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# **Germplasm, Breeding, Composition, Development, Utilization and Variety Development**

## **Soybean Germplasm Enhancement Using Genetic Diversity**

**Pengyin Chen, University of Arkansas Division of Agriculture**

Project Focus:

This research project emphasizes on germplasm enhancement with genetic diversity and specialty value-added traits. The objective is to increase genetic diversity in the soybean gene pool by incorporating exotic germplasm and unique traits of value into the breeding program. Effort has been made in developing lines with 50% plant introduction parentage that have diverse yield genes, disease resistance, and specialty seed quality attributes including high protein, high oil, low phytate, high isoflavone, high oleic, low linolenic, low saturated fat, high sucrose, low stachyose, lipoxygenase-free, large or small seed size, high water absorption, and soft texture. Lines with these specialty traits are used for feed, oil, and soyfood such as tofu, miso, soymilk, soynuts, edamame, bean sprouts, and natto. In addition, we develop molecular markers for the traits of interest and use marker-assisted selection to improve breeding efficiency. We have released a high protein line, two lines with drought tolerance and prolonged nitrogen fixation, and two lines for natto production.

Location of Studies: UA Experiment Stations at Keiser, Pine Tree, Marianna, Stuttgart, Rohwer, Kibler, and Fayetteville

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2009-2010

## **Breeding Soybean Cultivars with High Yield and Multiple Pest Resistance**

**Pengyin Chen, University of Arkansas Division of Agriculture**

Project Focus:

The UA soybean breeding program focuses on cultivar development and germplasm enhancement. The overall goal is to provide a steady flow of new and improved conventional and transgenic cultivars adapted to the mid-south. Emphasis is placed on developing cultivars with high yield potential, wide adaptation, diverse maturity, multiple pest resistance, and environmental stress tolerance. Effort has been made in selecting lines of maturity groups 4 to 6 with resistance to Stem Canker, Sudden Death Nematode, Frogeye Leaf Spot, Root Knot Nematode, Soybean Mosaic Virus, Soybean Rust, Phomopsis Seed Decay, and Purple Seed Stain; and with tolerance to drought, flood, and chloride stress. Our popular variety releases include UA 4805, Ozark, and Osage that are widely grown in Arkansas and other southern states.

Location of Studies: UA Experiment Stations at Keiser, Pine Tree, Marianna, Stuttgart, Rohwer, Kibler, and Fayetteville

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2009-2010

**Coupling high-throughput genetic and phenotypic information for yield enhancement  
F. Fritschi (UMo), L.C. Purcell (UA), J.D. Ray (USDA-ARS Stoneville, MS), R. Smith (USDA-ARS Stoneville, MS)**

**Project Focus:**

Great strides have been made in rapidly genotyping soybean using different molecular techniques, but there has been relatively little progress in associating molecular genotypes with phenotypes. It is critical that phenotypic selection methods be developed that can be associated with molecular measurements because farmers grow crops for their phenotypes, specifically for yield. This research project explores several rapid, high-throughput methods for determining phenotypes and associating those phenotypes with genotypes determined using molecular markers. To do this, approximately 400 diverse plant introductions (MG IV) are being evaluated in field experiments. At least two molecular markers from each linkage group will be evaluated in each genotype. Understanding the genetic linkage of these traits will provide a roadmap for mining the germplasm collection and greatly increase the breeding efficiency for yield-improving traits.

**Location of Studies:** Stuttgart, AR and Columbia, MO

**Funding Source:** United Soybean Board

**Length of Project:** 2009-2011

**Drought stress tolerance for the Midwest and South: Soybean variety improvement  
T.E. Carter (NC State), L.C. Purcell (UA), P. Chen (UA), F. Fritschi (UMo, Columbia),  
R. Boerma (UGa), T.R. Sinclair (UFI), T. Rufty (NC State), J. Orf (UMn), J.E. Specht (UNe)**

**Project Focus:**

The goal of this research is to identify germplasm with traits that confer agronomic drought tolerance, and to use this germplasm in developing high-yielding adapted lines with drought tolerance. A unique aspect of this effort is that physiological traits are being used as selection criteria along with molecular techniques and traditional breeding.

**Location of Studies:** Fayetteville, Keiser, Stuttgart, Rohwer, and Marianna, AR, along with multiple locations in NC, GA, MO, MN, and NE

**Funding Source:** United Soybean Board

**Length of Project:** 2008-2010

## **Application of New Genetic and Genomic Resources to the Improved Control of Soybean Sudden Death Syndrome (SDS)**

**P. Chen, J. Rupe, B. Bluhm-Arkansas Division of Agriculture, Led by S. Cianzo-Iowa State University with Madan Bhattacharyya-Iowa State University; Ahmad Fakhoury, Jason Bond, Khalid Meksem, Southern Illinois University- Carbondale**

Project Focus:

- (1) Breed high-yielding resistant cultivars and germplasm lines for Northern and Southern US soybean production regions by incorporating new resistance genes and alleles.
- (2) Determine Fv molecular-genetic mechanisms of disease infection and symptom expression, and the interaction between soybean-Fv.
- (3) Develop new screening tools and quantifiable methods to measure plant resistance.

Location of Studies: University of Arkansas, Fayetteville, AR  
Iowa State University, Ames, IO  
Southern Illinois University, Carbondale, IL

Funding Source: United Soybean Board

Length of Project: 2008-2010

## **Screening Germplasm and Breeding for Resistance to Phomopsis Seed Decay in Soybeans** **Shuxian Li – USDA, Stoneville, MS; Collaborators: Pengyin Chen and John Rupe, University of Arkansas Division of Agriculture, Fayetteville, AR; Allen Wrather, University of Missouri, Delta Center, Portageville, MO**

Project Focus:

- (1) Screen untagged germplasm lines for resistance to PSD
- (2) Breed high-yielding resistant cultivars and germplasm lines for North Central and Southern US soybean production regions by incorporating new resistance genes and alleles.
- (3) Develop new and rapid screening tools that are correlated with the field screening method for the measurement of plant resistance.

Location of Studies: Vegetable Research Station, Kibler, AR; Stoneville, MS; Portageville, MO

Funding Source: United Soybean Board

Length of Project: 2009-2011

## **Effect of resistance genes on Phytophthora Root Rot**

**J. Rupe, C. Rothrock, R. Cartwright, University of Arkansas Division of Agriculture**

Project Focus:

Isolines of the soybean cultivar Bedford, each with a different gene for resistance to Phytophthora root rot, are planted in sites with a history of PRR. While symptom development is rare, isolines with certain genes have significantly higher yields than the susceptible parent indicating a 10 to 15% yield loss without symptoms. The tests were planted on three dates to determine what environmental conditions are associated with the disease.

Location of Studies: Northeast Arkansas Research and Extension Center, Keiser, AR; Southeast Branch Station, Rohwer, AR

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2008-2010

### **Anti-Colon Cancer Effect of Soy Saponin Fractions in Soybeans**

**Sun-Ok Lee and Pengyin Chen, University of Arkansas Division of Arkansas, Fayetteville**

Project Focus:

The primary objective of this project is to determine the role of soy saponin fractions in the prevention or treatment of colon cancer in mice.

Location of Studies: Food Science, University of Arkansas, Fayetteville

Funding Source: State Fund-Arkansas Bioscience Institute (ABI)

Length of Project: 2009-2011

### **Protein, Amino Acid Composition, and Bioactive Peptides (Protein Fragments) in Meals of High Oleic Acid Soybean Lines Developed By Dr.Pengyin Chen (Soybean Breeder)**

**Dr. Navam Hettiarachchy and Dr.Pengyin Chen, University of Arkansas Division of Agriculture**

Project Focus:

Extraction, composition, and analysis of protein including amino acids from soybean meal from high oleic acid lines developed and grown in Arkansas. Derivation of gastro-intestinal resistant peptide fractions from protein extracted from selected soybean lines using enzymes. Testing the peptide fractions for bioactivity against human cancer cell growth, and hypersensitivity, and purification of significant active peptides.

Location of Studies: Agricultural Research Station, University of Arkansas, Fayetteville

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2008-2010

### **Intensification of protein content in soybean meals**

**Ruben O. Morawicki, University of Arkansas Division of Agriculture**

Project Focus:

The objective of this project is to develop a procedure to treat soybean meals, so the concentration of protein could be boosted. This would allow the use of soybean meals in new applications.

Location of Studies: Department of Food Science

Funding Source: Institute of Food Science and Engineering (U of A Division of Agriculture)

Length of Project: Renews annually

### **High-conjugated linoleic acid (CLA) based soy food and nutraceutical products**

**Andrew Proctor, University of Arkansas Division of Agriculture, Fayetteville**

Project Focus:

Developing CLA-rich soy oil food products such as potato chips and salad oils to provide the nutritional benefits of CLA in food that conventionally contain oil. CLA is traditionally a product of ruminates found only in dairy and beef products. Due to our new processing method we can convert soy oil linoleic acid to CLA.

Location of Studies: University of Arkansas, Fayetteville

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2008-2010

**Food and Pharmaceutical Co Products: Part III: High-conjugated linoleic acid (CLA) soy oil for treatment of atherosclerosis and obesity**

**Andrew Proctor, University of Arkansas Division of Agriculture, Fayetteville**

Project Focus: Investigating the role of high-CLA soy oil on various obesity related diseases

Location of Studies: University of Arkansas, Fayetteville

Funding Source: Mid-South Department of Energy

Length of Project: 2008-2010

**High CLA soy oil production by photoisomerization**

**Andrew Proctor, University of Arkansas Division of Agriculture, Fayetteville**

Project Focus:

Conjugated linoleic acid (CLA) has anti-cancer, anti-heart disease and anti-obesity properties and is found in less than one percent in dairy and bovine food products. Enhancing the nutritional value of soy oil by converting linoleic acid to conjugated linoleic acid by simple photoisomerization has been achieved, producing oils with up to 20% CLA by a simple processing procedure. We are now optimizing the process. A provisional patent has been filed and full patent will be submitted shortly.

Location of Studies: University of Arkansas, Fayetteville

Funding Source: USDA, NRI

Length of Project: 2006-2010

**Isolation of conjugated linoleic acid rich triglycerides fractions and fatty acids from high CLA soy oil for nutrition studies**

**Andrew Proctor & Latha Devareddy, University of Arkansas Division of Agriculture, Fayetteville**

Project Focus:

We recently found that CLA rich soy oil can reduce serum cholesterol in obese rats by 38%, reduce LDL, and increase HDL cholesterol. We have separated CLA rich triglycerides by HPLC and now are working to separate CLA rich oil fatty acids to produce even more potent nutritional products.

Location of Studies: University of Arkansas, Fayetteville

Funding Source: Arkansas Biosciences Institute

Length of Project: 2008-2010

**Effect of diets supplemented with CLA-enriched soybean oil, standard soybean oil, or marine fish oil on growth, health, feed conversion, survival, body composition, and shelf life of channel catfish.**

**Rebecca Lochmann, University of Arkansas at Pine Bluff**

Project Focus:

To determine whether CLA-enriched soybean oil can improve the fatty acid composition of farmed channel catfish for human health relative to diets with traditional soybean oil or fish oil, while maintaining or improving catfish growth, health, and product quality.

Location of Studies: UAPB Aquaculture / Fisheries Center, Pine Bluff

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2009-2010

### **Soybean Variety Testing**

**Don Dombek, University of Arkansas Division of Agriculture**

Project Focus:

Evaluating the yield and agronomic performance of soybean advanced strains and varieties.

Early-Planted, Full-Season and Double-Cropped tests are conducted.

Location of Studies: NEREC, Keiser; LMCRS, Marianna; RREC, Stuttgart; SEREC Rohwer Division, Rohwer; VSS, Kibler and Scott Matthews Farm, Poinsett Co.

Funding Source: Seed Industry and UA Division of Agriculture

Length of Project: Renews Annually

### **Assessment of Soybean Varieties in Arkansas for Sensitivity to Chloride Injury**

**Dr. Steven Green (ASU-J) and Cooperators – Matt Conatser (ASU-J), Dr. Rick Cartwright, Dr. Pengyin Chen, Don Dombek, and Dr. Jeremy Ross, University of Arkansas Division of Agriculture**

Project Focus:

- (1) Analyze and report chloride reaction in soybean cultivars provided by the University of Arkansas Variety Testing program and breeding lines provided by private seed companies
- (2) Continually improve accuracy, reproducibility, and efficiency of the chloride screening process. Damaging chloride levels in soil and irrigation water persist and continue to increase in Arkansas and many other states. This program is committed to providing accurate and much needed chloride reaction screenings to soybean breeders in order to select cultivars genetically resistant to high chloride levels, and provides producers with valuable information needed to select a suitable cultivar for areas affected by elevated chloride levels.

Location of Studies: Arkansas State University, Jonesboro

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2008-2010

### **Soybean Breeding and Variety Development**

**Blair Buckley, LSU Agricultural Center**

Project Focus:

The objective of the project is to develop high-yielding, disease-resistant soybean varieties adapted to the environmental conditions of Louisiana and the Gulf Coast region. Major traits of emphasis are: yield, Cercospora leaf blight resistance, aerial blight resistance, frogeye leaf spot resistance, Asian soybean rust resistance, drought tolerance, and salt tolerance.

Location of Studies: Red River Research Station; Bossier City, LA

Funding Source: State funding, Louisiana Soybean & Grain Research & Promotion Board

Length of Project: 2008-2012

### **Developing Soybean Resistance to Asian Rust Pathogen**

**Oard, Svetlana, LSU Agricultural Center**

Project Focus:

Development of a broad-range antimicrobial disease resistance in soybeans with focus on antifungal protection. This project uses a genetic engineering approach to introduce an antimicrobial peptide to increase disease resistance in leaf tissues.

Location of Studies: Baton Rouge, LA

Funding Source: Soybean Board

Length of Project: 2009-2010

### **Extraction, purification and antioxidant properties of soy isoflavones from defatted soy flakes** **Zhimin Xu**

Project Focus:

The objective of this project is to utilize defatted soy flake, a byproduct generated from soybean oil refining as a source of food antioxidant. The soy antioxidant could be an inexpensive and safe preservative used in food products, such as ground meat, to prevent deterioration of food quality and prolong food storage time. The result of this project would greatly increase the economic value of this low-value byproduct of soybean processing.

Location of Studies: Department of Food Science, Louisiana State University Agricultural Center

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2009-2010

### **Continuous Microwave Extraction of Soy Isoflavones**

**Sabliov, C. M., D. Boldor, Z. Xu and M. Lima**

Project Focus:

The objective of the study is to develop and to optimize a continuous microwave assisted extraction system for efficient extraction of isoflavones from soybean oil.

Location of Studies: BAE Department, LSU Ag Center, Baton Rouge, LA

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2006-2010



**Extraction of the anti-carcinogenic, anti-inflammatory protein Bowman-Birk inhibitor from soybean whey for use in multiple sclerosis, muscle dystrophy, and inflammatory bowel disease**  
**Jack Losso, John Finley; LSU Ag Center**

**Project Focus:**

Multiple Sclerosis (MS) is an incurable long-term inflammatory disease of the central nervous system that affects the brain and spinal cord that affects 250,000 to 350,000 people in the U.S. with MS and approximately 200 new cases are diagnosed each week and an economic burden in the billions of dollars. Numerous animal and clinical studies have concluded that the soybean protein known as Bowman-Birk inhibitor (BBI) inhibits cancer cell growth, reduces inflammation and attenuates neuronal loss, making it an excellent candidate for oral therapy in MS, MD, and UC, and for the general population to maintain good health suggest that soybean growers will grow and produce more soybeans each year for the multiple applications available for BBI. In return, soybean farmers will generate enough income to remain competitive in the business.

**Objectives:**

- (1) Develop a scalable extraction method for the isolation of BBI from soybean wash waters and whey
- (2) Develop a method to measure the levels of BBI in soy food products

**Location of Studies:** LSU Ag Center Department of Food Science

**Funding Source:** Louisiana Soybean and Grain Research and Promotion Board

**Length of Project:** 2009-2010

**Louisiana Soybean Variety Testing Program**

**Don Boquet, Ernest Clawson, Jim Hayes, and Dustin Harrell**

**Project Focus:**

Evaluation of commercial soybean varieties for adaptation and performance in Louisiana

**Location of Studies:** Northeast Research Station, Macon Ridge Research Station, Dean Lee Research Station, Red River Research Station, Rice Research Station, Iberia Research Station

**Funding Source:** State funds and fees charged for each entry

**Length of Project:** Indefinite

**Development of Soybean Genotypes and Management Systems for Early Season and Stress Environments**

**Arnold Burns, Nace Bellaloui, and Anne Gillen**

**Project Focus:**

Develop high-yielding soybean germplasm with enhanced seed composition and plant protection traits for soybean production systems of the Mid South United States.

**Location of Studies:** Stoneville, MS

**Funding Source:** ARS

**Length of Project:** 2008-2012

**Coupling High Yield through Genetic and Phenotypic Information for Yield Enhancement  
Felix Fritschi, Larry Purcell, Jeff Ray and Rusty Smith**

Project Focus:

Investigate and identify genetic and phenotypic information for yield enhancement.

Location of Studies: Stoneville MS, Columbia MO, and Fayetteville AR

Funding Source: ARS-USB

Length of Project: 2008-2009

**Identification and Utilization of Exotic Germplasm to Improve Soybean Productivity  
Randy Nelson, Rusty Smith, Grover Shannon, Pengyin Chen, Tommy Carter, Roger Boerma,  
Jim Orf, Brian Diers, Bill Kenworthy, and R. Mian**

Project Focus:

Investigate and identify genetic exotic germplasm to improve soybean productivity.

Location of Studies: Stoneville, MS and Urbana, IL

Funding Source: ARS-USB

Length of Project: 2008-2009

**Reducing Soybean Yield Losses from Disease through Genetic Improvements  
Jeff Ray, Rusty Smith, and Shuxian Li**

Project Focus:

Conserve available genetic diversity in genus Glycine; acquire and characterize new accessions to enhance the southern USDA Soybean Germplasm Collection.

Location of Studies: Stoneville, MS

Funding Source: ARS

Length of Project: 2009-2013

**Genetics and Mapping of Charcoal Rot Resistance  
Jeff Ray, Rusty Smith, and Alemu Mengistu**

Project Focus:

Investigate the genetics and mapping for charcoal rot resistance.

Location of Studies: Stoneville, MS and Jackson, TN

Funding Source: ARS-USB

Length of Project: 2008-2009

**Screening Germplasm and breeding for Resistance to Phomopsis Seed Decay in Soybeans  
Li, Chen, Rupe, and Wrather**

Project Focus:

Screen germplasm for resistance to phomopsis seed decay.

Location of Studies: Stoneville MS, Fayetteville AR, and Columbia MO

Funding Source: ARS-USB

Length of Project: 2009-2011

### **Reducing Soybean Yield Losses from Disease through Genetic Improvements**

**Jeff Ray, Rusty Smith, and Shuxian Li**

Project Focus:

Identify differential sources of resistance/tolerance and associated molecular markers for the Phomopsis/Diaporthe complex.

Location of Studies: Stoneville, MS

Funding Source: ARS

Length of Project: 2009-2013

### **Reducing Soybean Yield Losses from Disease through Genetic Improvements**

**Jeff Ray, Rusty Smith, and Shuxian Li**

Project Focus:

Identify differential sources of resistance/tolerance to Asian soybean rust and identify molecular markers associated with responsible genes.

Location of Studies: Stoneville, MS

Funding Source: ARS

Length of Project: 2009-2013

### **Reducing Soybean Yield Losses from Disease through Genetic Improvements**

**Jeff Ray, Rusty Smith, and Shuxian Li**

Project Focus:

Determine the inheritance and identify molecular markers linked to genes controlling resistance to Macrophomina Phaseolina

Location of Studies: Stoneville, MS

Funding Source: ARS

Length of Project: 2009-2013

### **Development of Soybean Genotypes and Management Systems for Early Season and Stress Environments**

**Arnold Burns, Nace Bellaloui, and Anne Gillen**

Project Focus:

Introgress genes for rust resistance from Plant Introduction into germplasm adapted to the Mid South.

Location of Studies: Stoneville, MS

Funding Source: ARS

Length of Project: 2008-2012

**Application of Biotechnology to Control the Soybean Cyst Nematode: Soybean Resistance Genes Arelli, Bent, Cianzio, and Meksem**

Project Focus:

Identify soybean resistance genes through biotechnology to control soybean cyst nematode.

Location of Studies: Jackson, TN

Funding Source: ARS-USB

Length of Project: 2007-2009

**Introgression of Novel Genes Conferring Resistance to SCN in Soybean Germplasm of Early Maturity Groups**

**Prakash Arelli**

Project Focus:

Introduction of novel genes as a method for conferring resistance to soybean cyst nematode in the germplasm of early soybean maturity groups

Location of Studies: Jackson, TN

Funding Source: ARS-ISU

Length of Project: 2007-2009

**Breeding Soybeans for Durable Resistance to Emerging Nematode Populations in Tennessee Arelli and Pantalone**

Project Focus:

Breed soybeans for durable resistance to emerging nematode populations in Tennessee

Location of Studies: Jackson, TN

Funding Source: ARS-TN Soybean Promotion Board

Length of Project: 2009-2011

**Genetic and Cultural Methods to Manage Cyst Nematodes in Soybeans**

**Prakash Arelli and Pat Donald**

Project Focus:

Investigate genetic and cultural methods to manage cyst nematodes in soybeans.

Location of Studies: Jackson, TN

Funding Source: ARS

Length of Project: 2007-2011

**Development of a Rapid Genetic Field Race Test for Soybean Cyst Nematode (SCN) and Generation of SCN resistance through Gene Inactivation**

**Vincent Kirk, Gary Lawrence, Trey Koger, Tom Allen, and Clarissa Balbalian, Mississippi State University**

Project Focus:

Identification of molecular markers – use massively parallel signature sequencing to identify genes that are the same in all SCN races that affect Mississippi soybeans. Those genes will be targets for genetically engineering resistance to SCN.

Location of Studies: Mississippi State University, Mississippi State, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

**Development of Soybean Genotypes and Management Systems for Early Season and Stress Environments**

**Arnold Burns, Nace Bellaloui, and Anne Gillen**

Project Focus:

Identify the physiological mechanisms that regulate seed composition qualities of oil, fatty acids, and protein under stress environments.

Location of Studies: Stoneville, MS

Funding Source: ARS

Length of Project: 2008-2012

**Enhancement of Mississippi Soybean Variety Trials through Entry Standardization**

**Bernard W. White, Mississippi State University**

Project Focus:

Continue to test all roundup ready varieties at all locations in maturity groups IV and V. Continue testing group III at Brooksville, Clarksdale, Olive Branch, and Stoneville. Test conventional varieties at Stoneville, Longwood, and Brooksville. Add irrigated variety test on a cotton soil at Stoneville in response to soybean acreage moving into production fields historically reserved for cotton.

Location of Studies: Statewide (on and off-station locations)

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009

**Development of Soybean Genotypes and Management Systems for Early Season and Stress Environments**

**Arnold Burns, Nace Bellaloui, and Anne Gillen**

Project Focus:

Coordinate and participate in the Uniform Soybean Tests Southern States.

Location of Studies: Stoneville, MS

Funding Source: ARS

Length of Project: 2008-2012

**Development of Soybean Genotypes and Management Systems for Early Season and Stress Environments**

**Arnold Burns, Nace Bellaloui, and Anne Gillen**

Project Focus:

Optimize ESPS and pest management strategies for the Mid South United States.

Location of Studies: Stoneville, MS

Funding Source: ARS

Length of Project: 2008-2012

**Evaluation of Private and Public Soybean Varieties and Breeding Lines for Resistance to Stem Canker, Frogeye Leaf Spot, Purple Leaf and Pod Stain, Charcoal Rot and Rust**

**G.L. Sciumbato, Mississippi State University**

Project Focus:

To determine the virulence of stem canker isolates collected in Mississippi in 2008. Evaluate entries submitted for testing in the Mississippi soybean variety trials for resistance to stem canker, frogeye leaf spot, purple leaf and pod stain, and charcoal rot. Evaluate entries submitted for testing in the Mississippi soybean variety trials for resistance to soybean rust. Emphasis will be placed on the evaluation of soybean varieties grown after wheat because environmental conditions are more favorable for soybean rust development when these varieties are maturing.

Location of Studies: Delta Research and Extension Center, Stoneville, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2007-2009

**Screen Soybean Variety Evaluation Entries for Resistance to Plant Parasitic Nematodes to Enhance Our Soybean Production**

**Gary Lawrence and Bernard White, Mississippi State University**

Project Focus:

Screen soybean variety evaluation entries for resistance to plant-parasitic nematodes (root-knot, reniform, and soybean cyst).

Location of Studies: Mississippi State University, Mississippi State, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

**Evaluation of Soybean Seed and Hopper Box Treatments on “New” Soybean Land**

**G.L. Sciumbato, Mississippi State University**

Project Focus:

Evaluate various seed treatment and hopper-box inoculants products for soybean growth, nodulation, and yield for soybeans grown on silt-loam soils not historically grown to soybeans.

Location of Studies: Delta Research and Extension Center, Stoneville, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

## **Physiological and Environmental Factors Affecting Seed Qualities under Early Soybean Production System in Mississippi**

**Lingxiao Zhang and Mark Shankle, Mississippi State University**

Project Focus:

Examine the relationship between seed maturity and its qualities in terms of seed compositions and seed germination rate. This information will help us to understand the physiological mechanisms of how environmental factors affect soybean seed qualities, including shattering, germination ability, and seed deterioration. This research will help us to find a better approach to solve the problem.

Location of Studies: Delta Research and Extension Center, Stoneville, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

## **Yield Trials for Released Varieties and Advanced Experimental Genotypes in North Texas**

**Jim Heitholt, Texas A&M-Commerce and Texas AgriLife Research; Russell Sutton, Texas AgriLife Research; Curtis Jones, Texas A&M-Commerce and Texas AgriLife Extension**

Project Focus:

To compare yield and agronomic traits among promising soybean genotypes in the one of the nation's hottest and driest soybean production regions. Entries include commercial soybean lines from several companies and entries from the USDA-ARS Uniform Trials. Data on grain yield, plant height, and maturity are provided to the commercial seed industry and to public breeders.

Location of Studies: Two locations in north Texas, usually Ellis County and Delta County

Funding Source: Commercial seed company entry fees

Length of Project: 1999 to present – plan to continue into 2010 and beyond

## **Identification and Development of Soybean Genotypes Tolerant to Heat and Drought in the Southwestern USA**

**Jim Heitholt, Texas A&M-Commerce and Texas AgriLife Research; Rusty Smith, USDA-ARS, Stoneville, MS**

Project Focus:

Solar radiation and moisture conditions for soybean production in the southern U.S. are often favorable but high temperatures greatly suppress yield. One objective of this project is to screen soybean Plant Introductions and advanced lines from public breeding programs that can withstand high temperature. A second objective is to develop elite test lines by crossing advanced lines with promising types identified in field tests. For the first objective, screening is typically carried out in the field using late planting dates so that reproductive growth overlaps with the July and August heat. Alternatively, genotypes are evaluated in vinyl "growth chambers" constructed in the greenhouse; these chambers allow more control of environmental conditions than is possible in the field and facilitate the testing of more genotypes than is possible in a conventional growth chamber.

Location of Studies: Commerce, Texas

Funding Source: Funded by Texas Soybean Board in mid 2000s, currently not funded

Length of Project: 2006 to present, screening and breeding to continue into 2011

**Agronomic Viability and Development of Vegetable Soybean Genotypes in North Texas**  
**Jim Heitholt, Texas A&M-Commerce and Texas AgriLife Research; Initial genetic material was kindly provided by Dick Bernard, Tommy Carter, Pengyin Chen, Tom Devine, Tadesse Mebrahtu, and Katy M. Rainey**

**Project Focus:**

To compare yield and seed quality of selected vegetable soybean genotypes, including edamame, in north Texas. Yield trials conducted in 2007 and 2008 did not provide useful data because of insects and severe drought, respectively. I am crossing selected edamame types provided by other breeding programs with north-Texas-agronomically-adapted types to develop a more heat and drought tolerant edamame genotype for north Texas. I am also crossing edamame types with selected PI lines.

Location of Studies: Commerce, Texas

Funding Source: Unfunded

Length of Project: 2007 to present – plan to continue for several years



## **Production, Seed Quality, Irrigation, Drought Tolerance, Relay Cropping**

### **Soybean Planting Seed Quality Assessment and Education in Arkansas**

**R.D. Cartwright, J.C. Rupe, P. Chen, L. Purcell, J. Ross – University of Arkansas Division of Agriculture**

Project Focus:

Research will compare different seed quality assessment methods with field emergence, and a statewide planting seed survey will determine the range of germ and vigor in soybean seed distributed in the state. Education efforts will focus on developing an overall program “What You Should Know about Soybean Seed Quality in Arkansas”, delivered to growers and the soybean industry using various methods.

Location of Studies: Arkansas Agricultural Research and Extension Center, Fayetteville; Vegetable Substation, Kibler; Northeast Arkansas Research and Extension Center, Keiser; Newport Experiment Station, Newport; various cooperating farms in 30 major soybean production counties statewide

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2008-2010

### **Agronomic Limitations of Soybean Yield and Seed Quality in U.S.**

**Palle Pedersen (Iowa State Univ.) and Jeremy Ross (Univ. of Arkansas Division of Agriculture)**

Project Focus:

The goal of this project is to improve profitability of U.S soybean growers through applied research and education with emphasis on yield and seed quality. Results of this research will provide practical information for soybean producers in the U.S. and will dictate the future direction of soybean management research and recommendations.

Location of Studies: Poinsett County, Northeast Research and Extension Center, Pine Tree Experiment Station, and Southeast Research and Extension Center

Funding Source: United Soybean Board

Length of Project: 2008-2010

### **Investigating Emerging Production Recommendations for Sustainable Soybean Production**

**Jeremy Ross and Gus Lorenz, University of Arkansas Division of Agriculture**

Project Focus:

To investigate new and untested management inputs to improve soybean production in Arkansas. This project will evaluate economically damaging insect pest, investigate optimum seeding rates and planting methods, and evaluate the potential use of new and innovative production factors for soybean production.

Location of Studies: Statewide

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2008-2010

### **Soybean Maximum Yield Research**

**Larry C. Purcell (UA) and Jeremy Ross (UAEX), University of Arkansas Division of Agriculture**

Project Focus:

Soybean producer Kip Cullers in SW Missouri has reported yields of 139 (2006) and 155 (2007) bu/ac, and these yields are substantially greater than any other reported maximum yields. We hope to implement some of the production practices used on the Culler's farm and to identify limitations to high yields that Arkansas producers may be facing.

Location of Studies: Fayetteville and Keiser, Arkansas; Stark City, Missouri

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2008-2010

### **Irrigation Management of Soybeans**

**P. B. Francis, University of Arkansas, SEREC; P. L. Tacker and W. Smith, UA Division of Agriculture, CES**

Project Focus:

The objective of this project is to improve yield and yield stability of soybeans through irrigation management. The effects of delaying irrigation initiation on the yield and profit of three soybean maturity groups are being investigated. Revisions to the Irrigation Scheduling Program will be made pending the outcomes.

Location of Studies: Southeast Research and Extension Center, Monticello

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2007-2009

### **Soybean Drought Tolerance Research**

**Larry C. Purcell and Michael Popp, University of Arkansas Division of Agriculture**

Project Focus:

The overall goal of this research is to determine management factors (soybean maturity group - MG, planting dates, row spacing, and populations) that increase the efficiency with which irrigation leads to increased yield.

Location of Studies: Fayetteville and Keiser, Arkansas

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2008-2010

### **Relay Cropping of Soybeans and Wheat**

**P. B. Francis, University of Arkansas SEREC; L. Earnest, University of Arkansas SEBES; S. Hayes, University of Arkansas SEBES; R. Stark, University of Arkansas SEREC**

Project Focus:

The yield and profitability of determinate and indeterminate soybeans in relay and conventional double cropping systems with wheat is being evaluated. The hypothesis is that relay planting soybeans between skip rows of wheat at the boot stage will yield as well or better, and mature earlier than planting after the wheat harvest and thus, reduce the risk of late-season insect and disease control expenditures.

Location of Studies: Southeast Branch Experiment Station, Rohwer, Arkansas

Funding Source: Unfunded

Length of Project: Indefinite

### **Improving Soybean Profitability**

**J.E. Board, LSU Ag Center, Baton Rouge**

Project Focus:

Research is designed to identify genotypic potential for yield compensation at subnormal plant population in order to reduce grower seeding costs. Other research aims to identify mechanisms explaining yield improvement in old vs. new soybean cultivars. Additional studies provide management information for dealing with Asian Soybean Rust, as well as usefulness of inputs such as fertilizer, fungicide, increased seeding rate, etc.

Location of Studies: Baton Rouge, Crowley, Winnsboro, and St. Joseph

Funding Source: United Soybean Board

Length of Project: 2009-2014

### **Agronomic Limitations of Soybean Yield and Seed Quality in the United States**

**Principal Investigator: Palle Pedersen, Iowa State University; Program Manager: Jason De Bruin, Iowa State University; Co-Principal Investigators: Jeremy Ross, University of Arkansas, Chad Lee, University of Kentucky, James Board, Louisiana State University, Kurt Thelen, Michigan State University, and Seth Naeve, University of Minnesota. Additionally, Ernie Clawson and Don Boquet, LSU Ag Center, is conducting repetitions of 3 of the studies.**

Project Focus:

- (1) High-yield production practices for US soybean production
- (2) Soil and plant fertility management for soybean in the US
- (3) Determination of the minimal optimal plant population for soybean production in the US

Location of Studies: Northeast Research Station, Saint Joseph, LA; other locations in LA and in other U.S. states

Funding Source: United Soybean Board

Length of Project: 2009-2011

## **Evaluation of Maturity Group III, IV, and V Soybeans for Production as Double Crops Following Wheat**

**Ernie Clawson, LSU Ag Center**

Project Focus:

Compare the yield, timing of maturity, and other aspects of performance of Maturity Group III, IV, and V soybeans when planted after wheat.

Location of Studies: Northeast Research Station, Saint Joseph, LA

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: Annual renewal required; expected 2009-2012

## **Tri-State Soybean Inoculation Study**

**Ronald J. Levy Jr.**

Project Focus:

Soybean Inoculation – Evaluate commercially available inoculants and seed treatment fungicides, looking at plant stand, growth and yield.

Location of Studies: Dean Lee and Rice Research Station

Funding Source: Industry Funds

Length of Project: 2009

## **Becker Developmental Soybean Inoculation Study**

**Ronald J. Levy Jr.**

Project Focus:

Soybean Inoculation – Evaluate Becker developmental inoculants, looking at plant stand, growth and yield.

Location of Studies: Dean Lee

Funding Source: Industry Funds

Length of Project: 2009

## **Becker Commercial Soybean Inoculation Study**

**Ronald J. Levy Jr.**

Project Focus:

Soybean Inoculation – Evaluate Becker commercially available inoculants, looking at plant stand, growth and yield.

Location of Studies: Dean Lee

Funding Source: Industry Funds

Length of Project: 2009

### **Association between Heat Tolerant Seed Production and Seed Quality**

**K.R. Reddy, Mississippi State University**

Project Focus:

Evaluate changes in seed composition, quality, and germinability between a known heat-susceptible soybean genotype and a known heat-tolerant genotype under three temperature regimes (optional, moderately high, and high).

Location of Studies: North Farm, Mississippi State University, Mississippi State, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

### **Management of Seed Rot and Poor Seed Quality with Insecticide and Fungicide Combinations in Soybeans**

**Tom Allen, Don Cook, Jeffrey Gore, Angus Catchot, Trey Koger, Chris Daves, and Richard Baird – Mississippi State University**

Project Focus:

Investigate fungicide and insecticide combinations applied at various reproductive timings for improved seed quality characteristics on group IV soybeans.

Location of Studies: Delta Research and Extension Center, Stoneville, MS; North Farm, Starkville, MS; Central Research and Extension Center, Raymond, MS.

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

### **Characterization of Alternative Soybean Storage Practices and Their Effects on Post-Harvest Quality**

**Jason Ward and Jeremiah Davis – Mississippi State University**

Project Focus:

To characterize current on-farm soybean storage capacity and storage practices in Mississippi. To measure storage conditions within grain bags and assess its effect on grain quality.

Location of Studies: Grain collection to occur from various locations across the state. Research evaluations to occur at Mississippi State University, Mississippi State, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

### **Evaluation of Critical Shattering Time of Early-Maturity Soybeans under Early Soybean Production System**

**Lingxiao Zhang, Mark Shankle, and Bernard White – Mississippi State University**

Project Focus:

To continue to investigate seed shattering behaviors, patterns, and critical time of early soybean varieties under different growing conditions. To identify potential MGIV soybean varieties that have better physiological and genetic characteristics of shattering resistance; and to study and quantify the effects of planting date and harvest time on seed shattering and yield loss.

Location of Studies: Delta Research and Extension Center, Stoneville, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2008-2010

### **Evaluation of Experimental Soybean Lines for Drought Tolerance under Greenhouse Conditions Using a Competitive Soil Moisture Apparatus**

**Jim Heitholt, Texas A&M-Commerce and Texas AgriLife Research**

Project Focus:

To screen and identify Plant Introductions and advanced breeding lines that maintain leaf turgidity and adequate pod set when exposed to drought under “controlled” conditions and when competing for water directly with each other. My greenhouse pots are 15 gallons; each pot holds one plant from each of ten different entries. Once water is withheld (targeted for growth stage R3) each entry’s root system is exposed to identical soil moisture. Although my approach has its limitations, we can conduct tests throughout the year and make multiple side-by-side comparisons.

Location of Studies: Greenhouses at Texas A&M-Commerce

Funding Source: Texas Soybean Board

Length of Project: 2009 – Seeking funding for 2010 through 2012

### **Agronomic Factors Involved in Soybean Production along the Texas Gulf Coast**

**James Grichar, Joe Janek, Brent Batchelor – Texas AgriLife Research**

Project Focus:

Evaluate production requirements along the coast – variety trials, weed control, disease & insect control, planting date, fungicide needs etc.

Location of Studies: Texas Gulf on producer cooperators

Funding Source: Texas Soybean Board

Length of Project: 2009 growing season – has been renewed annually

***Bradyrhizobium* Inoculation and Nodulation/Yield Tests for Texas Soybeans**

**Calvin Trostle, Texas AgriLife Extension; James Grichar & Jim Heitholt, Texas AgriLife Research**

Project Focus:

Testing of different *Rhizobium* inoculants (seed box powder, on-seed liquid, none) for soybean production with and without applied N fertilizer.

Location of Studies: Texas Gulf Coast (Victoria County), Commerce area, High Plains (Moore County and an add-on site at Lubbock)

Funding Source: Texas Soybean Board

Length of Project: Targeting 2008-2010 but annually renewable

**Efficacy of Okara (residue from soymilk) as a Feed Supplement for Cattle and Goat**

**Jim Heitholt, Texas A&M-Commerce and Texas AgriLife Research; David Colbert, Texas A&M-Commerce; Scott Stewart, Texas A&M-Commerce; Lauren Ramsey, Texas A&M-Commerce; Chris Ellason, Texas A&M-Commerce; Flavio Ribeiro, Texas A&M-Commerce**

Project Focus:

Okara is the residue remaining after soymilk is brewed. Dried okara contains 35% protein and 15% fat. We seek to quantify the effects of okara on the performance of cattle and goats. We also plan to determine what percentage of okara can substitute for the conventional feed ration. In 2010, we will conduct a feasibility study that would indicate the potential for a co-op located near a major metropolitan area to generate soymilk for human consumption and okara for animal feed.

Location of Studies: Commerce, Texas

Funding Source: Unfunded

Length of Project: 2009 and beyond

## **Disease and Nematode Management**

### **Statewide Monitoring of Soybean Rust and Other Diseases**

**Scott Monfort and Jeremy Ross, Cooperative Extension Service, UA Division of Agriculture**

Project Focus:

- (1) To effectively monitor the state for Asian Soybean Rust through sentinel plots and mobile double crop soybean sentinel plots and to diagnose soybean samples in a timely and accurate manner.
- (2) Evaluate diagnostic methods of early detection of rust and determine benefits of fungicide management.

Location of Studies: Soybean sentinel and disease plots in 27 soybean producing counties throughout Arkansas

Funding Source: Arkansas Soybean Promotion Board, USB, North central soybean promotion board, & Agricultural Industry (Dow, Bayer, & Syngenta)

Length of Project: 2008-2010

### **Comprehensive Disease Screening of Soybean Cultivars in Arkansas**

**Terry Kirkpatrick, Southwest Research & Extension Center, and Scott Monfort, University of Arkansas Division of Agriculture**

Project Focus:

Annual evaluation of all soybean cultivars that are entered into the UofA Soybean Cultivar Performance Trials – Evaluations (screens) include greenhouse evaluations for root-knot, soybean cyst and reniform nematodes, and small plot replicated trials for stem canker and frogeye leaf spot. An aerial blight field screen will be added in 2010.

Location of Studies: Stem canker, root-knot and soybean cyst nematode (race 3) – Southwest Research & Extension Center, Hope, AR; Frogeye leaf spot – Newport Research Station, Newport; Reniform and soybean cyst (races 2 & 5) – University of Arkansas campus, Fayetteville

Funding Source: Arkansas Soybean Promotion Board

Length of Project: Annual with 3-year funding cycle

### **Control of seedling disease by fungicide seed treatment and cultivar selection and effect of plant population and seed treatment fungicide on stand and yield at three planting dates**

**J. Rupe, C. Rothrock, T. Kirkpatrick, M. Popp, R. Cartwright – University of Arkansas Division of Agriculture**

Project Focus:

This research compares the effects of fungicide seed treatment, cultivar, and planting density on stand establishment and yield on three planting dates at three locations.

Location of Studies: Northeast Arkansas Research and Extension Center, Keiser; Rice Research and Extension Center, Stuttgart; and Southeast Branch Station, Rohwer

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2008-2010



### **Charcoal Rot Cultivar Evaluation Using Adapted and Exotic Sources of Resistance**

**J. Rupe, C. Rothrock, S. Bajwa-University of Arkansas Division of Agriculture; A. Mengistu-USDA; Curt Hill-University of Illinois; Jason Bond, Ahmad Fakhoury-Southern Illinois University; Allen Wrather, Grover Shannon-University of Missouri; Chris Little-Kansas State University**

Project Focus:

Multi-state project that includes standardized cultivar comparison field tests in five states, micro plot tests to separate the effects of stress and the cultivar on disease development, development of greenhouse screening methods, toxin production, cultivar and plant introduction screenings, and the effects of disease on reflectance.

Location of Studies: In Arkansas: Arkansas Research and Extension Center, Fayetteville, AR and Southeast Branch Station, Rohwer, AR; also in Missouri, Kansas, Illinois, and Tennessee

Funding Source: United Soybean Board

Length of Project: 2008-2010

### **Effects of genotype on severity of charcoal rot and yield in soybeans**

**J. Rupe, C. Rothrock, R. Cartwright, University of Arkansas Division of Agriculture**

Project Focus:

Maturity group 4 and 5 cultivars are being compared in uninoculated and plots inoculated with *Macrophomina phaseolina*, the charcoal rot pathogen. Comparisons are made on stand, plant height, and yield.

Location of Studies: Cotton Branch Station, Marianna, AR

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2008-2010

### **Assessment of soybean varieties for reaction to aerial blight disease; and fungicides to control aerial blight**

**R.D. Cartwright – University of Arkansas Division of Agriculture**

Project Focus:

Research will develop and validate a method to evaluate soybean varieties in the Arkansas Variety Testing Program for reaction to aerial blight disease under field conditions; and assess different fungicides for efficacy against the disease.

Location of Studies: Arkansas Agricultural Research and Extension Center, Fayetteville, AR; Vegetable Substation, Kibler, AR

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2008-2010

### **Identification of the factors that cause soybean green bean syndrome**

**I. Tzanetakis, J. Rupe with S. Monfort, S. Bajwa-University of Arkansas Division of Agriculture; and S. Sabanadzovic, Mississippi State University**

Project Focus:

Fields with large areas of plants with green bean syndrome will be identified and assayed for soil and plant nutritional factors, viruses and phytoplasmas, and insect damage. Aerial photographs of the fields will be taken to determine patterns of the problem and these will be compared to satellite images of the same field taken earlier in the season.

Location of Studies: Grower fields throughout the state

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2008-2010

### **Detection of soybean cyst, reniform and root-knot nematodes in soil using multiplex real-time PCR**

**Ron Saylor, Terry Kirkpatrick, (Cooperators) – Scott Monfort, Bob Robbins, Rick Cartwright, University of Arkansas Division of Agriculture**

Project Focus:

To develop a rapid, accurate, and cost-effective PCR-based detection and quantification method for soybean cyst, reniform, and root-knot nematodes, the three major nematode pests of soybeans. This will speed reporting of nematode infestations so that more timely management decisions can be made, and increase the sensitivity of nematode detection, especially for samples with low numbers of nematodes that are difficult to detect visually.

Location of Studies: University of Arkansas, Department of Plant Pathology, Fayetteville; Southwest Research and Extension Center, Hope

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2009-2011

### **Testing of seed treatment for nematode control**

**R.T. Robbins, University of Arkansas Division of Agriculture**

Project Focus:

To test various seed treatments for control of selected plant parasitic nematodes. Control is defined as the amount of reproduction of tested nematodes on each treatment as determined by beginning and ending nematode numbers.

Location of Studies: Greenhouses Main Experiment Station, Fayetteville

Funding Source: Syngenta

Length of Project: Yearly Contract

### **Integrated Management of Soybean Nematodes**

**Scott Monfort, Cooperative Extension Service, and Terry Kirkpatrick, Southwest Research and Extension Center, University of Arkansas Division of Agriculture**

Project Focus:

- (1) To monitor the incidence and determine the potential risk of plant-parasitic nematodes (root-knot, soybean cyst, and reniform) to soybean production systems in Arkansas.
- (2) To evaluate currently-existing methods for controlling nematodes in soybeans, and to test newly emerging control technology and resistant cultivars.
- (3) To develop sustainable, economically feasible nematode management strategies for Arkansas producers.

Location of Studies: Commercial fields in Clay, Mississippi, Lonoke, Jefferson, Drew, and Faulkner Counties; Southeast Research & Extension Center, Rohwer

Funding Source: Arkansas Soybean Promotion Board; Agricultural Industry (Dow, Bayer, & Syngenta)

Length of Project: 3 years

### **Rotation of Roundup Ready and Conventional Soybeans Varieties from Sources with Different Soybean Cyst Nematode Resistance Reactions**

**R.T. Robbins and Terry Kirkpatrick, University of Arkansas Division of Agriculture**

Project Focus:

To determine if rotation of varieties with the available SCN resistance reaction sources will continue to be effective in further lowering SCN numbers. To determine if Roundup-ready varieties which predominate today, are as effective in reducing SCN numbers as conventional varieties. To attain, then maintain, high soybean yields in the presence of SCN through the use of these rotations.

Location of Studies: Pine Tree Experiment Station

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2002-2013

### **Biology and Control of Major Diseases of Soybeans**

**Raymond W. Schneider, LSU Ag Center**

Project Focus:

This project addresses the major diseases affecting soybeans in Louisiana, including *Cercospora* leaf blight and soybean rust. Several research thrusts are presently underway including 1) optimization of fungicide applications; 2) disease management with modified nutritional regimes; 3) GIS analysis of spatial distribution of soybean rust and soil and plant factors affecting distribution; 4) determination of time of infection for *Cercospora* leaf blight and development of disease management tactics; and 5) management of soybean rust with a biological control agent.

Location of Studies: Baton Rouge, LA

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2007-2012

**Evaluation of Soybean Cultivars and Fungicides for Disease Management in Northeast Louisiana**  
**Boyd Padgett, LSU Ag Center; Don Boquet, LSU Ag Center; Ernie Clawson, LSU Ag Center**

Project Focus:

The objectives of this project are to evaluate soybean varieties for resistance to diseases, evaluate new and commercial fungicides for efficacy against soybean diseases, and quantify yield loss due to disease.

Location of Studies: Dean Lee Research Station, Macon Ridge Research Station, Northeast Research Station, Red River Research Station, Morehouse, Concordia, Richland, and Jefferson Davis parishes

Funding Source: Promotion Board, Industry Funds

Length of Project: 2009-2010

**Analysis of Airborne Populations of Phakopsora pachyrhizi, the Soybean Rust Pathogen**  
**Raymond W. Schneider, LSU Ag Center**

Project Focus:

This multi-state project focuses on evaluation of technology to monitor airborne populations of the Soybean rust pathogen and to develop disease forecasting models based upon spore capture data. A new spore sampler, based upon electrostatic deposition, was developed during the course of this project.

Location of Studies: Baton Rouge, LA; Quincy, FL; Blackville, SC; Urbana, IL; Minneapolis, MN

Funding Source: United Soybean Board

Length of Project: 2007-2010

**Assessment of Satellite Reconnaissance to Detect and Monitor Asian Soybean Rust**  
**Raymond W. Schneider, LSU Ag Center; Forrest Nutter, Iowa State University; David Wright, University of Florida**

Project Focus:

The primary objective of this project is to document the specificity and resolution of satellite remote sensing capability in detecting and monitoring the spread of Asian soybean rust.

Location of Studies: Baton Rouge, LA; Ames, IA; and Quincy, FL

Funding Source: Department of Homeland Security

Length of Project: 2008-2010

**Investigation of soybean-Phakopsora pachyrhizi interactions through a proteomics-based approach**

**Zhi-Yuan Chen, Dept of Plant Pathology and Crop Physiology, LSU Ag Center**

Project Focus:

The focus of this project is to study soybean-Phakopsora pachyrhizi (soybean rust) interactions using proteomics to understand how the fungus establishes itself on soybean and how soybean defends against rust infection.

Location of Studies: Department of Plant Pathology and Crop Physiology, LSU Ag Center

Funding Source: Louisiana Board of Regents

Length of Project: 2008-2011

**Developing a new strategy to control soybean rust disease through a proteomics-based approach**

**Zhi-Yuan Chen, Dept of Plant Pathology and Crop Physiology, Louisiana State University Agricultural Center**

Project Focus:

The focus of this research project is to identify proteins either highly expressed in rust infected soybean leaves or in soybean lines that are resistant to soybean rust (*Phakopsora pachyrhizi*) and use these proteins to boost soybean resistance to rust disease.

Location of Studies: Department of Plant Pathology and Crop Physiology, LSU Ag Center

Funding Source: Louisiana State Soybean Promotion Board

Length of Project: 2009-2010

**Evaluation of Soybean Germplasm for Resistance to Asian Soybean Rust**

**Raymond W. Schneider, LSU Ag Center**

Project Focus:

The primary focus of this project is to conduct field screenings of germplasm and breeding lines for resistance to soybean rust.

Location of Studies: Baton Rouge, LA

Funding Source: United Soybean Board

Length of Project: 2007-2010

**Management of Asian Soybean Rust with Prescription Nutritional Amendments**

**Raymond W. Schneider, LSU Ag Center**

Project Focus:

This project focuses on the relationship between chloride nutrition and soybean rust. The roles of foliar applications manganese and boron also are addressed.

Location of Studies: Baton Rouge, LA

Funding Source: International Plant Nutrition Institute

Length of Project: 2007-2012

**Stratego, Stratego 'Spike' Programs / Soybeans / Rust, LSD / Univ. Efficacy and Tol.**

**Ronald J. Levy Jr.**

Project Focus:

Soybean Fungicide Efficacy – Evaluate fungicide products and programs that are effective against soybean rust and late season diseases

Location of Studies: Dean Lee

Funding Source: Industry Funds

Length of Project: 2009

**BASF Soybean Fungicide Programs / Soybeans / Rust, LSD / Univ. Efficacy and Tol.**

**Ronald J. Levy Jr.**

Project Focus:

Soybean Fungicide Efficacy – Evaluate fungicide products and programs that are effective against soybean rust and late season diseases

Location of Studies: Dean Lee

Funding Source: Industry Funds

Length of Project: 2009

**Syngenta Soybean Fungicide Programs / Soybeans / Rust, LSD / Univ. Efficacy and Tol.**

**Ronald J. Levy Jr.**

Project Focus:

Soybean Fungicide Efficacy – Evaluate fungicide products and programs that are effective against soybean rust and late season diseases

Location of Studies: Dean Lee

Funding Source: Industry Funds

Length of Project: 2009

**Syngenta Soybean Afla-Guard Programs / Soybeans / Rust, LSD / Univ. Efficacy and Tol.**

**Ronald J. Levy Jr.**

Project Focus:

Soybean Fungicide Efficacy – Evaluate Afla-Guard for its effectiveness against soybean rust and late season diseases

Location of Studies: Dean Lee

Funding Source: Industry Funds

Length of Project: 2009

**Identification of Plant Viruses Infecting Soybean in Louisiana**

**Rodrigo Valverde, LSU Ag Center**

Project Focus:

The main goal of this project is to continue the survey for viruses infecting soybean in Louisiana and to develop diagnostic tools. The specific objectives for this year are to continue the survey for soybean viruses and to characterize new viruses or strains.

Location of Studies: Soybean Farms throughout the State

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2008-2009

**The importance of induced responses and neighbor effects for plant defense against herbivores in diverse environments**

**J. Davis, K. Kamminga, A. Richter (LSU Ag Center); A. Accamando, J. Cronin (LSU)**

Project Focus:

Examine how resistance to herbivores in soybeans that have inducible defenses influence local pest communities. Plant species richness and composition within experimental plots is being manipulated and then we monitor herbivory and fitness on focal plants that utilize an inducible defense strategy.

Location of Studies: Ben Hur Research Station

Funding Source: NSF

Length of Project: 2009-2010

**Soybean Diseases as Influenced by Agronomic Practices, Soybean Genotypes, and Reduced Tillage**

**Alemu Mengistu**

Project Focus:

Determine the influence agronomic practices, soybean genotypes, and reduced tillage have on soybean diseases.

Location of Studies: Jackson, TN

Funding Source: ARS

Length of Project: 2009-2012

**Control, Characterization, and Identification of Potential Novel Resistance of the Late-Season Soybean Diseases Cercospora Leaf Blight and Frogeye Leaf Spot**

**Steve Martin, Brewer Blessitt, Trey Koger, Tom Eubank, Gabe Sciumbato, and Tom Allen – Mississippi State University**

Project Focus:

Evaluate the efficacy of foliar fungicides for control of late-season diseases in soybean varieties lacking resistance to certain important late season diseases. Survey and collect isolates of late-season cercospora from across Mississippi and identify any pathogen variability between isolates. Begin to identify possible resistance to late season cercospora and possible novel resistance to frogeye leaf spot.

Location of Studies: Delta Research and Extension Center, Stoneville, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

**Establishment, Colonization, Toxin Production and Development of the Charcoal Rot Fungus, *Macrophomina Phaseolina* on Soybeans**

**Richard Baird, and Tom Allen, Mississippi State University**

Project Focus:

Continued screening of nutrients and toxin production in plants to determine exact interactions for improved control and management of *M. phaseolina* and to evaluate botryodiplodin *in vivo* to determine natural soybean seedling resistance (+induced resistance). Further, evaluate the botryodiplodin levels between tolerant and susceptible soybean varieties (greenhouse and field). Isolates of *M. phaseolina* from the soybean production states from the United States will be evaluated for pathogenicity (botryodiplodin production potential) and their genetic variability using SSR molecular data.

Location of Studies: Mississippi

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

**Charcoal Rot Cultivar Evaluation Using Adapted and Exotic Sources of Resistance**

**Alemu Mengistu**

Project Focus:

Evaluate soybean cultivars for charcoal rot resistance using adapted exotic sources of resistance

Location of Studies: Jackson, TN

Funding Source: ARS-USB

Length of Project: 2009-2012

**Soybean Rust Monitoring**

**Tom Allen and Trey Koger, Mississippi State University**

Project Focus:

Monitor soybean sentinel plots, kudzu patches, and commercial soybean fields for the presence of soybean rust throughout the soybean growing season.

Location of Studies: Statewide

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009



**Application of Foliar Fungicides to Maturity Group IV and Early V Soybeans at the R5 Growth Stage or Later to Improve Seed Quality and Appearance**

**G.L. Sciumbato, Don Cook, Jeff Gore, and Tom Allen – Mississippi State University**

Project Focus:

Apply foliar fungicides to soybeans at growth stage R5 and later to determine if these late fungicide applications will have an effect on seed quality and appearance. Apply late season foliar insecticides to control pod feeding insects to determine if late season insects are having an effect on seed quality and appearance. Compare the effects of late applied foliar fungicides and foliar insecticides alone or in combination to determine if there are any interactions between the fungicides and insecticides. Grade seed from fungicide and insecticide treated and untreated plots to determine if treatment increased seed quality enough to justify fungicide cost.

Location of Studies: Delta Research and Extension Center, Stoneville, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

**Characterization of the Causal Agent of a Novel Foliage Soybean Disease and Survey of Disease Development**

**Shien Lu, Tom Allen and Richard Baird – Mississippi State University**

Project Focus:

To characterize the casual agent of a recently discovered soybean leaf spot and to investigate preliminary disease development

Location of Studies: Statewide

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

**Seeking the Cause of a Soybean Bud Proliferation Syndrome in Mississippi**

**Sead Sabanadzovic, Mississippi State University**

Project Focus:

To initiate an organized study on “bud proliferation” (or “bud blight”) disease observed in recent years in soybean production fields of Mississippi and Arkansas.

Location of Studies: Arkansas and Mississippi

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

**Screening of Soybean Varieties, Breeding Lines and SCN Resistant Selections for Charcoal Rot, Frogeye Leaf Spot and Phomopsis Seed Decay Resistance**

**Alemu Mengistu**

Project Focus:

Evaluate soybean cultivars, breeding lines, and soybean cyst nematode selections for resistance to charcoal rot, frogeye leaf spot, and phomopsis seed decay.

Location of Studies: Jackson, TN

Funding Source: ARS-TN Soybean Promotion Board

Length of Project: 2009-2012

**Viruses of Soybeans in Mississippi: A Case Study**  
**Sead Sabanadzovic, Mississippi State University**

Project Focus:

To identify viruses infecting soybeans in Mississippi, to evaluate their relative incidence and importance and to study alternative hosts of the main viral pathogen, Bean pod mottle virus (BPMV).

Location of Studies: Statewide depending on where the virus is identified in producer fields

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2007-2009

## **Insect Management**

### **Evaluation Management and Education to Reduce the Impact of Insects in Soybeans**

**Gus Lorenz and Scott Akin, University of Arkansas Division of Agriculture**

Project Focus:

20 Seed Treatment Trials for control of below and above ground arthropods and nematodes

25 Foliar efficacy trials for control of Bollworm, Fall Armyworm, Loopers, Green Cloverworm

17 Foliar efficacy trials for control of Bean Leaf Beetle

2 Assays of Bean Leaf Beetle to determine resistance to pyrethroid

25 Stink Bug efficacy trials for Green, Southern Green and Brown Stink Bug

8 Stink Bug efficacy trials for control of Red banded Stink Bug (new to Arkansas)

2 Assays of insecticide efficacy for Red banded Stink Bug mortality with standard and new insecticides

26 Foliar efficacy trials for control of Three Cornered Alfalfa Hopper

3 Simulated girdling trials for determination of economic threshold

3 Threshold trials for determination of impact of TCAH on late-planted soybeans

4 Foliar Dectes trials to determine efficacy for control of stem borers

1 Dectes Survey of Arkansas to determine extent of infestation in the mid south (22 counties surveyed)

15 Scouting Schools (10 in 2009) for proper procedures on scouting soybeans, insecticide selection, and identification of soybean pests (over 300 attending) – gave away over 200 sweep nets to participants this year.

Location of Studies: Farmer fields; University of Arkansas Division of Agriculture Research Stations

Funding Source: Industry Funds and Arkansas Soybean Promotion Board

Length of Project: On-going

### **Arkansas Survey for Invasive Insect Pests**

**Gus Lorenz and Scott Akin, University of Arkansas Division of Agriculture**

Project Focus:

Conducting a statewide survey for invasive pests of soybeans including old world bollworm, silver Y-spot, soybean borer, and other exotic pests considered to have the most potential for becoming a problem in Arkansas. The survey is being conducted with county Extension agents in Northeast and Southeast Arkansas. Two in-service training courses have been conducted on identification and proper trapping procedures. Collaborator is the Arkansas State Plant Board.

Location of Studies: Statewide – Arkansas

Funding Source: USDA

Length of Project: 2008 and 2009

### **Three cornered Alfalfa Hopper**

**Gus Lorenz, University of Arkansas Division of Agriculture**

Project Focus:

1. Determine the impact of TCAH on full season and double-crop beans as they relate to yield loss for Arkansas soybean producers.
2. Investigate differing levels of TCAH on seedling and reproductive stage beans to determine what populations are causing damage to help growers and “decision-makers” decide when preventative applications are necessary. This should reduce the number of insecticide applications overall.
3. Determine efficacy of available compounds for control. Determine value of seed treatments as a management option and determine which foliar compounds are the most efficacious.

Location of Studies: Grower fields in Ashley, Lincoln, Jefferson, and Desha counties and the Lon Mann Experiment Station

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2008-2010

### **Screening advanced breeding selections and current cultivars for host plant resistance to the southern soybean insect pest complex**

**J. Davis, K. Kamminga, A. Richter, J. Temple, B.R. Leonard (LSU Ag Center); R. Mian (Ohio State University); A. Gillen (USDA-ARS Stoneville); A. Cardinal (NCSU); Hornbeck Seed Company**

Project Focus:

Soybean entries (50) of MG III to VI are being screened in the field for host plant resistance to the soybean insect pest complex.

Location of Studies: Macon Ridge Research Station

Funding Source: None

Length of Project: 2009-2010

### **Monsanto Soy Insect Protection 2: 2009 US Field Efficacy Trials**

**J. Davis, K. Kamminga, A. Richter (LSU Ag Center)**

Project Focus:

Transgenic soybean entries expressing new Bt proteins are being evaluated for activity against Lepidopteron pests

Location of Studies: Ben Hur Research Station and Dean Lee Research Station

Funding Source: Industry

Length of Project: 2009-2010

**Biology, distribution and management of soybean insect pests**

**J. Davis, K. Kamminga, A. Richter, J. Temple, B.R. Leonard (LSU Ag Center)**

Project Focus:

- (1) Evaluate the efficacy of new and current insecticides for control of all soybean arthropod pests.
- (2) Define economic injury levels (EIL) and economic thresholds (ET) for red banded stinkbugs in soybeans based on yield and quality.
- (3) Determine red banded stinkbug distribution and densities in soybean fields and surrounding landscapes across Louisiana.
- (4) Survey for biological control agents parasitizing red banded stinkbug eggs.

Location of Studies: Ben Hur Research Station, Macon Ridge Research Station, Iberia Research Station, Rice Research Station, and soybean producer fields in Washington and LeBeau

Funding Source: Louisiana Soybean and Grain Promotion Board

Length of Project: 2008-2011

**Residual activity of new and current insecticides on Lepidopteron pests of soybeans**

**J. Davis, K. Kamminga, A. Richter (LSU Ag Center)**

Project Focus:

The objective of this protocol is to determine the residual activity of current and new insecticides with and without an adjuvant on Lepidopteron pests of soybeans.

Location of Studies: Ben Hur Research Station

Funding Source: Industry

Length of Project: 2009-2010

**Screening Experimental Soybean Lines and Development of Cultivars with Tolerance to Stink Bugs in the Southern USA**

**B. R. Leonard, J. Temple, J. Davis, (LSU Ag Center); and J. Heitholt (Texas Agrilife Research)**

Project Focus:

Soybean entries are being screened for conventional HPR traits in a field for trial for insecticidal activity against stink bugs.

Location of Studies: Macon Ridge Station

Funding Source: United Soybean Board through Texas A&M

Length of Project: 2006-2009

**Preliminary investigation of an integrated multiple-tactic strategy for managing stink bugs in soybeans**

**J. Davis, K. Kamminga (LSU Ag Center), D.A. Herbert, Jr. (Virginia Tech)**

Project Focus:

Evaluate the efficacy of an “attract and kill” strategy on stink bug distribution and density in soybean fields. Evaluate the efficacy of integrating multiple control strategies (trap crops, insecticides and attractants) to control stink bugs.

Location of Studies: Ben Hur Research Station, Macon Ridge Research Station, and Producer Field in Grand Prairie

Funding Source: Southern Regional IPM Center

Length of Project: 2009-2010

**Comparing Soybean Seed Injury among Stink Bug Species**

**B.R. Leonard, J. Temple, J. Moore, and J. Davis (LSU Ag Center)**

Project Focus:

Individual stink bugs (southern green, brown, red-banded) are being caged on soybean pods during the R4-R8 stages to determine their ability to cause seed injury, yield loss, and effects on seed quality. The development of this protocol will allow the future comparisons for evaluating insecticides and host plant resistance traits.

Location of Studies: Macon Ridge Station

Funding Source: None

Length of Project: 2008-2010

**Effects of host plant resistance on the feeding behaviors of aphids, stink bugs, and three-cornered alfalfa hoppers**

**J. Davis, K. Kamminga, A. Richter (LSU Ag Center)**

Project Focus:

Using the electrical penetration graph technique, we are studying feeding behavior of aphids, stink bugs and hoppers on selected soybean varieties expressing host plant resistance.

Location of Studies: LSU Baton Rouge Campus

Funding Source: None

Length of Project: 2009-2012

**Efficacy and residual activity of insecticide treated soybean seed on aphids and three-cornered alfalfa hoppers**

**J. Davis, K. Kamminga, A. Richter (LSU Ag Center)**

Project Focus:

Using the electrical penetration graph technique, we are studying feeding behavior of aphids and hoppers on insecticide treated seed.

Location of Studies: LSU Baton Rouge Campus

Funding Source: None

Length of Project: 2008-2010

### **Identifying aphid population densities, landing rates and species in Louisiana soybeans**

**J. Davis, E. Wosula, C. Clark (LSU Ag Center)**

Project Focus:

Significant aphid populations (500 per plant) were found colonizing soybeans in Louisiana for the first time in 2008. Aphids have had profound direct impact on North America soybean production in the last eight years, reducing yields and increasing insecticide applications. To address these concerns, this proposal will survey which aphid species are colonizing soybeans in Louisiana, as well as, population densities and landing rates.

Location of Studies: Soybean production areas of Louisiana

Funding Source: None

Length of Project: 2008-2011

### **Simulated and actual three-cornered alfalfa hopper injury on soybean seedling mortality, plant lodging, and seed yields**

**B. R. Leonard, J. Temple, J. Davis (LSU Ag Center); D. Cook, J. Gore (Mississippi State University); S. Aiken, G. Lorenz (University of Arkansas); S. Stewart (University of Tennessee)**

Project Focus:

Significant levels of soybean seedling girdling and late-season lodging related to three-cornered alfalfa hoppers have become more common. Plant injury from three-cornered alfalfa hopper injury during the seedling stage has not been well-defined in recent years. Changes in soybean production practices (Early season system, double-cropping, Round-up Ready, seed-costs, and minimum seeding rates) justify this work as a regional project.

Location of Studies: Louisiana, Mississippi, Arkansas, and Tennessee Research Stations

Funding Source: State Grain Boards

Length of Project: 2008-2012

### **Evaluation of the colaspis threat in Louisiana rice/soybean rotations**

**J. Davis, K. Kamminga, A. Richter, N. Hummel (LSU Ag Center)**

Project Focus:

- (1) Survey soybean and rice fields throughout Louisiana to determine colaspis species populations and densities throughout the growing season.
- (2) Correlate soybean colaspis adult levels to next year's rice colaspis larvae levels.

Location of Studies: All LSU Ag Center Research Stations and Louisiana rice growing areas

Funding Source: None

Length of Project: 2009-2010

### **The Soybean Green Plant Problem – An Evaluation of Possible Influencing Factors**

**B. R. Leonard, B. Padgett, R. Schneider, J. Griffin, J Davis, R. Valverde, and D. Boquet – LSU Ag Center**

Project Focus:

This research project was initiated in 2008 and will continue to investigate various factors that may contribute to the green plant problem. Individual factors including insects, fungicide use, plant disease, genetics, herbicide applications, and stress (moisture deficit) will be evaluated for their effect on green leaf retention, green stems, and green pods. Additionally, the possible interactions of these factors will be investigated. Plant stem samples (with “green plant” symptoms) collected from various locations for the presence of viruses. Harvest aids are being evaluated as a means to overcome incidence of green leaves, green stems, and/or green pods.

Location of Studies: LSU Ag Center Research Stations

Funding Source: Louisiana Soybean and Grain Promotion Board

Length of Project: 2008-2010

### **Evaluating Selected Insecticide Use Strategies in Louisiana Soybeans**

**B.R. Leonard, J. Temple, and J. Davis**

Project Focus:

- (1) To evaluate soybean IST products and rates against seed and seedling pests.
- (2) To define when to terminate late-season soybean IPM based upon seed yield/quality: stink bugs.
- (3) To evaluate the performance of commercial and experimental insecticides against the insect pest complex attacking Louisiana soybeans, with an emphasis on the red banded stink bug.

Location of Studies: Macon Ridge Research Station

Funding Source: Louisiana Soybean and Grain Promotion Board

Length of Project: 2008-2010

### **Screening of Pioneer Transgenic Soybean to Natural Infestation of Soybean Looper (SBL) and Velvetbean Caterpillar (VBC)**

**B. R. Leonard, J. Temple, J. Moore, and J. Davis – LSU Ag Center**

Project Focus:

Transgenic soybean entries (126) are being screened in a field for trial for insecticidal activity against soybean looper.

Location of Studies: Macon Ridge Research Station

Funding Source: Industry

Length of Project: 2009-2010



### **Surveying susceptibility of soybean looper to Intrepid**

**B. R. Leonard, J. Temple, and J. Davis – LSU Ag Center**

Project Focus:

Variability in the performance of the primary insecticide, Intrepid, used to control soybean looper has caused considerable concern among soybean IPM workers in the Mid-South. Higher rates are typically used in LA, but in 2007 and 2008 numerous reports of unsatisfactory control were reported. Several populations across LA will be evaluated in laboratory bioassays for susceptibility to this insecticide.

Location of Studies: Production regions of LA

Funding Source: None

Length of Project: 2008-2010

### **Economics of Soybean Maturity Groups' Yield Response to Insecticide Seed Treatment with Early Planting Dates**

**Normie Buehring, Jeff Gore, Don Cook, Steve Martin and Angus Catchot, Mississippi State University**

Project Focus:

Evaluate the growth and yield response of selected MG III, early MG IV; late MG IV; early MG V and late MG V varieties to insecticide + fungicide seed treatments with 4-week planting intervals from early April to early June at 3 locations. Identify soybean MG variety/insecticide-fungicide seed treatment and planting date combinations that produced the highest returns above seed and seed treatment costs. Determine the optimum planting dates for soybean variety maturity groups.

Location of Studies: North Mississippi Research and Extension Center, Verona, MS; Delta Research and Extension Center, Stoneville, MS; North Farm, Starkville, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2008-2010

### **Thresholds and Insecticide Resistance of Bean Leaf Beetle and Other Defoliating Insects**

**Fred Musser, Angus Catchot, Don Cook and Jeffrey Gore, Mississippi State University**

Project Focus:

Evaluate the impact of defoliation time and vertical distribution on yield. Monitor bean leaf beetle populations for pyrethroid insecticide resistance. Develop a rapid assay system for bean leaf beetle that predicts insecticide performance. Evaluate the degree of vertical and horizontal movement of bean leaf beetle.

Location of Studies: North Farm, Mississippi State University, Mississippi State, MS; Delta Research and Extension Center, Stoneville, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

**Screening Soybean Genotypes and Accessions for Tolerance to Stink Bugs in the Southern US**  
**Jim Heitholt, Texas A&M-Commerce and Texas AgriLife Research; Pengyin Chen, University of Arkansas; Roger Leonard, LSU Ag Center; other collaborators include Allen Knutson, Manuel Campos, and M.O. Way, with the Texas A&M System**

**Project Focus:**

To screen and identify Plant Introductions and advanced breeding lines that maintains yield and quality in the presence of high numbers of stink bugs. The study has 3 parts: (1) survey to gauge the economic costs of the problem, (2) screening of selected breeding lines for stink bug numbers, yield, and seed quality, and (3) development of new populations by crossing the best ranking lines with either regionally adapted lines (to provide agronomically useful lines) or with highly susceptible lines (to identify QTLs associated with tolerance).

**Location of Studies:** Field plots in AR, LA, and TX; Greenhouses at Texas A&M – Dallas

**Funding Source:** United Soybean Board

**Length of Project:** 2007 to present – seeking to continue project to 2012

**Development of Red Banded Stink Bug Economic Injury Levels**

**M.O. Way, Texas AgriLife Research and Extension**

**Project Focus:**

- (1) Soybean host plant resistance and adaptability to SE TX growing conditions (Beaumont Center) – 8 MGV (including Vernal) varieties planted Mar 21; 4 reps of each treatment (treated and non-treated plots) – treated plots were sprayed 3 times with acephate to control red banded stink bugs; plots are being sampled for stink bugs every 10 days – plots range from R3 to R5 at time of this report.
- (2) Insecticide screening tests (Beaumont Center) – 2 tests involving MGV and MGVII varieties (MGV for stink bug test and MGVII for Lepidoptera defoliator test); will apply treatments for stink bugs within 2-3 weeks, soybeans are in R2 now; treatments include thiamethoxam and lambda-cyhalothrin, clothianidin, dinotefuran and acephate.
- (3) Red banded stink bug damage quantification – plots planted May 7 with MGV variety; soybeans in R2 now; at R3, R4, R5 R6 and R7, plants will be caged with red banded stink bugs; selected pods will be treated with insecticide regularly, other pods will be left untreated.

**Location of Studies:** Texas AgriLife Research and Extension Center, Beaumont, TX

**Funding Source:** Texas Soybean Board

**Length of Project:** 1 Year (2009)

## **Weed Management**

### **A Team Approach to Weed Management in Soybeans**

**Bob Scott, Ken Smith, Dick Oliver and Jason Norsworthy, University of Arkansas Cooperative Extension Service and Experiment Station, Division of Agriculture**

Project Focus:

The focus of this project is to maintain and update recommendations in the Arkansas MP44 publication "Chemicals for Weed and Brush Control". It is also to provide producers and others with unbiased, up to date recommendations on new chemistry as it emerges from Industry and onto the market. As of late, this project has focused more heavily on glyphosate-resistant weeds and their control.

Location of Studies: **Approximately 100 trials are conducted under the umbrella of this large project each year.** Locations: UAPB farm at Lonoke, Newport Research Station, NEREC, SEREC, Pine Tree, and RREC at Stuttgart, Fayetteville Research Station, and various locations in producer fields all across AR.

Funding Source: Arkansas Soybean Promotion Board and Industry funds

Length of Project: 2008-2010

### **Weed Management and Biology Research in Soybeans**

**James L. Griffin, School of Plant, Environmental, and Soil Sciences, LSU Agricultural Center**

Project Focus:

This project addresses crop safety, weed control, and fit of experimental herbicides and transgenic technologies in Louisiana production systems with the goal to develop cost effective weed management programs. The project also addresses weed population shifts and weed resistance associated with herbicide-resistant crops. The possible interaction that may occur with use of insecticides and fungicides and the value of harvest aids on soybean yield and grade is also under investigation.

Location of Studies: Central Research Station, Ben Hur Research Farm

Funding Source: Louisiana Soybean Promotion Board

Length of Project: 2009-2010

### **Soybean Weed Control Research in Northeast Louisiana**

**Donnie Miller, LSU Ag Center**

Project Focus:

The project will focus on identifying effective and economical weed management programs in Northeast Louisiana soybean production systems. The utility of fall/winter herbicide applications in conservation tillage systems and impact of IPM systems, especially insecticide and fungicide co-application effects, will also be a focus. Research will also focus on management strategies post-harvest to assess the impact on subsequent weed populations.

Location of Studies: LSU Ag Center Northeast Research Station

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2009-2010

### **Soybean Weed Management Systems in Louisiana**

**Daniel O. Stephenson, IV, PhD – LSU Agricultural Center**

Project Focus:

Evaluation of experimental and registered herbicides and herbicide-tolerant soybeans for feasibility in weed management systems and crop tolerance. Development of weed management strategies for soybean cropping systems in the Louisiana Red River Valley. Research and extension efforts for the identification and evaluation of herbicide resistant weeds and to develop herbicide resistant weed management strategies.

Location of Studies: Dean Lee Research and Extension Center, Alexandria; Red River Research and Extension Center, Bossier City, LA; Multiple locations in producer crop fields throughout the state.

Funding Source: Louisiana Soybean and Grain Research and Promotion Board; Industry Funds

Length of Project: Project funded by Promotion Board is 2009-2010; others have indefinite timeline.

### **BASF Out Crossed Red Rice Reduction Study**

**Ronald J. Levy Jr. and Eric Webster**

Project Focus:

Evaluate crop rotation (rice-soybeans-tillage) for red rice and weed control.

Location of Studies: Acadia Parish

Funding Source: Industry Funds

Length of Project: 2009-2012

### **Syngenta Prefix Herbicide Evaluation**

**Ronald J. Levy Jr.**

Project Focus:

Soybean Herbicide Evaluation – Evaluate Prefix Herbicide weed control, looking at weed control, efficacy, growth and yield

Location of Studies: Dean Lee

Funding Source: Industry Funds

Length of Project: 2009

### **Syngenta FlexStar GT Herbicide Evaluation**

**Ronald J. Levy Jr.**

Project Focus:

Soybean Herbicide Evaluation – Evaluate FlexStar GT Herbicide weed control, looking at weed control, efficacy, growth and yield

Location of Studies: Dean Lee

Funding Source: Industry Funds

Length of Project: 2009

### **Liberty Link Soybean – Alternative Weed Control**

**Ronald J. Levy Jr.**

Project Focus:

Soybean Herbicide and Variety Evaluation – Evaluate Liberty Link soybean herbicide program, looking at weed control, efficacy, growth and yield

Location of Studies: Dean Lee (2), Vermillion and Pointe Coupee

Funding Source: Industry Funds

Length of Project: 2009

### **Efficiency of Pesticide Deposition**

**R. Barbosa – BAE Department – LSU Ag Center**

Project Focus:

To compare nozzle types and spray volumes in ground-based application systems for vertical product distribution within the crop canopy; To compare application volumes in aerial-based application systems for vertical product distribution within the crop canopy; To compare aerial and ground-based applications for vertical distribution in the crop canopy; To compare off-target drift with aerial and ground-based application methods.

Location of Studies: Ben Hur Research Station

Funding Source: Louisiana Soybean Board

Length of Project: 2007-2010

### **Addressing Critical Soybean Weed Control Issues in Mississippi**

**Vijay Nandula, Trey Koger, Tom Eubank and Brewer Blessitt, Mississippi State University**

Project Focus:

Assess the long-term impact of glyphosate-only weed management systems on pigweed populations and compare the net returns above weed management costs of these systems to programs that use residual herbicides in conjunction with glyphosate. Develop cost effective control strategies for glyphosate-tolerant Italian ryegrass and horseweed. Compare the efficacy and economics of fall- and spring-applied winter weed management programs. Develop control strategies for late-emerging annual grasses in early-maturing soybeans. Evaluate new products for positioning into soybean weed management programs in Mississippi.

Location of Studies: Delta Research and Extension Center and in multiple off-station field locations according to the presence of specific weeds and weed complexes.

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2008-2010

**Survey of the Mississippi Delta for Spread and Distribution of Glyphosate Resistant and Other Herbicide Resistant Weeds**

**Vijay Nandula and Robin Bond, Mississippi State University**

Project Focus:

To establish a comprehensive database of glyphosate-resistance as well as other herbicide-resistant weeds in the Mississippi Delta.

Location of Studies: Mississippi Delta encompassing thorough coverage of the delta depending on where populations of potential glyphosate-resistant weeds are identified.

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

## **Fertilization and Liming**

### **Soybean Fertilization**

**Nathan Slaton, University of Arkansas Division of Agriculture**

Project Focus:

The soybean fertilization project objectives include: (1) correlation and calibration of Mehlich-3 extractable soil P and K with soybean yield to improve soil-test based fertilizer recommendations, (2) evaluation of time (e.g., December, February, or April) of P and K fertilizer application on soybean P and K nutrition and yield, (3) determination of the nutrient concentration of soybean seed to update crop P and K removal estimates, and (4) comparison of fresh poultry litter and inorganic P and K fertilizer applied at equal P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O rates on soybean yield and tissue P and K concentrations. The current project was initiated in 2008, is in its second year of a three-year project, and was a continuation of a project with similar objectives conducted from 2005-2007. Full-season soybean production is the primary production system being examined. To date, the project has shown that (1) soil-test K is an excellent predictor of soil K availability for soybeans, (2) soil-test P (Mehlich-3) is weakly correlated with soybean yield response to P fertilization (requires more research), and (3) yield of soybeans receiving fresh poultry litter is equal to or greater, depending on site, than soybeans fertilized with equal rates of inorganic P and K fertilizers.

Location of Studies: Rice Research Extension Center, SE Research Extension Center, Cotton Branch Station, Pine Tree Station, and selected grower fields in eastern AR

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2008-2010

### **Optimizing the Lime Requirements for Soybeans**

**Leo Espinoza, Cooperative Extension Service, University of Arkansas Division of Agriculture**

Project Focus:

Validate existing lime recommendations, as well as to characterize the spatial variability in soil pH using an automated soil pH sensor (MSP-EC, VERIS Inc.). Efforts to characterize the temporal variability in nutrients are also part of this study.

Location of Studies: Southeast Research & Extension Center, Northeast Research & Extension Center, Lon Man Cotton Research Station, several farmers' fields

Funding Source: AR Soybean Promotion Board, Industry Funds, UA Division of Agriculture

Length of Project: 2008-2010

### **Calibrating Soil Tests and Fertilization for Soybean and Grain Crops in Louisiana**

**Jim J. Wang, Brenda Tubana, Rodney Henderson – LSU/LAES, Baton Rouge; H.J. Mascagni, Ernie Clawson – LSU/LAES, NERS; Don Boquet – LSU/LACS, MRRS; J. Stevens – LSU/LCES, Dean Lee Research and Extension Center**

Project Focus:

Calibrate P fertilization on corn based on Mehlich 3 soil test extraction in acid soils. Recalibrate P and K for soybean production on acid soils, by updating P and K recommendations. Continue to evaluate incorporating maintenance criteria into sufficiency recommendations for P and K.

Location of Studies: Red River Research Station, Central Research Station, Northeast Research Station, Macon Ridge Research Station

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2009-2010; continuing project

### **Impact of Starter Fertilizers on Growth and Yield of March-, April-, and May- planted Soybeans** **Steve Martin, Brewer Blessitt, Trey Koger, Wayne Ebelhar, Tom Eubank, and Normie Buehring, Mississippi State University**

Project Focus:

Determine the impact of new-to-the-market inoculants and associated growth enhancing compounds for soybean growth, nodulation, and yield. Determine the most beneficial inoculants pertaining to specific areas with nodulation problems. Determine the impact of seed treatments on efficacy of inoculants and associated growth-enhancing compounds. Develop more accurate nodulation thresholds for modern yield potentials for various stages of soybean development. Survey grower fields for most frequent limiting production factors.

Location of Studies: Delta Research and Extension Center, Stoneville, MS as well as numerous off-station locations in close proximity to Stoneville.

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009

### **Determination of Soil Management Zones for Efficient Soybean Production**

**Michael Cox, Mississippi State University**

Project Focus:

Determine how to delineate soil management zones that best relate to soybean yield response to soil factors. Determine if variable rate application of phosphorus, potassium, and lime can increase soybean production efficiency.

Location of Studies: Delta Research and Extension Center

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011



## **Addressing Agronomic and Management Issues Related to Soybean Production on Silt Loam Soils**

**Trey Koger, Tom Allen, Brewer Blessitt, and Tom Eubank, Mississippi State University**

Project Focus:

Identify optimal seeding rates for MG IV and V soybean on silt loam soils. Determine optimal plant populations for MG IV and V soybean twin-row and wide-row soybean on silt loam soils. Identify optimal plant populations and planting dates for MG IV and V soybean to reduce lodging potential on silt loam soils. Investigate optimal inoculants for soybean grown on soils historically grown to cotton as well as optimal fertility inputs in the case of poor nodulation and signs of nitrogen stress – comparisons of products.

Location of Studies: Delta Research and Extension Center

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

## **Soil-and Foliar-Applied Nutrients for Single-row and Twin-row Soybean Production in High Yield Environments**

**M. Wayne Ebelhar and Keith Crouse, Mississippi State University**

Project Focus:

Determine the effects soil- and foliar-applied fertilizer K and S on soybean yield. Examine the interaction of planting pattern and nutrient application for both K and S. Examine the relationship between organic and inorganic sulfur and evaluate soil test recommendations based on both. Investigate the affects of N, K, and S applications on soybean with respect to yield, protein, and oil content.

Location of Studies: Delta Research and Extension Center

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

## **Correlation of Spatial Distribution of Soybean and Yields to Soil Fertility and Other Soil Characteristics Utilizing GPS/GIS Technology**

**M. Wayne Ebelhar, Keith Crouse, and Gabriel Sciumbato, Mississippi State University**

Project Focus:

Evaluate yield spatial variability from soybean production as influenced by soil type, nutrient status, and other characteristics. Determine the uniformity of yield maps and the correlation of yields to controllable factors such as nutrient status, CEC, organic matter content etc. Continue the study of the effect of grid size, sampling systems, and evaluate the development of management zones for optimum nutrient use and yield production. Examine the spatial variability in protein and oil content of soybean as influenced by soil nutrient levels.

Location of Studies: Delta Research and Extension Center

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

## **Economics and Marketing**

### **Helping Arkansas Soybean Farmers Exploit Market Opportunities by Improved Use of Rice, Wheat, and Corn in Soybean Rotations**

**Merle Anders, Bradley K. Watkins, and Kristopher Brye – University of Arkansas Division of Agriculture**

Project Focus:

This study is a long-term rotation study that contains tillage (conventional, no-tillage), fertility (standard, enhanced), and variety (two standard varieties) treatment combinations in seven rotations. Soybeans are used as “full season” and “short season” (after wheat) crops. Data collection includes grain yields, economic analysis, soil quality, runoff, and variety performance. This study has been done for 9 years and is used as a base for scientific and extension publications.

Location of Studies: Rice Research & Extension Center, Stuttgart, Arkansas

Funding Source: Arkansas Soybean Promotion Board, Arkansas Rice Research and Promotion Board, Arkansas Corn and Sorghum Promotion Board

Length of Project: 2009-2011

### **Economic Analysis of Soybean Production Practices**

**C. Robert Stark Jr., University of Arkansas at Monticello Division of Agriculture**

Project Focus:

The project assists producers as they continue to seek opportunities for decreasing costs, increasing incomes, and reducing risks. Specific Objectives include:

- (1) Conducting an economic analysis of production practices used in Arkansas Soybean Research Verification Program that impact profitability and verifies Extension recommendations.
- (2) Standardizing the economic analysis by integrating the 2009 verification data with data from previous years to document the long-term benefits of the Arkansas SRVP.
- (3) Providing economic assistance and interpretation for determining yield response by planting date using data from previous Arkansas SRVP annual reports.
- (4) Providing economic assistance and interpretation of agronomic results for other projects previously funded/proposed for funding by the Arkansas Soybean Promotion Board.

Location of Studies: Southeast Research & Extension Center, Monticello, Arkansas

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2009-2010

### **Mississippi Soybean Basis: Changes, Impacts and Implications**

**John Michael Riley, John Anderson, and Ardian Harri, Mississippi State University**

Project Focus:

Quantify current Mississippi soybean basis. Determine the factors influencing changes from historical Mississippi soybean basis. Test models that accurately forecast soybean basis for multiple Mississippi locations. Create database of soybean basis for multiple locations in Mississippi. Design web based tools utilizing historical and current basis and basis forecast for Mississippi soybean producers to utilize in marketing and management decision making.

Location of Studies: Mississippi State University, Mississippi State, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

## Verification and Education

### **Soybean Real-Time Weed and Disease Alerts**

**Ken Smith, Rick Cartwright, Bob Reynolds, University of Arkansas Division of Agriculture**

Project Focus:

To provide up-to-date information on herbicide resistant weeds and soybean rust as it was developed in the field over the growing season. Two-to-four minute podcasts are the chosen methods of delivery. Twenty podcasts were developed on subject matter as it became available in the field and distributed to county agents, consultants, and farmers in soybean counties.

Location of Studies: Southeast Research & Extension Center; Lon Mann Research Station;  
Northeast Research & Extension Center.

Funding Source: Arkansas Soybean Promotion Board; Industry Funds

Length of Project: 2009

### **Soybean Research Verification Program**

**Jeremy Ross, Chris Grimes, and Steve Kelley, University of Arkansas Division of Agriculture**

Project Focus:

To verify University of Arkansas Division of Agriculture recommendations for soybean production and to maintain an economic data base of production practices on a large-scale field basis.

Location of Studies: Selected fields in the soybean growing regions of Arkansas

Funding Source: Arkansas Soybean Promotion Board

Length of Project: On-going

### **Improving Technology Transfer for Profitable and Sustainable Soybean Production**

**Jeremy Ross, University of Arkansas Division of Agriculture**

Project Focus:

To ensure that improving production practices for soybean production in Arkansas are distributed in a timely manner. This project is used for the development and distribution of weekly SoyNotes, the Soybean Variety Updates as well as updating of the SOYVA computer program. Funding for the Arkansas Soybean Research Conference is also included in this project.

Location of Studies: Statewide

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2008-2010

### **Louisiana Soybean Research Verification Program**

**Ronald J. Levy Jr.**

Project Focus:

Uses research based recommendations for decision making in order to have a profitable soybean crop. Provides the opportunity for Extension personnel to interact with producers one on one.

Location of Studies: Statewide

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2009

**Louisiana Soybean On-Farm Demonstration Program**

**Ronald J. Levy Jr.**

Project Focus:

Conduct on farm variety demonstrations looking at multiple varieties on various locations across the state, evaluating yield and cultural practices.

Location of Studies: Statewide

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2009

## **Biodiesel Education**

### **Arkansas Biodiesel Promotion and Education Project: Phase II**

**Edgar, D.W.; Johnson, D.M.; Wardlow, G.W.; Edgar, L.E.; & Scott, F.L. of the University of Arkansas Division of Agriculture**

Project Focus:

To educate professionals involved in agriculture about the performance and usability of biofuels. Specific target objectives include developing curriculum materials for use by farmers/producers, extension groups, school groups, fleet managers, purchasing agents, and other professionals involved in agriculture and creating a mobile classroom to educate professionals involved in agriculture about alternative energy solutions in agriculture. Additional objectives of the project include developing relationships between faculty and students and professionals involved in agriculture to improve communication between these two entities through the promotion of biofuel opportunities and analysis.

Location of Studies: University of Arkansas – Fayetteville; Northwest Arkansas

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2009-2011

### **Development of Sustainable Technologies for Conversion of Bio-Oil into Fuel and Feedstock Residues into Animal Feed**

Jim Heitholt, Texas A&M-Commerce and Texas AgriLife Research; Ben Jang, Dept. of Chemistry, Texas A&M-Commerce

Project Focus:

Our objective is to press oil from selected oilseed crops (safflower, canola, and soybean) and to compare the quality of bio-diesel that results after transesterification. Dr. Ben Jang is working on heterogeneous methods with catalysts with the goal of making the bio-diesel more efficiently. Heitholt will assess quality of biodiesel synthesized via homogenous techniques.

Location of Studies: Commerce, Texas

Funding Source: Graduate School, Texas A&M-Commerce

Length of Project: 2009 and beyond

## **Research Application and Education**

### **Soybean Management by Application of Research and Technology Program: Collaborative Initiative through Mississippi State University, Private Consulting sector, MSU-ES Area Agronomists and County Directors**

**Trey Koger, Tom Allen, Brewer Blessitt, and Tom Eubank, Mississippi State University**

Project Focus:

Improve profitability of soybean production in MS through collaborative effort between growers, MSU-ES personnel, and private consulting contingency.

Location of Studies: Statewide

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009

### **Internet Access to Soybean Information in Mississippi**

**Bob Ratliff, Mississippi State University**

Project Focus:

Improve soybean producers' access to information about soybean production and about the Mississippi Soybean Promotion Board by hosting, maintaining, and regularly updating the MSPB Web site, "Soybeans in Mississippi".

Location of Studies: No studies conducted. Work conducted from multiple locations to facilitate the delivery of soybean information via the World Wide Web to soybean producers in Mississippi and abroad.

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

### **Use of Avocado/Soybean Unsaponifiables (ASU) to Improve Cartilage Tissue Engineering through Cell Culture and Dietary Supplementation**

**Steven Elder and Ron McLaughlin, Mississippi State University**

Project Focus:

Determine whether ASU improves the biomechanical properties of cartilage engineered in vitro from human articular chondrocytes under ideal conditions. Determine whether ASU has a protective effect on the biomechanical properties of human articular cartilage engineered in vitro under conditions simulating chronic inflammation. Investigate the effect of SU on the biochemical and biomechanical properties of tissue regenerated to repair an articular cartilage defect in a rabbit model.

Location of Studies: Mississippi State University, Mississippi State, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011

**Effects of Soybean-derived Phytoestrogens on Reproductive Development in Neonatal and Pubertal Pigs: Significance in Human Reproductive Development**

**Peter Ryan, Mark Crenshaw, Brian Rude, and David Christiansen, Mississippi State University**

Project Focus:

Determine whether genistein exposure, a soybean-derived phytoestrogen, alters reproductive tract development and function of female and male neonatal pigs. Determine whether neonatal exposure of female piglets to genistein manifests negative effects that compromise adult reproductive performance in gilts of breeding age.

Location of Studies: Mississippi State University, Mississippi State, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2009-2011