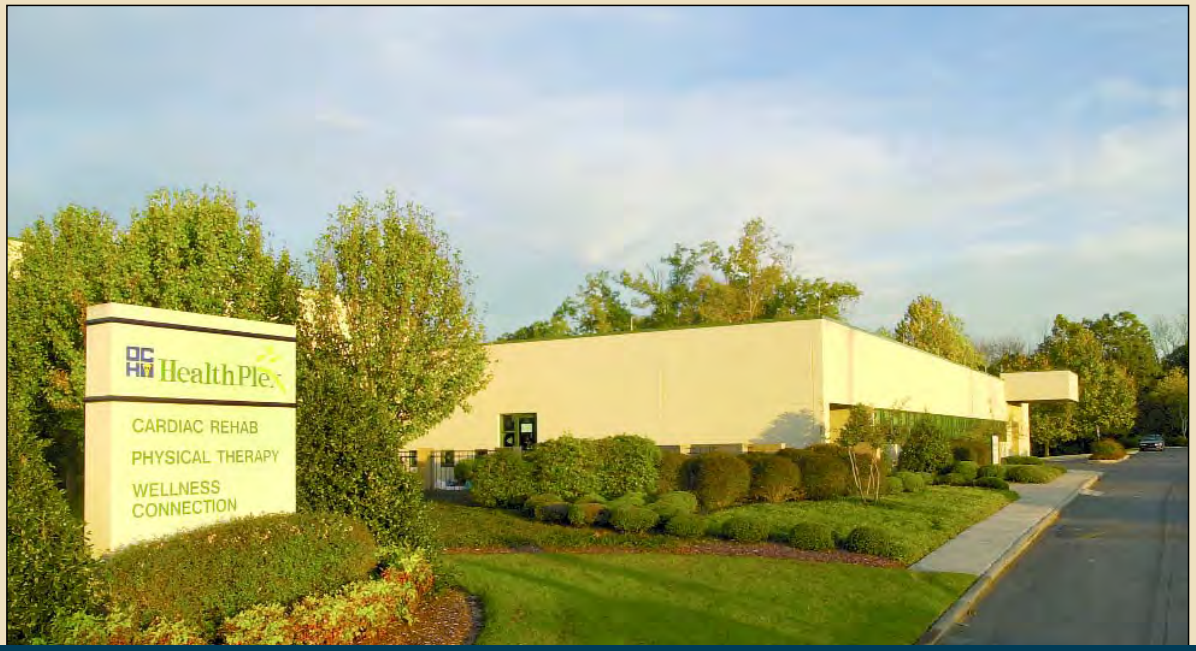
MAFES-supported projects at Mississippi State's Social Science Research Center (SSRC) help provide state and local governments and agencies with information necessary to provide effective, efficient services.

During the past year, SSRC researchers formed a partnership with the Mississippi Development Authority to provide support for workforce development in the state. Their work has already led to data sharing and improved information systems.

Another SSRC project with MAFES and Agency for Healthcare Research and Quality funding has led to the formation of a network of child care centers in the Mississippi Delta to conduct child health services research. Individuals from the University of Mississippi Medical Center's School of Dentistry are part of the research team and have conducted oral health examinations of more than 300 preschool children in the network's 15 child care centers. The procedures are being expanded to include specific intervention to deter and/or decrease the level of early childhood cavities.

The center's Survey Research Unit completed several MAFES-supported surveys during the past year, including the Rural Delta Poll to help plan economic development strategies in Mississippi's Delta counties.

Another recent SSRC project, the Physician Labor Force Study, resulted in the first comprehensive data concerning physicians practicing in the state. The study highlighted rural shortages and provided the information necessary for a better understanding of Mississippi's rural health needs.



Marco Nicovich

For more about the work of the Social Science Research Center, visit www.ssrc.msstate.edu.

RESEARCH UNITS

Three research units within the Division of Agriculture, Forestry and Veterinary Medicine provide specialized assistance with MAFES projects.

GeoResources Institute

Development and verification of applications of geospatial technologies related to managing, conserving and protecting agriculture and natural resources is a major focus of the GeoResources Institute, or GRI. The institute provides a center of expertise in agricultural and related areas that builds multidisciplinary research teams from across the academic, governmental and commercial communities.

The institute has current research in several areas:

- Pest management
- Water management
- Productive capacity mapping
- Advanced production systems
- Nutrient management
- Stress detection
- Directed scouting
- Crop growth regulation

Food Science Institute

The Food Science Institute provides support and service to all foods related activities at Mississippi State. Scientists associated with the institute work in the university's on-campus laboratories and pilot plants, and there is a close interaction with the Delta and Coastal Research and Extension Centers and other university facilities with food-related activities.

The center's research activities include work in these areas:

- Dairy food technology
- Food chemistry
- Food engineering
- Food microbiology and safety
- Human nutrition
- Meat science
- Physical chemistry and rheology
- Product development
- Sensory analysis

Life Sciences & Biotechnology Institute

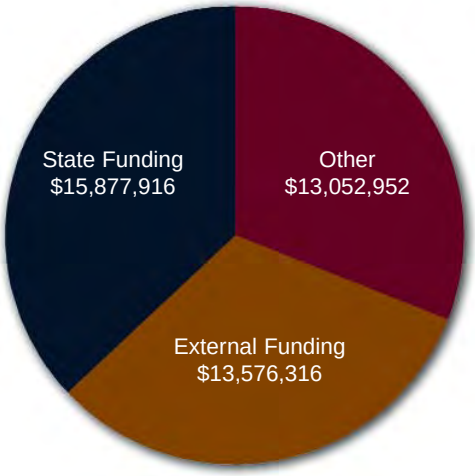
The Life Sciences and Biotechnology Institute was formed in 2000 to encourage scientific collaborations among faculty members in biology, agriculture, human and animal medicine, food science, and bioinformatics. Proteomics, a research area dealing with proteins produced by cell type and organism, is a primary focus area.

The institute holds training programs in genomic and proteomic analyses, as well as the use of robotic instrumentation. The workshops provide Mississippi State researchers and students hands-on experience with the most modern techniques in biotechnology. The institute's 2004 Proteomic Workshop also included participants from the Mississippi Medical Center, the University of Mississippi and USDA/ARS Stoneville.

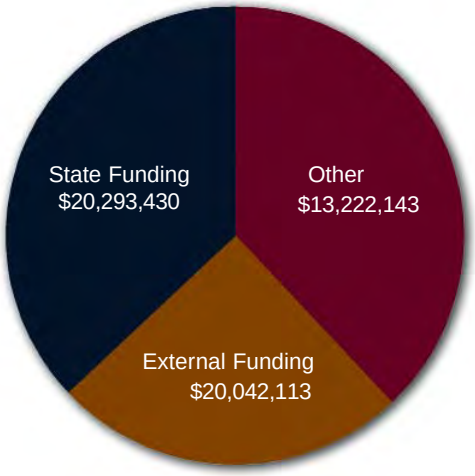
Marco Nicovich

John Madsen

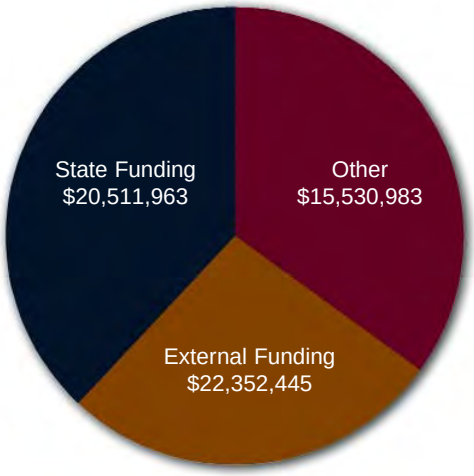
Russ Houston



1994
Total Budget: $42,506,087



2003
Total Budget: $53,557,686



2004
Total Budget: $58,395,391

Producer Input Helps Guide Research

The ultimate goal of MAFES research is to provide support for the individuals, businesses and organizations that produce goods and services for the citizens of Mississippi. As a result, input from the users of the knowledge gained through research is important in guiding MAFES activities.

Much of that input comes from producers of the state's major agricultural crops through their service on producer advisory committees, cooperation in on-farm field trials and the activities of their commodity groups. Producers representing various commodity groups also provide direct input into the types of research they need through participation in the scientific peer-review process that decides which projects receive funding.

Producer checkoff funds from the Mississippi Soybean Promotion Board, the Mississippi Rice Promotion Board and the Mississippi Cotton Incorporated State Support Committee currently provide support for almost 40 MAFES projects. Mississippi's sweet potato and pork commodity groups also support research through their checkoff programs.

2004: Each budgeted dollar generated $1.10 in leveraged funds.

2003: Each budgeted dollar was leveraged at 95 cents.

Projects Supported by the Mississippi Soybean Promotion Board

Variety Trials

Evaluation of Private and Public Soybean Varieties and Breeding Lines for Resistance to Stem Canker, Frogeye Leaf Spot, Purple Leaf and Pod Stain, and Soybean Mosian Virus

The Effect of Slow-Release Foliar Nitrogen Fertilizer on Soybean Yield and Seed Quality

Establishment, Colonization, Toxin Production and Development of the Charcoal Rot Fungus, Macrophomina phaseolina, on Soybean During the Disease Life Cycle: Basic Biology Investigations

Impact of Foliar Fungicides, Weathering and Stinkbugs on Soybean Yield

Screening Soybean for Resistance to Charcoal Rot (Macrophomina phaseolina) and Pathogens in the Phomopsis/Diaporthe Complex

World Wide Web Access to Soybean Information in Mississippi

Utilizing Precision Planting with Reduced Seeding Rates for Improved Soybean Profitability

Improving Soybean Yield Potential Through Double Cropping and Seed Treatment

Screening Soybean Varieties for Resistance to the Soybean Cyst and Reniform Nematodes to Enhance Soybean Production

Strategies to Monitor and Control Glyphosate-resistant Weeds

Continued Improvement in Soybean Variety Selection and Decision Making System for Mississippi Soybean Growers

An Approach to Positively Shift the Production of Rainfed Soybean by Foliar Applications of Glycine Betaine

Use of Ground Raw Soybeans to Enhance Reproductive Efficiency in Swine

Projects Supported by the Mississippi Rice Promotion Board

Projects supported by the Mississippi Rice Promotion Board

Nitrogen Management for Enhancement of Breeding Line Production in the Mississippi Delta

Rice Breeding and Variety Development in Mississippi

Winter Rice Breeding Nursery in Puerto Rico

Red Rice Control

Rice Weed Control

Control of Early to Late Insect Pests of Rice in the Mississippi Delta

Evaluation of Varieties and Breeding Lines for Resistance to Rice Sheath Blight and Blast

Supplement of Rice Foundation Seed Stocks Program

Projects Supported by the Mississippi Cotton Incorporated State Support Committee

Nitrogen and Potassium Management in Cotton/Corn Rotations

Cotton Lint Yield and Fiber Quality Response to Reduced Seeding Rates

Improving Fiber Quality by Planting and Harvesting Two Varieties Together

Evaluation of Mississippi Cotton Cultivars and Breeding Lines Using an Established Reniform Nursery

Effects of Defoliation Timing on Cotton Lint Yield and Fiber Quality

Evaluation of Wide Row and Skip Row Patterns in Mississippi Cotton

Alternative Narrow Row Cotton Spindle Picker Production Systems for Improved Profitability

Tarnished Plant Bug and Stink Bug Impact on Transgenic Cotton

Development and Evaluation of Nectariless Breeding Lines for Resistance to Plant Bugs

Development of Cotton Cultivars and Breeding Line Adapted to Mississippi

Breeding Cotton for Resistance to Root Knot Nematode (Race 3) and Reniform Nematode (Rev. 2000)

Management Investigations for Reniform Nematode Suppression in Cotton and Crop Rotations and Nematicides as Methods of Economically Managing the Reniform and Root Knot Nematode in Cotton

Nitrogen Management Systems in Cotton Grown Using Conservation Tillage: A Mississippi On-Farm Research Approach

Strategies to Monitor and Control Glyphosate-Resistant Weeds

Monitoring Cotton Growth and Scheduling Plant Growth Regulator Applications Based on Remote Sensing

Can All Fungicides, Nematicides and Insecticides Needed for Early Disease, Nematode and Insect Control Be Applied to Cottonseed at Planting?

Crop Rotations and Nematicides as Methods of Economically Managing the Reniform and Root Knot Nematode in Cotton