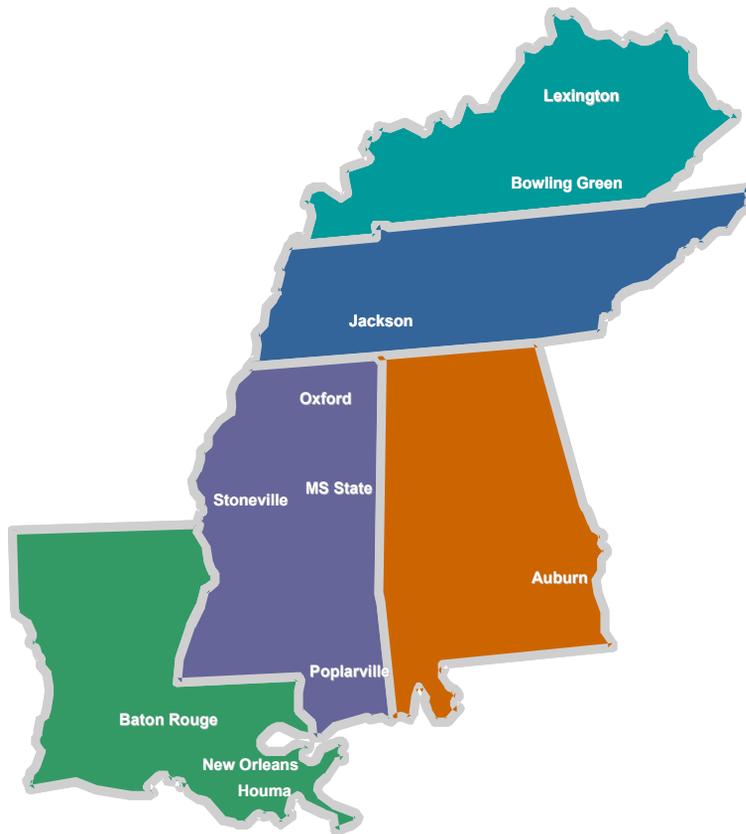


MID SOUTH AREA



**Research Programs and
Career Opportunities**

Our Commitment and Goals

The mission of the Area Office is to provide leadership and operational accountability for ARS personnel, funding, facilities, and other resources with the Area. In accordance with the ARS Strategic Plan and National Programs, our business is to provide relevant, quality research and technology in support of farmers, agroindustry, and consumers.

The Area Office and Staff implement the ARS Plan in the states of Alabama, Louisiana, Mississippi, Tennessee, and Kentucky.

Sincerely,

Edgar G. King

Dr. Edgar G. King

Mid South Area Director



MSA Diversity Committee

ARS employees, supervisors, and managers are committed to building, maintaining, retaining and assimilating a diverse, high-quality workforce where employees are recognized and their talents are valued. In our recruitment efforts, we reach out to diverse communities in many different ways. Our employment opportunities are published widely through the Office of Personnel.

Our vacancy announcements are distributed by mail to colleges and universities and outside organizations that reach a large population of minorities.

Sites Worth visiting ...Stay a While:

ARS careers

<http://www.ars.usda.gov/careers>

Subscribe to ARS Jobs E-mail

http://www.ars.usda.gov/careers/list_subscribe.html

Student Jobs

<http://www.studentjobs.gov>

Acknowledgements

This booklet has been prepared by Georgina Acosta and Deepak Bhatnagar on behalf of the ARS/Mid South Area Workforce Diversity Committee for MSA recruitment activities. This document highlights the range of research activities carried out in Mid-South Area. Francisco Garcia of the CUBE Corporation, SRRC provided all the excellent graphics support. The assistance of all the Research Leaders in providing the information contained in this booklet is gratefully acknowledged. Sandra Warren's help in putting together the list of research (CRIS) projects currently operating in MSA was essential to the completeness of this document.



Mid South Area Workforce
Diversity Committee

Career Opportunities for a Diverse Workforce

SCIENTIFIC DISCIPLINES

Agronomy
Aquaculture
Biochemistry
Bioinformatics
Biology
Botany
Chemistry
Computer Technology
Cotton, Technology
Ecology
Engineering, Agriculture
Engineering, Chemical
Engineering, Electronic
Engineering, Hydrology
Engineering, Materials
Entomology
Fish Biology
Food Technology
Genetics, Animal
Genetics, Plants
Genomics
Geology



Horticulture
Immunology
Microbiology
Microscopy, Electron
Molecular Biology
Pathology, Animals
Pathology, Plants
Physics
Physiology, Animals
Physiology, Plants
Soil Science
Statistics
Textile Technology
Veterinary Services



Career Opportunities for a Diverse Workforce

ADMINISTRATIVE DISCIPLINES

Accounting

Business Management

Office Automation

Contract



Program Analyst

Library Services

Purchasing

ALABAMA

Auburn



Aquatic Animal Health Research Unit

Dr. Phillip H. Klesius

Location Coordinator and Research Leader

Aquatic Animal Health Research Unit

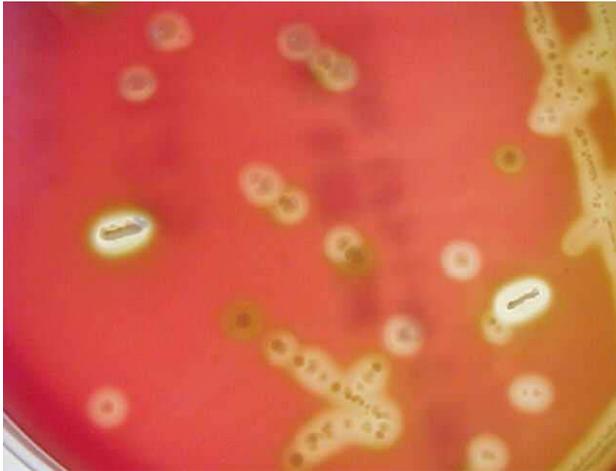
P.O. Box 952

Auburn, AL 36831-0952

Phone: (334) 887-3741

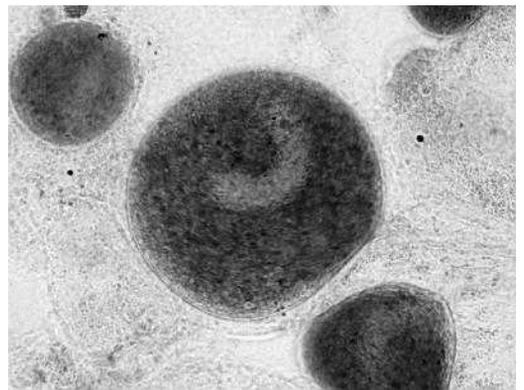
Fax: (334) 887-2983

- ◆ The Aquatic Animal Health Research Laboratory is a unit of the Agricultural Research Service of the United States Department of Agriculture and works in cooperation with Auburn University. The Aquatic Animal Health Research Laboratory at Auburn, Alabama and Chestertown, Maryland conducts integrated management of fish health by multi-disciplinary approaches. The highlights of the unit research include:
 - develop and apply techniques and tools to detect and diagnose pathogens in catfish and other warm water species
 - improve understanding of the interaction effects of environmental factors, including nutrients, stress, and microbes and microbial toxins on fish immune systems and the susceptibility of fish to diseases
 - advance understanding of neuropathological, behavioral, and clinical responses of fish to microbial neurotoxins; and develop and apply vaccines and vaccine delivery techniques to deter and prevent diseases and neuropathological disorders of catfish and other warm water fish species.
- ◆ Highlights of significant accomplishments are: AQUAVAC- ESC (TM) Intervet Inc. - an immersion modified live *Edwardsiella ictaluri* vaccine for enteric septicemia of catfish (ESC) and *Streptococcus iniae* vaccine-an injectable modified bacterin for warm water species.



Colonies of Streptococcus on
Blood Agar Plates

Parasite, Ich Invading the Skin of Catfish



Immersion Vaccination of Fish



Soil Dynamics Research Unit



Dr. Hugo Rogers

Research Leader

Soil Dynamics Research Unit

411 S. Donahue Drive

Auburn, AL 36832

Phone (334) 844-4741 ext. 140

Fax (334) 887-8597

- ◆ The Soil Dynamics Research Unit develops tools, practices, and products to better manage soil for sustainable and profitable agricultural production
The Laboratory solves agricultural problems in three major areas:
 - Conservation systems to improve production, farm profitability, and environmental quality
 - Organic waste management to solve both on-farm and environmental problems
 - Global change (response of conservation systems; mitigation of global change through soil carbon storage)



Heavy residue in cotton protects soil and conserves moisture.



Scientist and student assistant use laser device to measure soil deformations after tillage.

Non-inversion tillage alleviates soil compaction while leaving residue cover in place.



KENTUCKY

Lexington
Bowling Green





Animal Waste Management Research Work Site



Dr. Karamat Sistani

Research Soil Scientist

Animal Waste Management Research Work site

USDA-ARS, Big Red Way, EST 269

Western Kentucky University.

Bowling Green, KY 42101

Phone: 270-745-5142

Fax 270-745-5541

Email: karamat.sistani@wku.edu

Mission:

Develop and evaluate management practices and treatment technologies that protect water quality, reduce air emissions, and control pathogens at animal production facilities, manure storage areas, and field application sites. The unit will conduct solution-oriented research that aid farmers in cost effectively solving problems associated with animal waste in an environmentally sound manner considering the unique problems associated with karst topography.



The Forage/Animal Production Research Unit

James R. Strickland
Research Leader
USDA, ARS, FAPRU
Rm N-220F Ag Science North
University of Kentucky Campus
Lexington, KY 40546
Phone: 859-257-1647
Fax: 859-257-3393
Email: jstrickland@ars.usda.gov

The Forage/Animal Production Research Unit in Lexington, Kentucky is strategically located within the transition zone of the Eastern and Midwestern United States. As this transition zone is the major contributor to forage animal production in the United States, the unit was established with the mission to improve productivity, profitability, competitiveness and sustainability of forage-based enterprises within the zone.

The mission is accomplished through the use of multidisciplinary (often interinstitutional) teams which work to identify, evaluate, and manipulate genetic and physiological factors for the enhancement of food animal and equine health/performance in forage-based enterprises and to improve forage plant persistence/production. Further, the unit, through strategic collaborations, strives to improve environmental sustainability through improved understanding of how manipulation of forage-based enterprises affect the environment.

The goal of the Forage-Animal Production Research Unit is to establish multidisciplinary, cross institutional research teams, with our partner (the University of Kentucky) and other appropriate entities, which are uniquely suited to solve production/performance related problems and maximize competitiveness and sustainability of forage-based enterprises in the transition zone of the Eastern and Midwestern United States.



LOUISIANA

Baton Rouge

Houma

New Orleans





Soil and Water Research Unit



Dr. James L. Fouss

Location Coordinator, Research Leader

Soil and Water Research Unit

4115 Gourrier Avenue

Baton Rouge, LA 70808-4499

Phone (225) 757-7726

Fax (225) 757-7728

- ◆ Soil and Water Research Unit develops technologies and integrated management systems for soil, water, crop, agrochemical and cultural practices in the warm, humid climatic region of the U.S., with special emphases in the Lower Mississippi River Valley and Gulf Coastal Region.
- ◆ The goal of the research is to optimize the integrated systems for efficient and profitable crop production, while reducing losses of agrochemicals (fertilizers and pesticides) and sediment in drainage runoff that negatively impact the environment.

Installing a surface drainage runoff flume at the St. Gabriel, LA research plots (to evaluate runoff water quality from sugarcane production land)



Application of polyacrylamide (PAM) in a "quarter drain channel" to evaluate its effect for reducing soil erosion in the shallow drainage channel (in a sugarcane field).



Technician collecting a flow-proportion drainage sample from water managed research plots for laboratory analysis of agrochemical (fertilizer and pesticide) content.

Honey Bee Breeding, Genetics and Physiology Research Unit

Dr. T. E. Rinderer

Research Leader

Honey Bee Breeding, Genetics, and Physiology Research Unit

1157 Ben Hur Road

Baton Rouge, LA 70820-5502

Phone (225) 767-9280

FAX (225) 766-9212

- ◆ The Honey Bee, Breeding, Genetics and Physiology Unit has provided the nation's beekeeping industry with high quality stocks of honey bees that are improved for resistance to parasitic mites.
- ◆ The unit has discovered a population of honey bees in eastern Russian that has genes for resistance to two parasitic mites. Through a program of stock importation and intensive field testing a stock of honey bees that resists both parasitic mites is being developed. Although the stock is still being developed, it has been released to the industry owing to its existing high commercial value.



Evaluating Russian bee colonies in a test apiary in Iowa



Varroa mites in a brood cell



Evaluating Russian bee colonies in a research apiary in Mississippi



Sugarcane Research Unit



Dr. Edward P. Richard
Research Leader
Sugarcane Research Unit
5883 USDA Road
Houma, LA 70360
Phone (985) 872-5042
Fax (985) 868-8369

- ◆ The mission of the Sugarcane Research Unit is to conduct basic and applied research that will increase sugarcane production efficiency while minimizing the impact of the crop's culture on the fragile ecosystem of the Mississippi Delta.



Sugarcane growing being subjected to a photoperiod treatment to induce early flowering

Cotesia sp. wasp depositing eggs in larvae of the sugarcane borer. The number one economic insect pest of sugarcane in the Americas



Cotesia larvae emerging from a parasitized sugarcane borer in a sugarcane stalk.



Commodity Utilization Research Unit



Dr. Armand B. Pepperman

Research Leader

Commodity Utilization Research

P.O. Box 19687

1100 Robert E. Lee Blvd

New Orleans, LA 70124

Phone(504) 286-4511

Fax (504) 286-4367

- ◆ The Commodity Utilization Unit consists of eight projects all directed to designing and developing innovative, cost-effective and environmentally friendly technologies that produce value-added products of enhanced quality from agricultural crops. Research is being conducted on several commodities including corn, cottonseed, soybean, tung, sugar cane and agricultural byproducts such as nutshells and chicken litter.



Development of an Enzyme-based technology to reduce phosphate pollution of the environment and enhance phosphorus utilization in plants



Determining the differential expression of phosphatases in algae causing harmful algal bloom (HAB) fish kills to further define the ecological impacts of nutrient loading and physiological basis for increased HAB occurrence





Cotton Fiber Quality Research Unit



Dr. Alfred D. French

Research Leader

Cotton Fiber Quality Research Unit

P.O. Box 19687

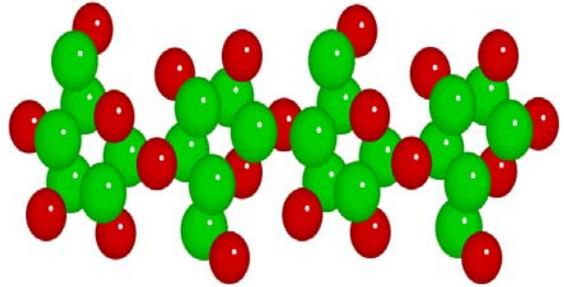
1100 Robert E. Lee Blvd

New Orleans, LA 70124

Phone (504) 286-4411

Fax (504) 286-4217

- ◆ Cotton Fiber Quality Research Unit applies physics, chemistry, biology and biochemistry to:
 - Improve measurements of fiber length, strength, maturity, and fineness
 - Develop solutions for quality problems such as white specks
 - Increase knowledge of the relationship of molecular and biochemical properties and structure/morphology to fiber and yarn performance
 - Determine the effects on cotton quality of varied environment during fiber growth



Computer modeling for analysis of 3-D structures of carbohydrates



Electron microscopy analysis of cotton fiber structures

Cotton Textile Chemistry Research Unit

Eugene J. Blanchard
Acting Research Unit
Cotton Textile Chemistry Research
P.O. Box 19687
1100 Robert E. Lee Blvd
New Orleans, LA 70124
Phone (504) 286-4520
Fax (504) 286-4271

- ◆ Cotton Textile Chemistry Research Unit is to increase utilization of U.S. cotton through development of new methods and processes for producing superior value-added textile products.
- ◆ Development of cotton gauze with a bound peptide enzyme inhibitor designed to retard the activity of the protease enzyme, elastase, which destroys wound healing proteins. This new medical cotton gauze promotes healing of chronic wounds by neutralizing the negative effects of elastase in wound fluids



Research in the area of medical textiles resulted in development of cotton gauze with a bound peptide enzyme inhibitor designed to retard the activity of the protease enzyme, elastase, which destroys wound healing proteins. This new medical cotton gauze promotes healing of chronic wounds by neutralizing the negative effects of elastase in wound fluids.

New composite materials were developed by blending cotton fibers with sucrose-based epoxy compounds for production of value-added, flexible, nonwoven, flame resistant insulation materials. The new composites outperformed the insulating properties of commercial fiberglass by a factor of two.





Cotton Textile Engineering Research Unit



Dr. Timothy Calamari
Research Leader
Cotton Textile Engineering Research
P.O. Box 19687
1100 Robert E. Lee Blvd
New Orleans, LA 70124
Phone (504) 286-4540
Fax (504) 286-4419

- ◆ The mission of the Cotton Textile Engineering Research Unit is to perform research leading to better technology for the utilization of cotton and other agricultural fibers as raw materials for the manufacture of woven, knit, and nonwoven textiles. The work involves collaboration with researchers in cotton breeding, production, harvesting, ginning, marketing, and textile manufacturing



Utilization of cotton and other agricultural fibers as raw materials for the manufacture of woven, knit, and nonwoven textiles

Weaving machine – used for converting yarn into newly formed fabric



Ring spinning machine – serves to twist the fibers into yarn

Formosan Subterranean Termite Research Unit

Alan R. Lax

Research Leader

Formosan Subterranean Termite Research Unit

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New Orleans, LA 70124

Phone (504) 286-4472

Fax (504) 286-4235

- ◆ Research is focused on development of an integrated pest management plan for the most effective control of the termite. Responsibilities of the group include research to improve control technology through elucidation of the biology, biochemistry, behavior and microbiology of the organism to provide improvements to baiting technology through improved foraging and consumption of toxic baits, and to provide engineering approaches to prevention of infestation of structures. Ecological research has been initiated to elucidate the mechanism of new colony formation and to provide means of precision targeting control measures. Research has been initiated to determine incidence of natural infestation of living trees, means of early detection of such infestation and potential preventive and remedial control measures. Nutritional research has led to the development of a bait matrix the termites prefer to other sources of cellulose and which allows more effective delivery of toxin to a termite colony.

In addition to new detection technologies we are developing new bait matrices to deliver toxins to the termites (top right), biological pesticides to specifically kill the termites. Queen termite (right) becomes much enlarged laying as much as 2000 eggs per day.



Dr. Alan Lax (left) and Dr. Weste Osbrink listen to termite activity at the base of a heritage oak tree on the grounds of SRRC in New Orleans.

Formosan Subterranean Termite National Program

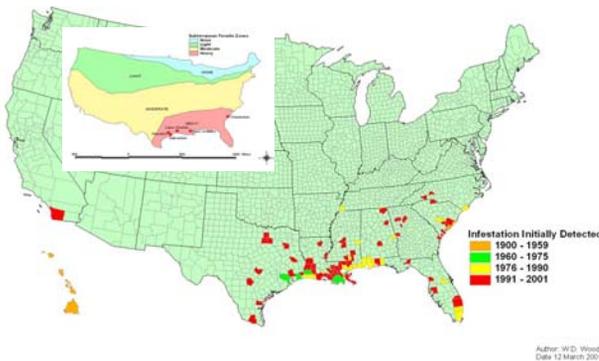
Frank S. Guillot
National Program Coordinator
FST National Program
P.O. Box 19687
1100 Robert E. Lee Blvd
New Orleans, LA 70124
Phone (504) 286-4222
Fax (504)286-4235

- ◆ To initiate and coordinate an integrated National program for management of the Formosan subterranean termite. Overall planning, development, organizing, and management of related action programs in the Formosan Subterranean termite (FST) project at Area Wide test site and dissemination of knowledge about effectiveness of the products and technology in the test sites. This MU is tasked with participation in team efforts associated with termite pest management and leadership for FST initiatives in the Mid South Area and to the ARS FST for eliminating the FST as an economic pest through cooperation and collaboration with appropriate scientists, economists, sociologists, and statisticians and assessing the efficiency of termite pest management programs and the environmental impact associated with termite detection and control technologies.

In 1998 the USDA initiated Operation Full Stop, treating all properties within a 15-block area in the French Quarter in New Orleans. The number of alates has greatly decreased within the treated area



Year Infested



The Formosan subterranean termite was imported in to the United States in military shipments returning from the Pacific theater during WWII. Originally introduced into Charleston, SC, Houston, TX, Lake Charles and New Orleans, LA, the termite has now spread to infest 11 states. The inset map shows the area of the US which is most likely to support subterranean termite activity because of the proper temperature and moisture conditions.



The Formosan subterranean termite attacks not only wooden structures such as homes but is much more likely to attack many species of living trees. The trees are weakened by the attack and also serve as a reservoir of termites which may then attack nearby structures.

Food and Feed Safety Research Unit

Dr. Thomas E. Cleveland

Research Leader

Food and Feed Safety Research

P.O. Box 19687

1100 Robert E. Lee Blvd

New Orleans, LA 70124

Phone (504) 286-4387

Fax (504) 286-4269

- ◆ The mission of the Unit is to develop biotechnological strategies to improve the quality and safety of foods and feeds for consumption. Specifically, the Unit conducts research to prevent fungal attack of crops and/or aflatoxin contamination through:
 - enhancement of host plant resistance using molecular breeding or gene insertion technology,
 - elucidating and targeting the molecular mechanisms governing aflatoxin biosynthesis for interruption,
 - development of commercial formulations of biocompetitive atoxigenic fungi for application in cotton and corn growing areas chronically affected by aflatoxin contamination, and
 - characterization of new plant derived chemical protectants that have potential to replace commercial synthetic fungicides on the market. In additional research, isoflavonoid pathways are manipulated in soybean for optimization of phytoestrogen levels, thus enhancing the nutraceutical value of soy-based products and the health of females consuming these products.



DNA sequencing for understanding molecular regulation of aflatoxin biosynthesis

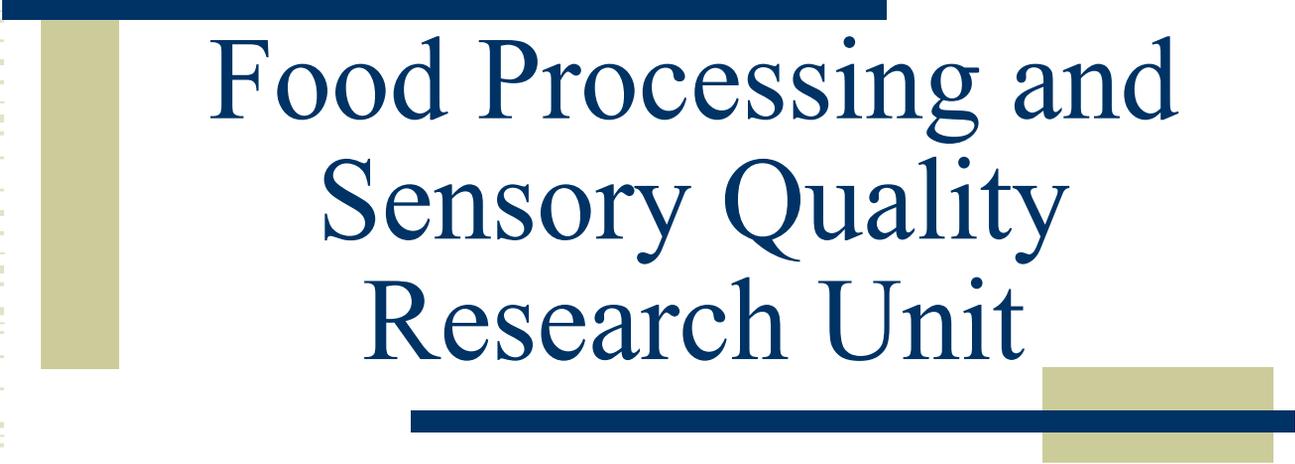


Use of proteomics for identifying markers that can be used to breed aflatoxin resistant crops





Food Processing and Sensory Quality Research Unit



Dr. Elaine T. Champagne

Research Leader

Food Processing and Sensory Quality Research

P.O. Box 19687

1100 Robert E. Lee Blvd

New Orleans, LA 70124

Phone (504) 286-4451

Fax (504) 286-4430

- ◆ Invent, design, and develop cost-effective, environmentally-acceptable processing systems that yield value-added products of enhanced quality from food crops



Low-oil uptake products from rice

New methods for assessing and predicting crop sensory quality



Peanut products with reduced allergenicity

MISSISSIPPI

**Mississippi State / Oxford / Poplarville /
Stoneville**





Corn Host Plant Resistance Research Unit



Dr. W. Paul Williams

Research Leader

Corn Host Plant Resistance Research Unit

P. O. Box 5367

Mississippi State, MS 39762

Phone 662-325-2733

FAX: 662-325-8441

- ◆ To identify, develop, and release corn germplasm with genetic resistance to disease and insect pests. Current research is primarily focused on identification of genes for resistance to *Aspergillus flavus* infection and aflatoxin accumulation in corn grain and development of techniques for efficiently transferring these genes for resistance into agronomically superior corn germplasm lines.



Development of technique for efficiently transferring resistant genes into agronomically superior corn germplasm lines

Identifying and developing corn germplasm with genetic resistance to disease and insect pests



Genetics and Precision Agriculture Research Unit

Dr. Johnie N. Jenkins

Location Coordinator / Director / Research Leader

Genetics and Precision Agriculture Research Unit

P. O. Box 5367

Mississippi State, MS 39762

Phone 662-320-7387

FAX: 662-320-7528

- ◆ Develops cotton lines with resistance to insects and nematodes.
- ◆ Conducts research to understand the genetics and molecular biology of cotton.
- ◆ Works with industry to conduct research on transgenic insect resistant cotton.
- ◆ Develops genetic and molecular biology information to improve cotton.
- ◆ Conducts Precision Agriculture on three grower's cotton farms.
- ◆ This research seeks to use farming inputs in the most optimal manner to optimize profits.



Cotton field in full bloom

Studying crop growth and development under precisely-controlled conditions of water and key nutrient elements



Agronomists record cotton height, nodes and fruiting sites - a process called mapping - to determine site-specific variation in performance

Waste Management and Forage Research Unit

Dr. Dennis E. Rowe

Research Leader

Waste Management and Forage Research Unit

P. O. Box 5367

Mississippi State, MS 39762

Phone 662-320-7421

FAX: 662-320-7544

- ◆ Address safety issues and economic utilization of poultry and swine waste. Research is on virtually all aspects of nutrient management and pathogen management for these animal manures.
 - Remediate land to which too much waste has been applied
 - Develop safe procedures for application to crop and forages, manage watersheds of forages for safe application and grazing
 - Modify poultry litter to improve bird health and to improve fertilizer value.



Remediate land which has too much waste applied to it, and develop safe procedures for application to crop and forages and to improve fertilizer value

Providing data for latest nutrient management criteria and regulation by the Department of Environmental Quality of Mississippi



Research on all aspects of nutrient and pathogen management



Biological Control and Mass Rearing Research Unit



Douglas Streett

Research Leader

Biological Control and Mass Rearing Research Unit

P. O. Box 5367

Mississippi State, MS 39762

Phone 662-320-7530

FAX: 662-320-7571

- ◆ The mission of the Biological Control and Mass Rearing Research Unit (BCMMRU) is to conduct basic and applied research on the production and use of natural enemies for control of arthropod pests in agriculture. Emphasis is placed on development of in vivo and in vitro mass rearing methods and technology, related research on field biology/ecology, and economic use of parasites, predators and pathogens as biological control agents.

Development of several artificial diets for predator and major pests



Identification of antifungal agents for use in tarnished plant bug diet



Poultry Research Unit

Dr. Scott L. Branton

Research Leader

Poultry Research Unit

P. O. Box 5367

Mississippi State, MS 39762

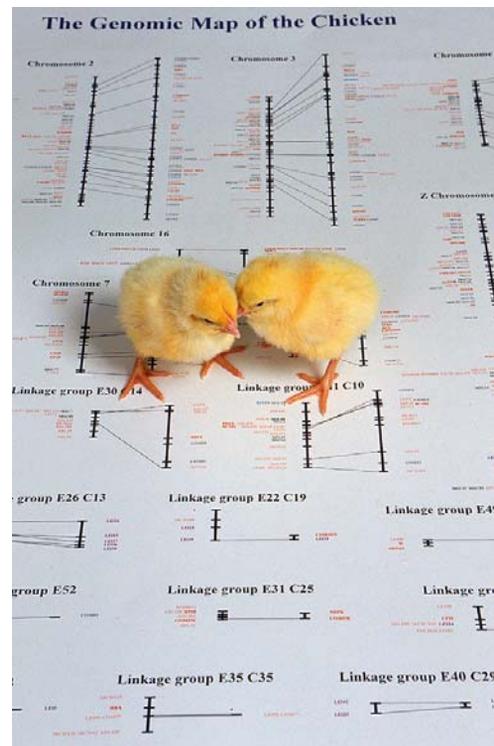
Phone 662-320-7479

FAX: 662-320-7589

- ◆ The mission of the Poultry Research Unit is to improve poultry production efficiency and product quality. Disease, engineering, management, and nutrition research are conducted with a multidisciplinary approach.
- ◆ The disease research is directed toward Mycoplasma infections of economic importance with emphasis on development of techniques to identify mycoplasmal infections and documentation of the cost of those infections.
- ◆ The engineering research concerns development of basic data and systems for maintaining optimum poultry housing conditions. Management and nutrition research seek improved growth rate and increased resistance to high environmental temperatures through nutrition and feeding programs.



Creating optimum poultry housing conditions



Vaccinating hens at the right time against Mycoplasmosis a serious respiratory disease of poultry results in saved eggs



Natural Products Utilization Research Unit



Dr. Stephen O. Duke

Research Leader

Natural Products Utilization Research Unit

P.O. Box 8048

University, MS 38677

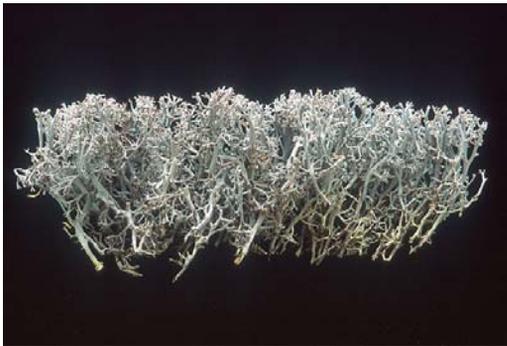
Phone (662) 915-1036

Fax (662) 915-1035

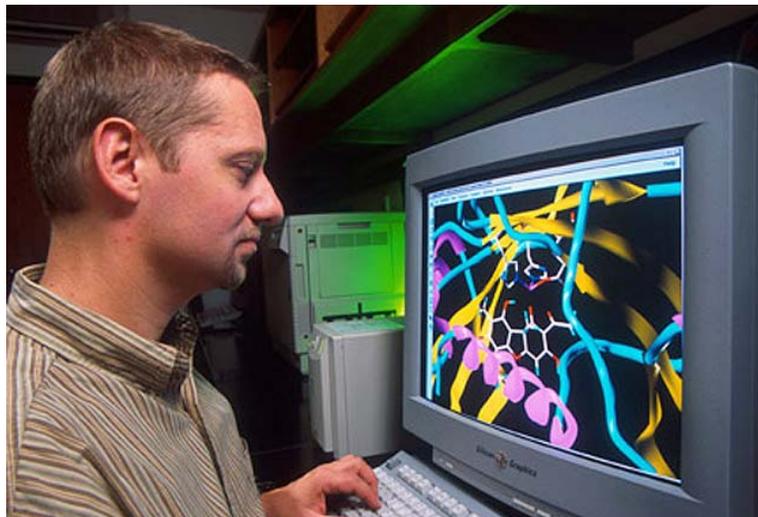
- ◆ To discover natural products for use in agricultural pest management, with emphasis on pest management agents derived from plants. Discovery efforts are focused on products for agricultural sectors that the agrochemical industry has little interest in, such as horticultural crops and aquaculture.
- ◆ A secondary mission is to support development of medicinal plants as alternative crops.



Plant physiologist Stephen Duke and research associate Albrecht Michel use image analysis for real time monitoring of the effects of phytotoxins on duckweed growth and development. This work is being done to provide base line information for genomic fingerprinting of molecular sites of action of phytotoxins.



Closeup of the lichen *Cladonia rangiferina* collected by plant physiologist Joanne Romagni.



Usnic acid, a natural lichen product, is under study as a potential herbicide. Plant physiologist Franck Dayan examines the molecular interactions between usnic acid and the enzyme it inhibits.



Channel and Watershed Processes Research Unit



Dr. Carlos V. Alonso

Research Leader

Channel and Watershed Processes Research Unit

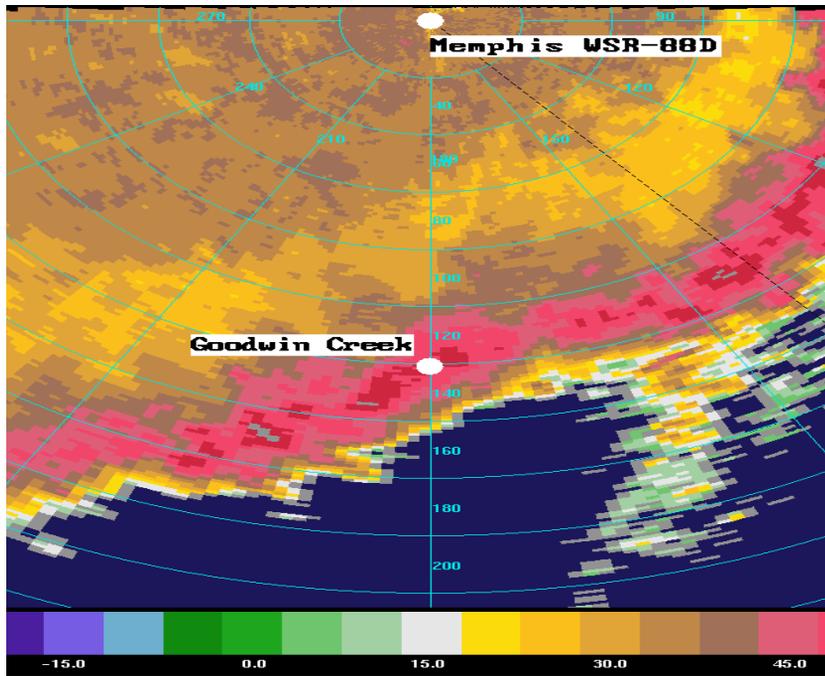
P.O. Box 1157

Oxford, MS 38655

Phone (662) 232-2969

Fax (662) 232-2915

- ◆ Develop improved methods to measure, predict, and control runoff, soil erosion by concentrated flows and sediment yield from agricultural watersheds using an integrated laboratory, field-based, and computer modeling approach



Accurate characterization of large-scale hydrology in agricultural watersheds by tracking surface and subsurface water and energy balances over large ungaged areas



Geomorphic assessment of stream stability, engineering solutions for river restoration, and development of target levels for sediment Total Maximum Daily Loads.



Water Quality and Ecology Research Unit



Dr. Martin A. Locke

Research Leader

Water Quality and Ecology Research Unit

P.O. Box 1157

Oxford, MS 38655

Phone (662) 232-2912

Fax (662) 232-2988

- ◆ The mission of the Water Quality and Ecological Processes Research Unit is to evaluate the effects of watershed practices and stream channel stabilization measures on channel ecosystems and stream water quality and to develop, test, and evaluate innovative and cost-effective agricultural management practices for improving water quality and ecological integrity that will help farmers meet Total Maximum Daily Load goals and national water quality standards.



Edge of field and agronomic best management practices improved water quality and ecology of Oxbow Lake watersheds by reducing sediment, increasing water clarity and improving primary productivity (plankton) and fisheries.

Analysis of shallow groundwater.



Scientists from the Water Quality and Ecology Research Unit tested and evaluated the use of constructed wetlands and vegetated agricultural ditches as new and innovative Best Management Practices for the reduction of pesticides, sediment and nutrients in agricultural runoff.



Upland Erosion Research Unit



Dr. Matt Romkens

Director, National Sedimentation Laboratory

Research Leader, Upland Erosion Processes Research

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Oxford, MS 38655

Phone (662) 232-2927

Fax (662) 232-2915

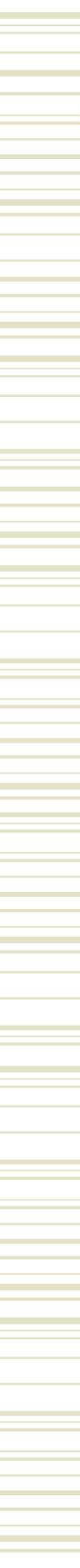
- ◆ The Upland Erosion Processes unit addresses the following three interrelated research objectives.
 - Quantifying the basic processes and properties governing the detachment and transport of soil, sediment, water, and associated chemical constituents.
 - Developing environmentally friendly and economically feasible control and prevention methods using land and crop management systems.
 - Improving modeling capabilities by developing, refining, and evaluating soil erosion control and prediction models for watershed scale application.



Watershed research has demonstrated effectiveness of vegetative barriers in controlling erosion



Stiff-grass hedges at edges of fields, as shown here for corn plots at the MAFES experiment station in Holly Springs, MS, have proven effective at trapping sediment.



U.S. Small Fruits Research Station



Dr. James M. Spiers

Research Leader

U.S. Small Fruits Research Station

P.O. Box 287

Poplarville, MS 39470

Phone (601) 795-8751

Fax (601) 795-4965

- ◆ The mission of the Small Fruits Research Station is:
 - ◆ To develop new and improved cultural and management practices for small fruit
 - ◆ To develop new and improved small fruit cultivars adapted to the Gulf Coast states



Technician Cynthia De Fouquette and horticulturist James Spiers examine fruit from the new blueberry plant called Biloxi.

A newly released southern highbush cultivar called Biloxi ripens earlier than most other blueberries and is adapted to the Gulf Coast.





Application and Production Technology Research Unit

Mr. J. R. Williford

Location Coordinator/Research Leader

Application and Production Technology Research Unit

P.O. Box 36

Stoneville, MS 38776

Phone (662) 686-5352

Fax (662) 686-5372

- ◆ To reduce losses due to pests by discovery and development of new and innovative technology for safe, accurate and timely application of pesticides and growth regulators. Research is being conducted to target specific areas and optimally schedule application of water and chemical using remote sensing, in-field sensors, and models



An air-assisted ground sprayer for applying ultra low volume (ULV) malathion was evaluated for boll weevil control.

Tests were conducted on a sensor-sprayer, which detects the presence of weeds between crop rows using optical detectors



Atomic absorption spectrometry



Catfish Genetics Research Unit



Dr. William R. Wolters
Research Leader
Catfish Genetics Research Unit
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Stoneville, MS 38776
Phone (662) 686-3597
Fax (662) 686-3567

- ◆ The Catfish Genetics Research Unit's mission is to determine the inheritance of economically important traits in catfish, develop a breeding program to improve catfish production traits, evaluate improved catfish lines for release to commercial production, and conduct research on pond production problems to improve water quality and production efficiency.



Bill Wolters (center) and Catfish Genetics Research Unit staff members (left to right) Elijah Allen, DeMarcus McKinley, and Wesley Sealey, examine USDA103 catfish in an experimental pond.

Market-size USDA 103 catfish ready for harvest. This new variety grows faster than other tested catfish.



Cultured channel catfish are typically processed on machines. Research geneticist Brian Bosworth examines catfish fillets after processing.



Cotton Ginning Research Unit



W. Stanley Anthony
Research Leader
Cotton Ginning Research Unit
P.O. Box 256
Stoneville, MS 38776
Phone (662) 686-3093
Fax (662)686-5483

- ◆ To develop cotton gin machinery, procedures and processes to ensure that the quality cotton fiber is available to meet consumer requirements. This technology must be consistent with acceptable farmer profits and environmental quality.



Repairing a cotton bale package with a USDA/ARS-patented machine that is licensed to two commercial companies.



Adjusting a USDA/ARS-patented device that reduces the energy needed to package cotton bales by 35%. The patented is licensed to three U.S. companies



Verifying operation of a grading station of a computerized process control system



Crop Genetics and Production Research Unit



Dr. Lawrence Young

Research Leader

Crop Genetics and Production Research Unit

P.O. Box 345

Stoneville, MS 38776

Phone (662) 686-5241

Fax (662) 686-5218

- ◆ To discover natural products for use in agricultural pest management, with emphasis on pest management agents derived from plants. Discovery efforts are focused on products for agricultural sectors that the agrochemical industry has little interest in, such as horticultural crops and aquaculture.
- ◆ A secondary mission is to support development of medicinal plants as alternative crops.



Breeding for fiber strength



Develop genetic and production management systems that improve productivity of cotton



Southern Insect Management Research Unit

Dr. D. D. Hardee

Research Leader

Southern Insect Management Research Unit

P.O. Box 346

Stoneville, MS 38776

Phone (662) 686-5231

Fax (662)686-5421

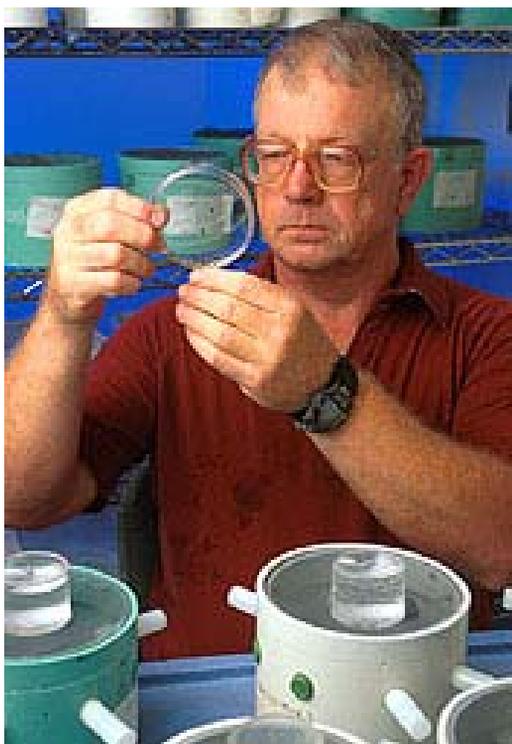
- ◆ The mission of the Southern Insect Management Research Unit (SIMRU) is to:
 - Develop new knowledge on the biology of field crop insects for development of new and improved control tactics
 - Establish fundamental principles for encouraging and using natural enemies more effectively
 - Develop and integrate insect suppression systems that minimize the cost of plant protection, yet are economically and ecologically acceptable.



To assess resistance to *Bt* proteins, entomologist Douglas Sumerford weighs a cotton bollworm larva that was exposed to the *Bt*-insecticidal protein Cry1Ac for 12 days.



Tobacco budworm
Heliothis virescens (F.) larva



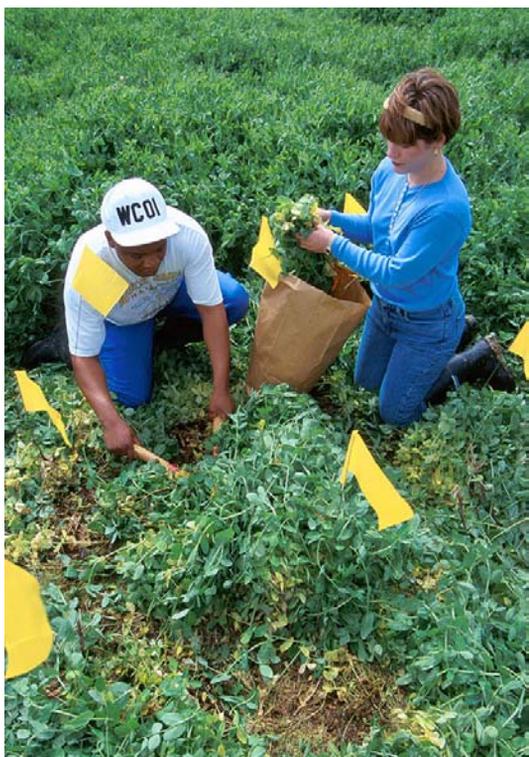
Entomologist Gordon Snodgrass checks the growth of tarnished plant bugs in a rearing room at the USDA-ARS research facility in Stoneville, Mississippi.

Southern Weed Science Research Unit

Dr. Martin Locke
Research Leader
Southern Weed Science Research Unit
P.O. Box 350
Stoneville, MS 38776
Phone (662) 686-5272
Fax (662)686-5422

- ◆ Managing weeds is crucial to any farming system because weed competition with crops results in costly reductions in quantity and quality of food and fiber. The USDA-ARS Southern Weed Science Unit has a comprehensive research program integrating weed control practices into safe, efficient, and economical management recommendations, including:
- ◆ Managing and evaluating invasive weeds and herbicide resistance under conservation management and transgenic cropping systems
- ◆ Assessing and developing weed and crop management strategies that improve soil resources and water quality to assist growers in achieving TMDL compliance and land stewardship
- ◆ Developing strategies to manage the spread of non-native invasive weed species
- ◆ Discovering and enhancing performance of biologically based weed control alternatives to herbicides

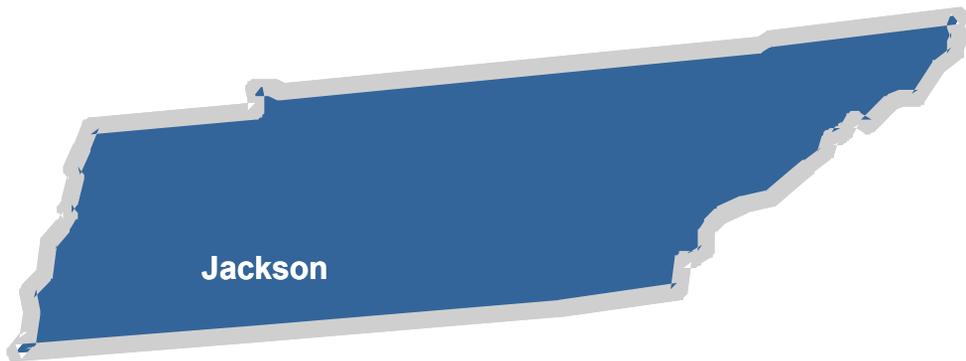
Left to right: Project coordinator Frank Gwin, farmers T.A. Murtagh and David Walker, and soil scientist Martin Locke review an aerial map of Mississippi Delta counties involved in the Management Systems Evaluations Area project.



Cover crops prevent erosion and add nitrogen to the soil. Here, technicians Earl Gordon and Jennifer Tonos collect samples so they can estimate the amount of plant matter in a field near Thighman Lake.

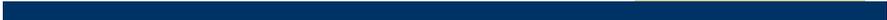
TENNESSEE

Jackson





Crop Genetics and Production Research Unit



Prakash Arelli

Crop Genetics and Production Research

Research Geneticist

605 AIRWAYS BLVD

JACKSON, TN, 38301

Phone: (731) 425-4741

Fax: (731) 425-4760

parelli@ars.usda.gov

The mission of the Crop Genetics and Production Research Unit at Jackson, TN (worksite) is to:

- 1) Broaden the soybean germplasm base for genetic resistance to new and emerging cyst nematode populations;
- 2) Release improved germplasm and varieties of soybean that are environmentally safe to enhance the productivity and grower profitability in the Mid-South; and
- 3) Integrate cultural practices to augment sustainability of host plant resistance for soybean cyst nematode.



ARS National Programs

Mid South Area

Animal Production, Product Value and Safety

Food Animal Production 101

Enhance Forage-Based Livestock Production Systems
6440-21310-001-00D
101 (40%) - 205 (60%)

Animal Health 103

Diagnosis and Control of Mycoplasmosis in Poultry
6406-32000-006-00D
103 (100%)

Arthropod Pests of Animals and Humans 104

Area-Wide Fire Ant Suppression Project: Demonstration Site in Mississippi
0500-00044-014-00D
104 (30%) - 304 (70%)

Biological Management of the Red Imported Fire Ant
6402-22320-001-00D
104 (100%)

Acoustical Detection and Control of Fire Ants and Termites
6402-22320-002-00D
104 (100%)

Ecology and Integrated Strategies for Management of Formosan Subterranean Termites
6435-32000-005-00D
104 (100%)

Development of Biological Control Agents for Management of Subterranean Termites
6435-32000-006-00D
104 (100%)

Control of the Formosan Subterranean Termite Using behavior Modifying Chemicals, Including Hormones
6435-32000-007-00D
104 (100%)

Coordination of National Termite Management Program
6435-32000-008-00D
104 - 100%

Animal Well-Being and Stress Control Systems 105

Nutritional and Environmental Management to Improve Quality and Production Efficiency of Poultry

6406-32630-002-00D

105 (100%)

Aquaculture 106

Optimizing Catfish/Water Quality Interactions to Increase Catfish Production Efficiency

6402-13320-002-00D

106 (100%)

Genomics and Bioinformatics Research in Catfish, Cotton, and Soybeans

6402-21310-001-00D

106 (30%) - 301 (70%)

Catfish Genetics, Breeding, and Physiology

6402-31000-006-00D

106 (100%)

Improve Production Efficiency in Aquaculture

6402-31000-007-00D

106 (100%)

Control of Undesirable Microbes and Off-Flavors in Aquaculture

6408-41000-003-00D

106 (100%)

Integrated Management of Fish Health by Multi-Disciplinary Approaches

6420-32000-012-00D

106 (100%)

Mitigation of Off-Flavors in Catfish Aquaculture Systems

6435-43440-040-00D

106 (70%) - 306 (30%)

Human Nutrition 107

Identify Mechanisms of Isoflavonoid Induction in Legumes and Their Phytoestrogenic Effects

6435-42000-017-00D

107 (40%) - 108 (60%)

Food Safety (Animal and Plant Products) 108

Agricultural Practices, Ecological and Varietal Effects on Aflatoxins and Other Mycotoxins in Corn

6402-42000-002-00D

108 (100%)

Enhancing Corn with Resistance to Aflatoxin Contamination and Insect Damage

6406-21000-009-00D

108 (30%) - 301 (70%)

Aflatoxin Control through Targeting Mechanisms Governing Aflatoxin Biosynthesis in Crops

6435-41420-004-00D

108 (100%)

Enhancement of Seed-Based Biochemical Resistance to Aflatoxin Contamination in Cottonseed and Corn

6435-42000-016-00D

108 (100%)

Identify Mechanisms of Isoflavonoid Induction in Legumes and Their Phytoestrogenic Effects

6435-42000-017-00D

108 (60%) - 107 (40%)

Adaptation and Divergence Among Aflatoxin-Producing Fungi and Optimized Use of Atoxigenic Strains

6435-42000-018-00D

108 (100%)

Natural Resources and Sustainable Agricultural Systems

Water Quality and Management 201

Animal Waste Management Research

6401-12630-001-00D

201 (30%) - 206 (70%)

Development of Water Management Technology and Efficient Cropping Systems for the Mid South

6402-12130-001-00D

201 (40%) - 207 (60%)

Sustainability of Soil Resources in Weed and Crop Management Systems in Mid South Agriculture

6402-12220-002-00D

201 (40%) - 202 (60%)

Development of Acoustic and Seismic Technology to Characterize Soils, Assess Water Content, and Otherwise Reduce Production Costs

6408-12130-011-00D

201 (60%) - 202 (40%)

Processes, Control, and Prediction of Erosion and Runoff on Upland Areas in Agricultural Watersheds

6408-12130-012-00D

201 (60%) - 202 (40%)

Integrated Analysis of Landscape Processes for the Management of Agricultural Watersheds

6408-13000-012-00D

201 (100%)

Environmentally Sound Stream Corridor Rehabilitation and Management in Agricultural Watersheds

6408-13000-015-00D

201 (100%)

Validation and Application of Erosion and Sediment Transport Models and Development of Water Quality Models in Support of DEC and USDA Agencies

6408-13000-016-00D

201 (100%)

Watershed Management Systems for Improved Water Quality in the Mississippi Delta

6408-13660-004-00D

201 (60%) - 207 (40%)

Integrated Water, Agrochemical and Crop Management Systems to Sustain Water and Soil Quality

6413-13220-008-00D

201 (70%) - 202 (30%)

Soil Resource Management 202

Sustainability of Soil Resources in Weed And Crop Management Systems in Mid South Agriculture

6402-12220-002-00D

202 (60%) - 201 (40%)

Development of Acoustic and Seismic Technology to Characterize Soils, Assess Water Content, and Otherwise Reduce Production Costs

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Integrated Water, Agrochemical and Crop Management Systems to Sustain Water and Soil Quality

6413-13220-008-00D

202 (30%) - 201 (70%)

Global Change and Belowground Processes In Agricultural Systems

6420-11120-004-00D

202 (30%) - 204 (70%)

Conservation Production Systems for Improved Profitability and Soil Quality

6420-12610-002-00D

202 (60%) - 207 (40%)

Air Quality 203

Global Change 204

Global Change and Belowground Processes In Agricultural Systems

6420-11120-004-00D

204 (70%) - 202 (30%)

Rangeland, Pasture and Forages 205

Enhance Forage-Based Livestock Production Systems

6440-21310-001-00D

205 (60%) - 101 (40%)

Manure and Byproduct Utilization 206

Animal Waste Management Research

6401-12630-001-00D

206 (70%) - 201 (30%)

Effective Management and Safe Use of Waste from Poultry and Swine Production

6406-12630-003-00D

206 (100%)

Detection and Fate of Microorganisms in Poultry and Swine Wastes

6406-32000-007-00D

206 (100%)

Utilization of Organic Waste to Improve Agricultural Systems and Environmental Quality

6420-12000-008-00D

206 (100%)

Integrated Agricultural Systems 207

Development of Water Management Technology and Efficient Cropping Systems for the Mid South

6402-12130-001-00D

207 (60%) - 201 (40%)

Development of Precision Agricultural Systems for Cotton Production

6406-21610-007-00D

207 (100%)

Watershed Management Systems for Improved Water Quality in the Mississippi Delta

6408-13660-004-00D

207 (40%) - 201 (60%)

Conservation Production Systems for Improved Profitability and Soil Quality

6420-12610-002-00D

207 (40%) - 202 (60%)

Crop Production, Product Value and Safety

Plant, Microbial and Insect Genetic Resources, Genomics, and Genetic Improvement 301

Develop Soybean Genotypes and Management Systems for Early Season and Stress Environments

6402-21000-004-00D

301 (70%) - 305 (30%)

National Cotton Variety Test Program

6402-21000-027-00D

301 (100%)

Genetic-Physiological Team Research to Improve Production, Fiber Quality and Competitive Ability of Cotton

6402-21000-028-00D

301 (60%) - 305 (40%)

Combining Molecular and Conventional Techniques to Improve Cotton Fiber Yields and Quality

6402-21000-029-00D

301 (70%) - 302 (30%)

Genetic and Cultural Methods to Reduce Soybean Yield Losses to Diseases and Environmental Stress

6402-21220-007-00D

301 (70%) - 303 (30%)

Genomics and Bioinformatics Research in Catfish, Cotton, and Soybeans

6402-21310-001-00D

301 (70%) - 106 (30%)

Research on Kenaf and Other Alternative Crops and Value-Added Products

6402-21410-003-00D

301 (30%) - 305 (70%)

Cultural and Genetic Methods to Reduce Reniform Nematode in Cotton

6402-22000-003-00D

301 (30%) - 303 (70%)

Resistance Monitoring and Resistance Management of Lepidoptern Spp. Infesting BT Cotton

6402-22000-035-00D

301 (30%) - 304 (70%)

Small Fruit Cultural and Genetic Research In the Mid South

6404-21000-005-00D

301 (70%) - 305 (30%)

Vegetable and Ornamental Research in the Gulf South

6404-21220-003-00D

301 (70%) - 303 (30%)

Enhancing Corn with Resistance to Aflatoxin Contamination and Insect Damage

6406-21000-009-00D

301 (70%) - 108 (30%)

Germplasm Enhancement and Genetic Improvement of Cotton

6406-21000-010-00D

301 (100%)

Breeding, Genetics, Stock Improvement and Management of Russian Honey Bees for Mite Control and Pollination

6413-21000-010-00D

301 (40%) - 305 (60%)

Development and Use of Mite-Resistance Traits in Honey Bee Breeding

6413-21000-011-00D

301 (40%) - 305 (60%)

Improving Sugarcane Productivity by Conventional and Molecular Approaches to Genetic Development

6435-21000-006-00D

301 (70%) - 302 (30%)

Plant Biological and Molecular Processes 302

Combining Molecular and Conventional Techniques to Improve Cotton Fiber Yields and Quality

6402-21000-029-00D

302 (30%) - 301 (70%)

Discovery and Development of Natural Product Based Weed Management Methods

6408-21410-004-00D

302 (100%)

Development of Natural Products from Plants and Microbes for Replacement of Synthetic Pesticides

6408-21410-005-00D

302 (100%)

Chemistry of Natural Products for Pest Management

6408-41000-004-00D

302 (30%) - 306 (70%)

Improving Sugarcane Productivity By Conventional and Molecular Approaches to Genetic Development

6435-21000-006-00D

302 (30%) - 301 (70%)

Genotypic Variation In Genes Related To Sucrose Metabolism In Sugarcane

6435-21000-007-00D

302 (100%)

Molecular Analysis of Development to Improve Cotton Fiber

6435-21440-002-00D

302 (70%) - 306 (30%)

Plant Diseases 303

Use of Host Plant Resistance to Manage the Soybean Cyst Nematode

6402-21220-005-00D

303 (100%)

Genetic and Cultural Methods to Reduce Soybean Yield Losses to Diseases and Environmental Stress

6402-21220-007-00D

303 (30%) - 301 (70%)

Cultural and Genetic Methods to Reduce Reniform Nematode in Cotton

6402-22000-003-00D

303 (70%) - 301 (30%)

Vegetable and Ornamental Research in the Gulf South

6404-21220-003-00D

303 (30%) - 301 (70%)

Disease Control through the Enhancement of Resistant Sugarcane Germplasm

6435-22000-010-00D

303 (60%) - 304 (40%)

Genetic Up-Regulation of Antifungal Natural Products for Post Harvest Crop Protection

6435-41000-078-00D

303 (30%) - 306 (70%)

Crop Protection and Quarantine 304

Area-Wide Pest Management of the Tarnished Plant Bug in Cotton in Absence of the Boll Weevil

0500-00044-013-00D

304 (100%)

Area-Wide Fire Ant Suppression Project: Demonstration Site in Mississippi

0500-00044-014-00D

304 (70%) - 104 (30%)

Rearing Research in Support of Coffee Berry Borer Biological Control

0500-00056-002-00D

304 (100%)

Develop Biological Control Techniques and Mass Rearing Technology for Beneficial and Pest Insects

6401-22000-018-00D

304 (100%)

Weed Biology and Ecology and Development of Sustainable Integrated Weed Management Systems for Cotton, Soybean, and Corn

6402-22000-033-00D

304 (70%) - 305 (30%)

Integrated Pest Management of Insects Affecting Corn, Cotton, Soybean, and Sweet potato

6402-22000-034-00D

304 (100%)

Resistance Monitoring and Resistance Management of Lepidoptern Spp. Infesting BT Cotton

6402-22000-035-00D

304 (70%)- 301 (30%)

Replacement of Herbicides and Methyl Bromide by Microbiological Control of Weeds

6402-22000-036-00D

304 (70%) - 308 (30%)

Development of Pesticide Application Technologies for Spray-Drift Management and Targeted Spraying

6402-22000-038-00D

304 (40%) - 305 (60%)

Biology and Management of Secondary Pests of Cotton after Boll Weevil Eradication

6406-22000-021-00D

304 (100%)

Augmentation Biological Control of Insects and Weeds

6406-22000-024-00D

304 (100%)

Developing Integrated Weed and Insect Pest Management Systems for Efficient and Sustainable Sugarcane Production

6435-22000-009-00D

304 (70%) - 305 (30%)

Disease Control through Enhancement of Resistant Sugarcane Germplasm

6435-22000-010-00D

304 (40%)- 303 (60%)

Improve Formulation Technology for Biocontrol Agents of Agricultural Pests

6435-22000-011-00D

304 (100%)

Crop Production 305

Develop Soybean Genotypes and Management Systems for Early Season and Stress Environments

6402-21000-004-00D

305 (30%) - 301 (70%)

Genetic-Physiological Team Research to Improve Production, Fiber Quality and Competitive Ability of Cotton

6402-21000-028-00D

305 (40%) - 301 (60%)

Research on Kenaf and Other Alternative Crops and Value-Added Products

6402-21410-003-00D

305 (70%) - 301 (30%)

Weed Biology and Ecology and Development of Sustainable Integrated Weed Management Systems for Cotton, Soybean, and Corn

6402-22000-033-00D

305 (30%) - 304 (70%)

Development of Pesticide Application Technologies for Spray Drift Management and Targeted Spraying

6402-22000-038-00D

305 (60%) - 304 (40%)

Small Fruit Cultural and Genetic Research in the Mid South

6404-21000-005-00D

305 (30%) - 301 (70%)

Breeding, Genetics, Stock Improvement and Management of Russian Honey Bees for Mite Control and Pollination

6413-21000-010-00D

305 (60%) - 301 (40%)

Development and Use of Mite-Resistance Traits in Honey Bee Breeding

6413-21000-011-00D

305 (60%) - 301 (40%)

Developing Integrated Weed Management Systems for Efficient and Sustainable Sugarcane Production

6435-22000-009-00D

305 (30%) - 304 (70%)

New and Improved Cultural Practices for Sustainable Sugarcane Production and Environmental Protection

6435-21000-011-00D

305 (100%)

Quality and Utilization of Agricultural Products 306

Develop, Enhance and Transfer Gin Technology to Improve Fiber Quality and Farmer Profits

6402-41440-004-00D

306 (100%)

Discovery of Natural Products for Control of Microbial Pests and Diseases in Agriculture

6408-22430-002-00D

306 (100%)

Chemistry of Natural Products for Pest Management

6408-41000-004-00D

306 (70%) - 302 (30%)

Development of an Enzyme-Based Technology to Reduce Phosphate Pollution of the ... In Plants

6435-13410-002-00D

306 (100%)

Molecular Analysis of Development to Improve Cotton Fiber

6435-21440-002-00D

306 (30%) - 302 (70%)

Characterization and Improvement of Sugar Industry Process Units Impacted by New Production Practices

6435-41000-074-00D

306 (100%)

Development of Environmentally Acceptable Technologies for Processing Corn

6435-41000-075-00D

306 (100%)

Genetic Up-Regulation of Antifungal Natural Products for Post Harvest Crop Protection

6435-41000-078-00D

306 (70%) - 303 (30%)

Value Added Products and Processes from Cotton

6435-41000-081-00D

306 (100%)

Development of Processes to Improve Oilseed Utilization

6435-41000-082-00D

306 (100%)

Enzymatic Processes for Increasing Industrial Utilization of Vegetable Oils

6435-41000-083-00D

306 (100%)

Agricultural By-Products As Adsorbents for Environmental Remediation

6435-41000-084-00D

306 (100%)

Developing Novel Processes for Incorporating the Unique Nutritional and Functional Properties of Rice into Value-Added Products

6435-41000-091-00D

306 (100%)

Chemical Modification of Cotton Textiles for Improved Performance and Appearance

6435-41430-003-00D

306 (100%)

Peanut Allergenicity as Affected by End Products Produced During Roasting

6435-43440-010-00D

306 (100%)

Mitigation of Off-Flavors in Catfish Aquaculture Systems

6435-43440-040-00D

306 (30%) - 106 (70%)

Crop Sensory Quality: Basic Understanding and Instrumental Assessment

6435-44000-063-00D

306 (100%)

Improving the Sensory Quality and Shelf-Life of Fresh-Cut Fruit Products

6435-44000-064-00D

306 (100%)

Structure and Moisture as Determinants of Commercially Important Cotton Fiber Properties

6435-44000-065-00D

306 (100%)

Improved Cotton Quality Measurements

6435-44000-066-00D

306 (100%)

Bioenergy and Energy Alternatives 307

Methyl Bromide Alternatives 308

Replacement of Herbicides and Methyl Bromide By Microbiological Control of Weeds

6402-22000-036-00D

308 (30%) - 304 (70%)