Mid-South Soybean Research Project Summary – 2011

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A. Soil Management, Fertility, and Tillage

1. Double-cropped soybean management alternatives and their long-term effects on crop production, water conservation, and soil quality

Kristofor Brye, University of Arkansas Division of Agriculture

Project Focus:
Simultaneously evaluate the effects of alternative wheat-residue management practices [i.e., wheat-residue level (high and low, achieved with differential N fertilization), residue burning (burning and non-burning), and tillage (conventional and no-tillage)] and water management (irrigated and dryland) on crop production, economic viability, water conservation, and soil quality.
Location of Studies: Lon Mann Cotton Research Station, Marianna
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

2. Improving Yield and Yield Stability for Irrigated Soybeans

P. B. Francis, UAM/SEREC; Leo Espinoza, University of Arkansas Division of Agriculture. Cooperators: L. Earnest, SEBES Station Manager, S. Hayes, SEBES, C. Robert Stark, Jr., UAM/SEREC.

Project Focus:
The objective of this project is to investigate irrigation scheduling methods for improving yield and yield stability of irrigated soybean for conditions and production systems in Arkansas, allowing for more profitable production. Specific objectives include: 1.) Evaluate different methods for scheduling irrigation on soybeans in early, full, and double crop (late planted) production systems for early and mid-late maturing cultivars in experimental plots and on producer's fields. 2.) Recommend effective and user-friendly irrigation management protocols for Arkansas conditions.
Location of Studies: University of Arkansas Southeast Branch Experiment Station (SEBES), Rohwer, AR and various producers' fields
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013, renews annually

3. Fertilization of Soybean

Nathan Slaton, University of Arkansas Division of Agriculture

Project Focus:
Overall research mission is to identify and prevent soybean yield losses attributed to insufficient mineral nutrition. The specific goals addressed with this project are to 1) evaluate whether early season iron (Fe) and manganese (Mn) are potential yield limiting factors on alkaline soils, and 2) continue to evaluate phosphorus (P) and potassium (K) fertilization strategies, soil test methods and plant analysis that aid in identifying deficient soils and/or maximize yield potential and economic returns. Objectives: 1) Evaluate soybean growth (vigor) and yield to Fe and Mn fertilization via seed treatments

and/or foliar applications on high pH soils that may be prone to these nutrient deficiencies. 2) Continue P and K fertilizer rate trials established at Pine Tree Branch Station in 2000 (PTBS) and Rice Research Experiment Station in 2007 (RREC). 3) Correlate soil-test P alone or in combination with other soil chemical properties with soybean yield and trifoliate leaf responses to P fertilization. 4) Evaluate soybean yield and nutrient uptake response to P and K fertilizer application time (e.g., fall vs late winter vs spring applications). 5) Develop and/or refine research-based recommendations regarding soil-test based recommendations, fertilizer application rates, and time of fertilization.

Location of Studies: Pine Tree Research Station, Colt; Rice Research and Extension Center, Stuttgart.
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

4. Optimizing Lime Requirements for Soybeans and Variable Rate Applications

Leo Espinoza, Dharmendra Saraswat, Terry Griffin, University of Arkansas Division of Agriculture

Project Focus:

To validate existing lime recommendations for soybean and the sustainability of Variable Rate Fertilization. Specific objectives: 1) To assess the yield response of soybean to varying lime rates and sources. 2) To characterize the spatial and temporal variability in soil pH and macronutrients. 3) To quantify the agronomic and economic benefit of variable rate potassium applications under different soybean rotations and soil types.

Location of Studies: Lon Mann Cotton Research Station, Marianna; Southeast Branch Research Station, Rohwer
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

5. Corn and Soybean Crop Residue Management Impact on Soil Quality, Yield and Returns

Dr. Normie Buehring, Dr. Wayne Ebelhar, Dr. Billy Kingery, Dr. Steve Martin, Mississippi State University

Project Focus:

To determine how corn and soybean residue management and tillage affect soil quality, crop yield, and crop residue yield and nutrient content in a corn-soybean rotation; and the economic returns on these crop management systems. The results are expected to provide growers the economic information on tillage-crop residue management systems (in an irrigated and non-irrigated environment) that provide the highest return and their positive or negative impact on soil quality. We would expect greater soil degradation with more tillage operations and burning corn residue.

Location of Studies: North Mississippi Research and Extension Center, Verona, MS; Delta Research and Extension Center, Stoneville, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011-2015

6. Improving Soybean Nutrient Management Using Timely Soil Testing Programs
Dr. Larry Oldham, Dr. Keith Crouse, Mississippi State University

Project Focus:
To improve inorganic nutrient management of soybeans by defining the influence of season on soil test results for phosphate and potash, and enhancing the understanding of growers and consultants regarding proper planning and implementation of soil testing programs. The effort will characterize soil testing results through time for a number of soils and environments and demonstrate that timeliness of sampling affects the profitability of soybean production.
Objectives: 1) Improve soil sampling management for better utilization of inorganic fertilizer nutrients with volatile price points. 2) Improve awareness among Mississippi soybean growers of the importance of soil testing for soil phosphorus and potassium fertility management.
Location of Studies: Multiple research station locations throughout the state
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2010-2012

7. Validity of Current Potassium Recommendations for High Yielding Soybeans With Respect to Grain Yield and Soybean Disease Control.
Dr. Gabe Sciumbato, Mississippi State University

Project Focus:
Objectives: 1) Determine soil K level that results in the highest yields in current high yielding soybean varieties based on soil test recommendations. 2) Evaluate different soil K levels to determine the optimum potassium level needed to have the least amount of foliar diseases. 3) Determine whether higher K will make the soybean more resistant to late season foliar disease and less dependent on late season foliar fungicide applications.
Location of Studies: Delta Research and Extension Center, Stoneville, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011

8. Managing soybean production on low nutrient status soils in Mississippi.

Dr. Mark W. Shankle, Dr. Keith Crouse, Trevor Garrett, Mississippi State University

Project Focus:

Objectives: 1) Validate current soil testing recommendations from several soil testing facilities for potassium (plus other nutrients) in soybean. Recommendations seem to vary among laboratories and this research will provide insight to growers for making fertilizer management decisions based on the lab they prefer to utilize. 2) Identify optimal K_2O fertilize rate for soybeans in soil testing low to very-low for potassium. In addition to rate validation and optimization, these results could advance variable rate technologies through adjustments to equations utilized in field prescription recommendations in the future…i.e. rate based on specific soil level not index range. 3) Determine the economic benefits of each fertilizer rate recommended by several soil testing laboratories in Mississippi (maybe Tennessee too since some recommendations come from Nashville). Preliminary results from 2010 indicate that recommendations from public and private soil test laboratories are different. Higher recommended fertilizer rates may or may not maximize yield and can violate the "law of diminishing returns" for crop revenue.

Location of Studies: Dulaney Farms, Clarksdale, MS; Pontotoc County, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2010-2012

9. The Effect of Phosphorus and Potassium Application and Timing Methods in Soybeans on Yield and Water Quality

Donna S. Morgan and Dr. Sterling B. Blanche, LSU AgCenter Dean Lee Research and Extension Center

Project Focus:

Objectives: 1) To determine nutrient utilization in soybeans with various timing and fertilizer application methods. Data collected will include tissue analysis, plant growth, and grain yield. 2) To measure nutrient and sediment losses through water quality sampling and soil tests. 3)

To disseminate research findings to Louisiana soybean producers, other agricultural personnel, and the scientific community through county agents, consultants, commodity meetings, popular press, online publications, and professional meetings.

Location of Studies: LSU AgCenter Dean Lee Research Station

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2011-2012

10. The Importance of Soil Sampling, Soil Testing and Soil Test Recommendations for Soybean and Grain Crops in Louisiana
J. Stevens, LSU AgCenter Dean Lee Research & Extension Center

Project Focus:

Objectives: 1) Provide training for County Agents to enhance their understanding of the proper techniques to be utilized in soil sampling and associated tasks. This training will take place at various locations across the state. 2) County Agents and State Specialist will be involved with agricultural producers in assessing their soil testing needs and perform soil sampling activities for selected producers. These samples will be submitted to the LSU AgCenter Soil Testing Laboratory (STPAL) for analysis. 3) Soil test recommendations, provided by the STPAL, will be discussed with the producers and County Agents. Producers will be made well aware of their soil fertility status on the fields tested, during discussion sessions with individual producers. The soil test data will be arranged whereby the producer will be able to begin a base-line for the soil fertility status. Record keeping will be an essential part of this study. The initial soil test data, fertilizer and/or lime rates and other soil amendments will be recorded and the field will be taken to yield. A thorough evaluation will be performed on all fields as to the economic benefits derived by following STPAL recommendations. 4) Producer fields will be retested in coming years to evaluate the changes in the soil fertility status, as a result of following the STPAL soil test recommendations. These data will be communicated at local, statewide, and regional soil testing meetings/trainings.

Location of Studies: Various fields throughout the state
Funding Source: Louisiana Soybean and Grain Research and Promotion Board
Length of Project: 2011

11. Soil Test Calibration and Fertilization Research for Sustainable Soybean and Corn Production in Louisiana
Brenda S. Tubaña, LSU School of Plant, Environmental, and Soil Sciences

Project Focus:

Objectives: 1) Validate and update fertilization rates based on Mehlich-3 soil test ratings for corn and soybean production using a classical-response trial approach. 2) Evaluate alternative approaches (e.g., build-up and maintenance for P and K, yield goal and optical sensor-based N recommendations) for managing essential nutrients based on quantitative relationships among nutrient supply, crop nutrient demand, crop yield, fertilizer price, soil quality (soil organic matter), and interactions with other nutrients. 3) Evaluate corn response to P fertilization as affected by soil Zn concentration. 4) Evaluate the influence of lime application on available soil macro- and micro-nutrients concentrations on an acid upland soil continuously grown with corn. 5) Evaluate different approaches for N recommendations using optimal N rate base upon classical N response studies, optical sensors, and a yield goal concept.

Location of Studies: LSU AgCenter Red River Research Station and others
Funding Source: Louisiana Soybean and Grain Research and Promotion Board
Length of Project: 2011

B. Variety Development and Evaluation

1. Comprehensive Disease Screening of Soybean Varieties in Arkansas
Terry Kirkpatrick, Southwest Research and 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 aerial blight, stem canker and frogeye leaf spot.

Location of Studies: Root-knot nematode – Southwest Research & Extension Center, Hope, AR; Frogeye leaf spot, Stem canker – Newport Research Station, Newport; Reniform and soybean cyst (races 2,3,5 & 14) – University of Arkansas campus, Fayetteville; Aerial blight – Vegetable Substation, Kibler

Funding Source: Arkansas Soybean Promotion Board

Length of Project: Annual with 3-year funding cycle

2. Breeding New Soybean Cultivars with High Yield and Disease Resistance
Pengyin Chen, Caroline Gray, Tetsuaki Ishibashi, Tina Hart, Eddie Gordon, Joe Shafer, Bill Apple, Jonathan McCoy, and Scott Hayes, University of Arkansas Division of Agriculture

Project Focus:
To provide a steady flow of new and improved soybean cultivars with high productivity and profitability to the soybean industry. Specific Objectives: 1) Develop high-yielding maturity group (MG) 4-6 cultivars (Roundup Ready and conventional) adapted to various environments and production systems in Arkansas. 2) Develop new varieties and germplasm with resistance to soybean cyst nematode (SCN), root knot nematode (RKN), sudden death syndrome (SDS), stem canker (SC), frogeye leaf spot (FLS), soybean mosaic virus (SMV), and soybean rust (SR).

Location of Studies: Lon Mann Cotton Research Station, Marianna; Rice Research and Extension Center, Stuttgart; Northeast Research and Extension Center, Keiser; Vegetable Research Station, Kibler; Pine Tree Branch Station, Colt; Southeast Branch Station, Rohwer.

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2010-2012

3. A comprehensive approach to assessing soybean varieties for chloride toxicity

Ken Korth and Pengyin Chen, University of Arkansas Division of Agriculture

Project Focus:

Salt damage to soybean in Arkansas is a growing problem. Assessment of soybean variety reaction to salt has been inconsistent and more information would be beneficial in variety selection to growers on salt-affected soils. Specific Objectives: 1) To determine the reaction of commercial soybean varieties in Arkansas to salt toxicity using the Grover Shannon greenhouse method and to validate selected greenhouse salt reaction data in field trials. 2) Compare a tissue chloride analysis method and a foliar symptom method using hydroponic cultures.

3) Develop a simple and easy greenhouse screening method using potting mix or top soil based on differential foliar symptoms. 4) To assess soybean physiological responses during chloride tolerance or sensitivity, and attempt to correlate these with response in the greenhouse and field.

Location of Studies: University of Arkansas - Fayetteville
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2010-2012

4. Drought Tolerance Research – Developing Rapid Screening Methods

Larry C. Purcell and Vaughn Skinner, University of Arkansas Division of Agriculture

Project Focus:

To develop remote-sensing tools that can rapidly screen large numbers of soybean lines for drought tolerance traits in field environments. Specific Objectives: 1) Identify soybean lines that have cool canopies during drought using aerial-thermal imaging and associate canopy temperature with ground-based wilting ratings. 2) Use aerial photography to determine soybean lines with prolonged N_2 fixation during drought from the association of dark green leaf color and shoot N. 3) Characterize differences in seedfill duration among lines in response to drought by aerial color imaging.

Location of Studies: University of Arkansas- Fayetteville
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

5. Assessment of Soybean Varieties in Arkansas for Sensitivity to Chloride Injury

Dr. Steven Green, Cooperators: Matt Conatser, Dr. Rick Cartwright, Dr. Pengyin Chen, Don Dombek, and Dr. Jeremy Ross, University of Arkansas Division of Agriculture

Project Focus:
Continue to perform chloride reaction screenings in group III, IV, V, and VI soybean using the hydroponic testing method developed by the late Dr. Darrel Widick. Specific Objectives: 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) Continue to improve the accuracy, reproducibility, and efficiency of the chloride screening process.

Location of Studies: Pine Tree Research Station, Colt; Arkansas State University, Jonesboro
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2009-2011

6. Producing and Maintaining High Quality Soybean Seed in Arkansas and Grower Education

John Rupe, Pengyin Chen, Larry Purcell, Navam Hettiarachchy, Terry Siebenmorgen, Scott Monfort, Jeremy Ross, Don Dombek, Dr. Michael Popp, Nathan Slaton, University of Arkansas Division of Agriculture
Mary Smith, Aaron Palmer, Darryl Little, Arkansas State Plant Board
Dr. Miller McDonald, Ohio State University; Dr. Dennis Egli, University of Kentucky; Cindy Finneseth, Kentucky State Seed Testing Lab/AOSA Committee on Rules; Rusty Smith, USDA/ARS – Stoneville, MS.; Selected Crop Consultants, Selected County Agents, Selected Growers, and Seed Company personnel

Project Focus:
To determine factors that impact seed production and soybean seed quality in Arkansas; and to educate Arkansas producers about seed quality and vigor testing.
Specific Objectives:

Research- Rupe, Chen, Purcell, Siebenmorgen, Hettiarachchy, Monfort

1. To determine the effect of storage conditions on soybean seed quality.
2. To determine the effects of foliar fungicides, cultivar, and planting and harvest timing on seed and grain quality, seed infection, and test weight of soybean.
3. To determine the relationship between stinkbug damage and seed quality.
4. To determine the effects of planting and harvest dates on seed quality and seed composition.

Extension and Education –Ross, Dombek

5. To develop and deliver a sustained education program focused on soybean planting seed quality and seed vigor testing in Arkansas to soybean growers and the soybean industry

Location of Studies: Northeast Research and Extension Center, Keiser; Southeast Branch Research Station, Rohwer; Rice Research and Extension Center, Stuttgart; Vegetable Research Station, Kibler
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

7. Streamlining the Disease Screening Effort by Relocation of the Existing Stem Canker Screen to Newport and Developing a Technique for Screening for Sudden Death Syndrome
Terry Kirkpatrick, Scott Monfort, Kimberly Rowe, University of Arkansas Division of Agriculture

Project Focus:
1) Develop a protocol for screening cultivars for resistance to sudden death syndrome in the greenhouse at SWREC. 2) Relocate the stem canker screen from SWREC to the Newport Station under the overhead irrigation system. 3) Screen all cultivars in the 2011 Full Season OVT for resistance to stem canker at the Newport Station. 4) Provide preliminary stem canker screening information to Jeremy Ross and other CES personnel by November 1; Place entire data set on UAF Variety Testing website also by November 15.
Location of Studies: Newport Research Station; Southwest Research and Extension Center, Hope; Lonoke Agricultural Center
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

8. Preventing Seed Rot and Poor Seed Quality in Maturity Group IV soybean
Dr. Tom Allen, et al. Mississippi State University

Project Focus:
Objectives: 1) Continue fungicide / insecticide rate and application timing research in order to identify inputs that can potentially improve seed quality. 2) Repeat the survey conducted with MS grain elevators throughout MS and staggered over the harvest season for the third year. 3) Repeat the study to determine the impact of normal agronomic inputs on seed quality for conventional versus Roundup Ready soybean varieties. 4) Repeat the evaluation of gray- and red pod maturity group IV varieties for weathering capabilities and seed quality when subjected to delayed harvest. 5) Evaluate the interactions between stink bugs, fungicides, and simulated rainfall on seed quality. 6) Determine the strength of the association between stink bug damage and Phomopsis seed decay in commercial fields through survey techniques. 7) Evaluate the potential impact of stink bugs on the prevalence of *Phomopsis:* a. Quantify the direct and indirect damage from stink bugs. b. Determine the duration *Phomopsis* can be transmitted into seeds. c. Evaluate damage from stink bug infestations occurring from R5.5 to R7. d. Compare direct injury and *Phomopsis* incidence from different species of stink bugs (green, southern green, brown, and redbanded) and adults vs. late instar nymphs.

Location of Studies: Winnsboro, LA; Verona, MS; Starkville, MS; Stoneville, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2009-2013

9. Enhancement of Mississippi Soybean Variety Trials through Entry Standardization
Dr. Brad A. Burgess, Mississippi State University

Project Focus:
To standardize soybean varieties tested over all test locations in the Mississippi Soybean Variety Trials. The reason for this research is to conduct yield trials on all soybeans entered into the Mississippi variety trial to determine which particular varieties are best suited to the different environmental and geographic regions of the state. These results are determined by planting these soybean variety trials in those areas of the state where the majority of the soybeans are commonly grown and evaluating their yield potential when compared to other varieties within similar maturity groups. These trials will be conducted in at both irrigated and non-irrigated locations, four irrigated and six non-irrigated. The maturity groups tested will be Roundup Ready varieties within MG IV and MG V, both early and late maturing varieties. Also, Conventional Soybean varieties will be tested within MG IV and MG V. Each variety will be assigned to the specific maturity group provided by the participating company or university entering that variety.
Location of Studies: Various throughout state
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011 and continuing

10. Development of a rapid genetic field race test for soybean cyst nematode (SCN) and generation of SCN resistance through gene inactivation.
Dr. Vincent Klink, Dr. Gary Lawrence, Dr. Tom Allen, Clarissa Balbalian, Mississippi State University

Project Focus:
The SCN problem in Mississippi is being addressed in two objectives that build off of each other with success being achieved in both objectives to date. Objective 1 is a shorter term plan to manage SCN. Objective 2 is a longer term genetic engineering plan with the goal of generating interest from biotechnology companies to apply the knowledge from these studies to management and solving the SCN problem. The two objectives involve the use of a new genetic technology called massively parallel signature sequencing (MPSS). MPSS allows for the identification of genetic markers that are unique to each SCN race. The requested funding is for the specific project presented here. Objective 1: Identify molecular markers. Procedure 1a: MPSS is being used on SCN samples. Predicted/Obtained results 1a: Genetic markers are being identified for SCN races that are present in areas in Mississippi where soybeans are cultivated. Experiment impact 1a: The genetic marker strategy outlined in this research will result in a SCN race

test that takes a week to complete. These markers will aid farmers in determining what soybean variety to grow because the identity of SCN races will be made at the genetic level for a particular field. Procedure 1b: qPCR is used to quantify nematodes. Predicted/Obtained results 1b: qPCR is being used to assay nematode distribution in Mississippi soybean fields. Experiment impact 1b: The genetic marker strategy is allowing for a quantitative measure of the number of nematodes in an infested field. This procedure allows a diagnostic of field soil conditions that can predict nematode infection before it happens. Objective 2: Genes that are essential for survival of all 16 of the SCN races are being identified. Importantly, the essential genes can be (and have been) used to identify genes to control reniform nematode (*Rotylenchulus reniformis*) and root knot nematodes (*Meloidiogyne* sp.) that also infect soybean. Procedure 2: a genetic procedure developed to inactivate those nematode genes is being met with positive results as a strategy for genetically engineering resistance. Predicted/Obtained results 2: All SCN races, reniform and root knot nematodes fail to grow. Expected impact 2: Farmers will have in place, a manner to control every SCN race reniform and root knot nematode.

Location of Studies: Mississippi State University, MS, and MWG Operon, Huntsville, AL
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011

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

Dr. Gary Lawrence, Dr. Brad Burgess, Mississippi State University

Project Focus:

To screen soybean variety evaluation entries for resistance to plant-parasitic nematodes (root-knot, reniform, and soybean cyst). This project is a request to continue an annual screening program to provide to our growers the latest resistance reactions available to eventually all of these nematodes. This project will provide information to the new varieties added to the variety trials. Information generated from our current screen is distributed to our growers by the annual variety trials report.

Location of Studies: Mississippi State University, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011

12. Identification of soybean varieties with resistance to Phomopsis seed decay to enhance soybean seed quality

Dr. Shuxian Li, USDA-ARS, Dr. Gabe Sciumbato, Mississippi State University

Project Focus:

To screen commercially available soybean varieties for resistance to PSD and to identify soybean varieties with PSD resistance and high seed quality under inoculated and non-inoculated treatments. Fifty soybean varieties will be evaluated in the field with inoculated and non-inoculated treatments. Seed quality assays, including seed plating

for percentage of Phomopsis seed infection, germination tests, and visual quality scoring will be performed in the laboratory. This research will provide information about soybean varieties with PSD resistance and high seed quality to soybean growers and seed industry and aid in selection of varieties for use. Objectives: 1) Screen commercially available soybean varieties for resistance to Phomopsis seed decay (PSD) 2) Identify soybean varieties with PSD resistance and high seed quality under inoculated and non-inoculated treatments. 3) Provide information about soybean varieties with PSD resistance and high seed quality to soybean growers and seed industry interested in disease resistance and seed quality.
Location of Studies: Stoneville, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011

13. Evaluation of Private and Public Soybean Varieties and Breeding Lines for Resistance to Stem Canker, Frogeye Leaf Spot, Purple Leaf and Pod Stain, Black Root Rot and Rust
Dr. Gabe Sciumbato, Mississippi State University

Project Focus:
Objectives: 1) Determine the virulence of stem canker isolates collected in Mississippi in 2011. 2) 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 black root rot. 3) Evaluate entries submitted for testing in the Mississippi soybean variety trials for resistance to soybean rust. A variety trial will be planted late in the growing season because that is when conditions for soybean rust development are the highest when these varieties are maturing.
Location of Studies: Delta Research and Extension Center, Stoneville, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: Ongoing

14. Development and Propagation of Conventional Soybean Varieties for Texas
Jim Heitholt – Texas A&M University-Commerce and Patti Chun – Texas AgriLife Research

Project Focus:
To propagate three soybean crosses from TX 72821 and TX74053 that have been bred for drought tolerance and stink bug resistance, which will eventually be grown on commercial fields where farmers can compare profit to typical commercial varities.
Location of Studies: Texas A&M University
Funding Source: Texas Soybean Board
Length of Project: 2011-2012

15. Evaluation of Varieties and Management Practices for Improved Soybean Seed Quality

Donald Boquet, B. Rogers Leonard, Boyd Padgett, LSU AgCenter Macon Ridge Research Station

Project Focus:

Objectives: 1) Develop a method to rapidly evaluate soybean seed quality that relates well to state and federal grading standards. 2) Assess differences among varieties in seed quality at maturity and after periods of field weathering. 3) Evaluate the value of fungicides and insecticides at mid and late growth stages (R3- R6) for control of damaging seed diseases and insects and improvement of seed quality.

Location of Studies: LSU AgCenter Macon Ridge Research Station

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: Ongoing

16. Soybean Breeding and Variety Development

Blair Buckley, LSU AgCenter Red River Research Station

Project Focus:

Objectives: 1) To develop high-yielding, disease resistant soybean varieties and germplasm adapted to the environmental conditions of Louisiana and the Gulf Coast region. In addition to yield, traits emphasized are: a) Cercospora leaf blight resistance b) Frogeye leaf spot resistance c) Asian soybean rust resistance d) Drought tolerance e) Salt tolerance

Location of Studies: LSU AgCenter Red River Research Station

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: Ongoing

17. Developing Soybeans Resistant to Asian Rust Pathogen

Dr. Svetlana Oard, LSU School of Plant, Environmental, and Soil Science

Project Focus:

Objectives: 1) Evaluate antifungal resistance of the selected transgenic soybean lines from the pilot transformation experiment. 2) Perform a formal transformation experiment using our verified transformation vector pTF2_thioB to obtain a working set of transgenic soybean. 3) Analyze the new transgenic soybean lines from Objective (b) for production of PTH. 4) Complete analysis of effects of signal peptides on PTH production in leaf tissues.

Location of Studies: LSU School of Plant, Environmental, and Soil Science

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2011

18. Developing a disease screening protocol for the evaluation of cultivars for resistance to *Phytophthora sojae* in Arkansas

Craig Rothrock, Terry Kirkpatrick, and John Rupe, University of Arkansas Division of Agriculture

Project Focus:
To develop a reliable disease screening procedure for resistance to *Phytophthora sojae* for evaluating cultivars grown in Arkansas. Objectives: 1) To determine disease reaction of cultivars grown in Arkansas to existing races of *Phytophthora sojae* in Arkansas. 2) Characterize the nature of resistance in the cultivars. 3) Examine the current race structure of *Phytophthora sojae* in Arkansas.

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

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2010-2012

C. Germplasm Research

1. Screening Soybean Germplasm and Breeding Soybeans for Flood Tolerance

Pengyin Chen, Caroline Gray, Tetsuaki Ishibashi, Tina Hart, Jonathan McCoy, and John Carlin, University of Arkansas Division of Agriculture

Project Focus:
To improve soybean tolerance to waterlogging/flooding. Specific Objectives: 1) Screen diverse soybean germplasm and identify source(s) of genetic tolerance to flooding. 2) Incorporate flood tolerance from identified source(s) into Arkansas elite cultivars and lines.

Location of Studies: Rice Research and Extension Center, Stuttgart, AR
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2010-2012

2. Soybean Germplasm Enhancement Using Genetic Diversity

Pengyin Chen, Caroline Gray, Tetsuaki Ishibashi, Tina Hart, Eddie Gordon, Joe Shafer, Bill Apple, Jonathan McCoy, and Scott Hayes, University of Arkansas Division of Agriculture

Project Focus:
To broaden the gene pool and improve productivity of southern soybean using exotic germplasm with genetic diversity. Specific Objectives: 1) Incorporate useful genetic diversity for yield from exotic plant introductions (PIs) and northern elite germplasm into high-yielding lines for adaptation to Arkansas environment. 2) Incorporate unique traits of interest and value from diverse germplasm into southern elite cultivars and lines.

Location of Studies: Lon Mann Cotton Research Station, Marianna, AR; Northeast Research and Extension Center, Keiser, AR; Pine Tree Research Station, Colt, AR; Rice Research and Extension Center, Stuttgart, AR; Southeast Branch Station, Rohwer, AR; and Vegetable Research Station, Kibler, AR
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2010-2012

3. Development of *Phomopsis* Seed Decay Resistant Soybean from New Sources of Resistance

Dr. Anne M. Gillen, Dr. Alemu Mengistu, Dr. Nacer Bellaloui, USDA-ARS

Project Focus:
To develop soybean lines with resistance to *Phomopsis* seed decay (PSD), high yield potential and good agronomics. Currently, no commercially available lines have resistance to PSD. Our immediate goal is to screen breeding lines derived from PI 423941 for resistance to PSD. PSD is caused by a complex of the fungi *Diaporthe/Phomopsis* with the primary causal agent being *P. longicolla.* Preliminary

results indicated that PI 423941 may have a higher level of resistance than the previously identified sources of resistance. Seed produced by PI 423941 under hot Mississippi conditions was shown to have excellent germination. Breeding lines with high levels of resistance to PSD, acceptable yield and agronomic traits will be released as germplasm and used as parents to continue breeding for PSD resistance, improved yield, and adaption to the Mid-South.
Location of Studies: Delta Research and Extension Center, Stoneville, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011

4. Identification and Incorporation of Reniform Nematode Resistance into Soybeans Adapted for Mississippi and the Mid-South
Dr. Salliana R. Stetina, Dr. James R. Smith, Dr. Jeffrey D. Ray, USDA-ARS

Project Focus:
Objectives: 1) To identify sources of host plant resistance to reniform nematode in soybean. 2) To initiate germplasm development by transferring the resistance to soybean lines agronomically adapted for Mississippi. 3) To collect DNA from parent lines that will later be used to identify molecular markers that can be used for marker-assisted selection. The proposed work is the critical first step in developing an effective, environmentally friendly tool to mitigate losses to reniform nematode in Mississippi.
Location of Studies: USDA, Stoneville, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011

D. Pest Management

a.) Diseases and Nematodes

1. Defining the spatial distribution and movement of inoculum of *Rhizoctonia solani* AG-1 for the precision management of aerial blight on soybean

W. Scott Monfort, Cooperative Extension Service, and Craig Rothrock, Dept. of Plant Pathology, University of Arkansas Division of Agriculture

Project Focus:
Involves Early Season and Full Season Soybean Production Systems.
To provide effective, cost efficient methods for the improved management of aerial blight on soybean by using a predictive system for anticipating disease development.
Objectives: 1) Develop an effective and efficient method to quantify inoculum of *Rhizoctonia solani*; 2) Monitor inoculum levels and movement and disease development in producers' fields as related to water movement, levee patterns, crop residue, and crop growth; 3) Apply previous history of spatial and temporal distribution of *Rhizoctonia solani* inoculum and disease development, flooding and levee patterns, crop residue, aerial imagery, and yield to predict potential high risk areas within the field for disease development.
Location of Studies: Two on-farm locations in Arkansas
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2010-2012

2. New Resources to Control Cercospora Diseases of Soybean in Arkansas

Burt Bluhm and Scott Monfort, University of Arkansas Division of Agriculture

Project Focus:
To reduce the impact of *Cercospora* diseases on soybean production in Arkansas.
Specific objectives: 1) Determine the extent to which fungicide resistance is present in Arkansas and assess the potential impact on production 2) Develop a rapid DNA-based assay to identify fungicide resistance 3) Define the diversity of pathogen populations in Arkansas 4) Identify new sources of genetic resistance to FLS and leaf blight
Location of Studies: Newport Research Station, Newport, AR
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

3. Late Season Diseases (Anthracnose and Pod & Stem Blight) Management in Early Season Production Systems in Arkansas

Cliff Coker and Dr. Scott Monfort, University of Arkansas, Division of Agriculture, Plant Pathology Department, Cooperative Extension Service

Project Focus:

Improving soybean profitability. Direct value since the findings from this project could have a noteworthy positive economic effect on production cost by increasing yields and lowering production costs. Objectives: 1) To determine the application threshold and the most economical timing and rate for foliar applications of currently labeled fungicides to control the late-season diseases: Anthracnose and Pod & Stem Blight. 2) To improve economically sustainable early season soybean production systems for Arkansas soybean producers utilizing refined late-season disease management recommendations which contribute to profitable soybean production. 3) To evaluate crop management and economic impact of Anthracnose and Pod & Stem Blight pathogens upon Arkansas early season soybean production system recommendations.
Location of Studies: Southeast Branch Station, Rohwer, AR
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

4. Newly Emerging Diseases in early production systems in Arkansas
Cliff Coker, Dr. Scott Monfort and Burt Bluhm, University of Arkansas, Division of Agriculture, Plant Pathology Department, Cooperative Extension Service

Project Focus:
Improving soybean profitability. Direct value since the findings from this project could have a noteworthy positive economic effect on production cost by increasing yields and lowering production costs. Objectives: 1) To determine the distribution of Neocosmospora Rot and Black Root Rot and other newly developing diseases throughout the production areas of Arkansas. 2) To improve economically sustainable early soybean production systems for Arkansas soybean producers utilizing refined disease management recommendations for newly emerging diseases which contribute to profitable soybean production. 3) To evaluate crop management and economic impact of newly emerging pathogens, i.e., Neocosmospora and Theilaviopsis upon Arkansas early soybean production system recommendations.
Location of Studies: Southeast Research and Extension Center, Monticello, AR and producers fields in identified counties
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

5. Integrated Management of Soybean Cyst and Reniform Nematodes in Soybean in Arkansas
Terry Kirkpatrick and Scott Monfort, University of Arkansas Division of Agriculture

Project Focus:
1) To monitor the incidence and determine the potential risk of plant-parasitic nematodes (soybean cyst, and reniform) to soybean production systems in Arkansas. 2) To evaluate currently-existing methods for controlling nematodes in soybean, 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: Southwest Research and Extension Center, Hope, AR and throughout Arkansas
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

6. Commercialization and Discovery of Biocontrol Agents for Soybean Nematodes Amy Thomas, Robert Robbins, Burt Bluhm, and Terry Kirkpatrick, University of Arkansas

Project Focus:
To develop unbiased information to support commercialization of an existing patented biocontrol fungus for soybean cyst nematode and to discover other biocontrol agents for potential control of all types of soybean nematodes. Specific objectives: 1) To identify the patented sterile Soybean Cyst Nematode (SCN) biocontrol fungus, ARF 18, using cultural, morphological and molecular methods. 2) To determine effectiveness of ARF 18 in field studies to support commercialization. 3) To survey for other biocontrol agents active on soybean cyst, reniform and root-knot nematodes and identify the cause of the dramatic decline of Soybean Cyst Nematode in test plots at the Pine Tree Experiment Station. 4) To assess SCN decline plots at PTES for control of 3 common SCN races and assess soil from these plots for control of SCN races, reniform and root-knot nematodes under greenhouse conditions.

Location of Studies: University of Arkansas – Fayetteville; Southwest Research and Extension Center, Hope; Vegetable Research Station, Kibler; Pine Tree Research Station, Colt.
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2010-2012

7. Control of New Soybean Cyst Nematode Races using Rotation of Different Roundup Ready and Conventional Soybean Varieties Robert T. Robbins and Terry Kirkpatrick, University of Arkansas Division of Agriculture

Project Focus:
To determine an effective soybean production system for growers facing Soybean Cyst Nematode problems when they cannot rotate to other crops. Specific Objectives: 1) To determine if rotation of varieties with the available SCN resistance reaction sources will continue to be effective in further lowering SCN numbers. 2) To determine if these rotations do prevent changes in SCN race. 3) To determine if Roundup ready varieties are as effective in reducing SCN numbers as conventional varieties. 4) To maintain high soybean yields in the presence of SCN through the use of these rotations.

Location of Studies: University of Arkansas – Fayetteville; Pine Tree Research Station, Colt.
Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

8. Detection of soybean cyst, reniform and root-knot nematodes in soil using multiplex real-time PCR.
Ron Sayler, Terry Kirkpatrick, Bob Robbins, 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 soybean. 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. Specific Objectives: 1) To develop PCR detection methods for each of the three nematode species. 2) To develop a multiplex real-time PCR assay that can detect and quantify all three species in a single reaction. 3) To incorporate these PCR based detection methods into standard nematode assays. 4) To establish routine use of these PCR methods in the nematode screening service offered by the Cooperative Extension Service (CES).
Location of Studies: University of Arkansas, Fayetteville; Southwest Research and Extension Center, Hope
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2009-2011

9. Effects of genotype on severity of charcoal rot and yield in soybean.
John Rupe, Craig Rothrock, University of Arkansas Department of Plant Pathology, Sreekala Bajwa, Biological and Agricultural Engineering, Subodh Kulkarni, Cooperative Extension Service

Project Focus:
To identify commercial soybean cultivars and germplasm lines that have moderate or high levels of resistance to charcoal rot. Specific Objectives**:** 1) To determine the effect of cultivar on charcoal rot development and yield in artificially infested, nonirrigated fields. 2) To develop a greenhouse screening procedure to determine soybean cultivar reaction to charcoal rot.
Location of Studies: Lon Mann Cotton Research Station, Marianna
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

10. Soybean disease monitoring for Mississippi soybean producers
Dr. Tom Allen, Dr. Shien Lu, Dr. Sead Sabanadzovic, Mississippi State University

Project Focus:
Objectives: 1) Monitoring for foliar diseases in soybean will provide MS soybean producers with the necessary information to make informed, timely decisions regarding the proper placement of fungicides in soybean production fields throughout MS. 2)

Determine the most effective fungicide management schemes for MS soybean producers by conducting fungicide treatment trials when the ability arises throughout the season specifically for soybean rust timing. 3) Monitor the environmental conditions at the locations where weather stations have been erected to determine if there is a specific correlation between environmental variables and infection of the local plant material by the soybean rust fungus.
Location of Studies: Multiple locations throughout the state.
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2009-undetermined

11. Rapid Identification of Soybean Fungi by Spectroscopic Techniques
Dr. Ashli E. Brown, Dr. Jose M. Rodriguez, Dr. Darrell L. Sparks, Mississippi State University

Project Focus:
Currently, identification of fungal types can only be done by soybean specialists located in extension centers throughout the state. Therefore, techniques that enable fungal diagnostics in the field would be a great benefit to soybean farmers.
Spectrometric techniques can be developed to identify fungal types. The most economic and efficient technology will be selected. We will explore the following technologies: 1. Matrix-assisted laser desorption-ionization time-of-flight mass spectrometry, MALDI-TOF. 2. Microscope-Fourier Transform Infrared Spectroscopy, Microscope FT-IR. 3. Microscope Raman Spectroscopy. Spectral libraries will be generated by our research team that can be used by technicians to identify the type of fungus from field samples. The generated data could be used to manage crop areas and to minimize crop losses.
Objectives: In an effort to reduce soybean crop losses, we will develop spectrometric techniques that will be able to identify specific types of fungi in field samples. We will explore MALDI-TOF, Microscope FT-IR and Microscope Raman Spectroscopy. The best technology will be selected and spectral libraries will be generated for these identifications. Field personnel will be trained on its use. With the use of the generated data, county agents could minimize crop losses.
Location of Studies: Starkville, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011

12. Evaluation of the Impact of Fertility and Fungicide Application Timing for the Prevention of Phomopsis Seed Decay (and late season Cercospora)
Dr. Alan Blaine, Dr. Billy Moore, Dr. Tom Allen, Dr. Bernie White, Mississippi State University

Project Focus:
Objectives: 1) To determine the specific timing of a strobilurin fungicide in the role of reducing in-field seed rot attributed to the Diaporthe/Phomopsis complex. 2) Determine if the addition of soil applied potassium (K; potash) will help reduce in-field

seed rot with (or even without) the addition of a fungicide. Most Mississippi soybean producers know the yield advantage subsequent to an R3/R4 strobilurin (i.e. Headline or Quadris) fungicide application. Many would apply a fungicide at a later growth stage if research determined that Diaporthe/Phomopsis seed rot could be prevented or even greatly reduced. Millions of dollars in losses could be avoided/prevented if the proper timing of fungicide application could be determined that would prevent seed deterioration.

Location of Studies: Beulah, MS; Cruger, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2010-undetermined

13. Characterization of Frog Eye Leaf spot isolates using molecular and host pathotype

Dr. Jeffrey D. Ray, Dr. Alemu Mengistu, Dr. James Smith, Dr. Renée S. Arias, USDA-ARS

Project Focus:

To characterize 100+ *C. sojina* isolates based on pathogenicity and molecular differences. Pathogenicity will be evaluated on the basis of responses to 12 soybean differentials grown and infected under controlled conditions. In order to molecularly characterize each isolate we will develop and then employ simple sequence repeat (SSR) molecular markers. The combination of pathogenicity and molecular characterizations will allow us to define specific isolates of *C. sojina*. This information will be critical to identifying sources of resistance to specific races of *C. sojina* and developing soybean cultivars with race-specific resistance. Objectives: 1) Characterize the pathogenicity of more than 100 *C. sojina* isolates. 2) Develop SSR molecular markers specifically for *C. sojina*. 3) Employ the SSR markers to molecularly differentiate *C. sojina* isolates. 4) Identify race-specific sources of resistance to *C. sojina* for use in the breeding program. Objective 4 is a long-term objective, whereas the objectives of pathologically and molecularly characterizing *C. sojina* isolates are a critical first steps in developing race specific resistance.

Location of Studies: MidSouth Genomics Center, Stoneville, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011

14. Electrically-charged Fungicide Adjuvants

R. Barbosa and C. Sabliov– LSU, Department of Biological and Agricultural Engineering

Project Focus:

Objectives: 1) To design and build a novel controlled delivery system for application of fungicides to soybean plants. 2) To assess the potential of the new delivery system to effectively prevent occurrence of soybean rust under dry and wet conditions in comparison to the control (i.e. fungicide alone).

Location of Studies: LSU

Funding Source: Louisiana Soybean and Grain Research and Promotion Board
Length of Project: 2011-2012

15. Cercospora Leaf Blight Disease of Soybean-Variety Differences, Environmental Effects, and Source of Inoculum

Zhi-Yuan Chen, LSU, Department of Plant Pathology and Blair Buckley, LSU AgCenter Red River Research Station

Project Focus:
Objectives: 1) To determine the responses of different soybean varieties to Cercospora leaf blight (CLB) disease. 2) To determine the effect of environmental factors on CLB disease development. 3) To determine the source of *Cercospora kikuchii* inoculums.
Location of Studies: LSU, Red River Research Station
Funding Source: Louisiana Soybean and Grain Research and Promotion Board
Length of Project: 2011

16. Measuring Yield Losses Due to Diseases of Soybeans

Clayton Hollier, LSU Department of Plant Pathology and Crop Physiology

Project Focus:
Objectives: 1) To determine the effectiveness of selected management strategies (reduced rates of fungicides, tank mixes and split applications). 2) To develop decision aids for fungicide use. 3) To determine yield losses due to wheat diseases and d) rate all soybean variety plots across the state.
Location of Studies: Various, throughout the state
Funding Source: Louisiana Soybean and Grain Research and Promotion Board
Length of Project: Ongoing

17. Soybean Disease (Including Rust) Sentinel Plot Scouting Program

Clayton Hollier, LSU Department of Plant Pathology and Crop Physiology

Project Focus:
Objectives: 1) To establish twenty (20) soybean sentinel plots across the state to weekly monitor SBR and other diseases. 2) To announce the results of the weekly soybean observations as they are available. 3) To advise soybean producers on applications of fungicides based on weekly results and yearly accumulation of disease information. 4) To use mobile scouting (scouting of commercial fields) as sentinel plots mature.
Location of Studies: Various, throughout the state
Funding Source: Louisiana Soybean and Grain Research and Promotion Board
Length of Project: Ongoing

18. Biology and Control of Major Diseases of Soybean
Raymond Schneider, LSU, Department of Plant Pathology and Crop Physiology

Project Focus:
Objectives: 1) Develop and verify commercially acceptable fungicide application protocols for Cercospora leaf blight. Other diseases also will be evaluated in these tests. 2) Continue assessments of plant nutrition on development of CLB, rust and other diseases. 3) Test foliar applications of minor elements, such as zinc, copper and iron, for their effects on disease development. 4) Devise and implement fungicide resistance monitoring program for rust and CLB pathogens. 5) Screen selected germplasm and breeding lines for resistance to rust. 6) Finalize and make available to the industry our yield loss calculator.
Location of Studies: Ben Hur Research Farm, Baton Rouge
Funding Source: Louisiana Soybean and Grain Research and Promotion Board
Length of Project: Ongoing

19. Control of Seedling Diseases by Fungicide Seed Treatment, Cultivar Selection and Plant Population Across Soybean Production Systems.
Dr. John Rupe, Dr. Craig Rothrock Dr. Pengyin Chen, and Dr. Michael Popp, University of Arkansas

Project Focus:
To provide effective, cost efficient seedling disease controls that will improve stand establishment and yields in Arkansas soybean production systems. Objectives: 1) To determine the effectiveness of current chemical seed treatments on soybean stand establishment and yield. 2) To determine the nature of resistance to *Pythium* spp. by identifying molecular markers, seed exudates and other plant responses involved in resistance. 3) To determine the effect of seed treatment, seeding rate, and environment on stands and yields using high and low vigor soybean seed. 4) To determine the economic feasibility of using fungicide seed treatments to protect stands and yields with reduced plant populations.
Location of Studies: Northeast Research and Extension Center, Keiser, AR; Rice Research and Extension Center, Stuttgart, AR; Southeast Branch Station, Rohwer, AR
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

b.) Insects

1. Developing a New Threshold for Corn Earworm, *Helicoverpa zea* For Both Double Crop and Full Season Soybean Production Systems

Gus Lorenz, Glenn Studebaker, and Scott Akin, University of Arkansas Division of Agriculture, Cooperative Extension Service

Project Focus:

Develop a dynamic threshold for corn earworm (CEW) that takes into account the value of the crop, the cost of control and most importantly maintains profitability for the Double Crop Soybean Production System and the Full Season Soybean Production System. Specific Objectives: 1) Initiate studies for determining at what point CEW populations are causing economic damage to soybean which often impact the Double Crop Soybean Production System and the Full Season Soybean Production System. 2) Determine the loss in yield associated with CEW populations in soybean. After determining loss associated to different population levels of CEW develop a threshold for growers and decision makers on when insecticide applications for control of CEW are justified to main maximum profit for soybean producers. 3) Evaluate efficiency of sampling methods for determining CEW populations in soybean.

Location of Studies: Lon Mann Cotton Research Station, Marianna, AR; Northeast Research and Extension Center, Keiser, AR; Southeast Branch Station, Rohwer, AR

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2010-2012

2. Evaluation of control options and treatment thresholds for redbanded stink bug (*Piezodorus guildinii*) in Arkansas soybean.

Scott Akin, Assistant Professor and Extension/Research Entomologist, UA Cooperative Extension Service, UA Department of Entomology
Gus Lorenz, Professor and Extension Entomologist/IPM Coordinator, UA Cooperative Extension Service, UA Department of Entomology

Project Focus:

The redbanded stink bug is a relatively new pest that has posed a potentially significant threat to Arkansas soybean production over the last couple of years. In 2009, high numbers were observed earlier than ever in our state (40-80 per 25 sweeps in early August, Ashley County). Our preliminary data suggests that not only can this pest inflict more crop damage than our more common stink bugs, but control with insecticides may be more difficult to attain when compared to other stink bugs. We want to evaluate management options for redbanded stink bug (*Piezodorus guildinii*) as well as investigate action thresholds for this pest. Findings from this project will have a positive economic effect on production costs by preserving yields and seed quality in full-season as well as double-crop soybean fields infested with redbanded stink bug. Specific Objectives: 1) To verify the action threshold of 6/25 sweeps for redbanded stink bug, as

well as compare feeding damage of this pest and other common stink bugs on reproductive-stage soybean. 2) To investigate various insecticide programs and determine the most effective and affordable options for control of redbanded stink bug.
Location of Studies: Southeast Branch Research Station, Rohwer; Lon Mann Cotton Research Station, Marianna; various producer fields throughout Arkansas
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2012

3. Lepidopteran Insect Pest Management in Soybeans
Dr. Don Cook, Dr. Jeffrey Gore, Dr. Angus Catchot, Dr. Fred Musser, Mississippi State University

Project Focus:
Objectives: 1) Refine/validate current corn earworm thresholds in soybeans. 2) Validate results from simulated insect defoliations studies (hand defoliation) using soybean loopers in field cages. 3) Determine residual efficacy of new insecticides for control of soybean looper. 4) Maintain and continue on-farm and research station efficacy testing of labeled insecticides for management of soybean insects. Data from these studies will be used to update the soybean section of the "Insect Control Guide for Agronomic Crops".
Location of Studies: Multiple research stations throughout the state
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011

4. Management and Ecology of Redbanded Stink Bug
Dr. Fred Musser, Dr. Angus Catchot, Dr. Donald Cook, Dr. Jeffrey Gore, Mississippi State University

Project Focus:
To explore some of the ecological and management questions that impact soybean production in Mississippi. We will compare movement and aggregation of redbanded stink bug to other common stink bug species, and we will evaluate efficacy and residual of existing and newer insecticides against stink bug species. Furthermore we will identify non-soybean hosts that are integral to overall population dynamics. With the data from this proposed research, we expect that we will be able to develop more comprehensive, economical and sustainable management strategies for the redbanded stink bug.
Objectives: 1) To determine the effects of using Group 3 soybeans as a trap crop for controlling redbanded stink bugs. 2) To compare the mobility of redbanded stink bugs to southern green stink bugs. 3) To determine the efficacy and residual activity of certain insecticides at controlling redbanded stink bugs compared to southern green stink bugs. 4) To determine the alternative hosts of redbanded stink bugs in the Mississippi delta before and after moving to soybeans.
Location of Studies: Starkville, MS and other locations as determined
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2010-2012

5. Entomology Soybean Research and Extension in 2011
Mo Way, Suhas Vyavhare, Mark Nunez, and Becky Pearson – Texas AgriLife Research and Extension Center

Project Focus:
Objectives: 1) Quantify damage of redbanded stink bug (RBSB) to soybeans and plant response to this damage. 2) Continue to evaluate soybean genotypes for relative susceptibility to insect pests, especially stink bugs. 3) Continue to evaluate novel insecticides for control of the array of insect pests attacking soybeans.
Location of Studies: Texas A&M University-Beaumont
Funding Source: Texas Soybean Board
Length of Project: 2011-2012

6. Integrated Pest Management in Soybeans of the Coastal Bend
Stephen Biles – Texas AgriLife Extension Service, Port Lavaca

Project Focus:
Objectives: 1) Investigate the pest management strategies to determine best management practices of soybean production. 2) Monitor soybean fields for insect pests and relay this information to growers through newsletters and grower meetings.
Location of Studies: Calhoun, Victoria, Refugio counties
Funding Source: Texas Soybean Board
Length of Project: 2011-2012

7. Biology, Distribution, and Management of Soybean Insect
J. Davis, LSU Department of Entomology

Project Focus:
Objectives: 1) Evaluate the efficacy of new and current insecticides for control of soybean arthropod pests. 2) Define economic injury levels (EIL) and economic thresholds (ET) for redbanded stink bug in soybean based on yield and quality. 3) Survey for biological control agents parasitizing redbanded stink bug eggs. 4) Monitor soybean looper populations throughout Louisiana for resistance to Intrepid 2F.
Location of Studies: Various, throughout the state
Funding Source: Louisiana Soybean and Grain Research and Promotion Board
Length of Project: Ongoing

8. Optimizing Chemical Control Strategies for Louisiana Soybean Pests
B. Rogers Leonard, LSU AgCenter Macon Ridge / Northeast Research Station

Project Focus:
Objectives: 1) To evaluate soybean IST products/rates against seed and seedling pests and measure yield impacts. 2) To refine action thresholds and define when to terminate soybean IPM based upon seed yield/quality. 3) To evaluate chemical control

technologies against pests, with an emphasis on stink bugs/ caterpillars. 4) To determine simulated and actual three-cornered alfalfa hopper injury on soybean seedling mortality, plant lodging, and seed yields in selected production systems.
Location of Studies: Macon Ridge Research Station/Northeast Region
Funding Source: Louisiana Soybean and Grain Research and Promotion Board
Length of Project: 2011

c.) Virus and Other

1. Identification of the factors that cause soybean green bean syndrome

Dr. Ioannis Tzanetakis and Dr. John Rupe, University of Arkansas
Cooperators: Dr. Sead Sabanadzovic, Mississippi State University, Dr. Rodrigo Valverde, Louisiana State University

Project Focus:
Identify and characterize biotic and abiotic factors that cause soybean green bean syndrome. Specific Objectives: 1) Survey for the presence of soybean green bean syndrome (GBS). 2) Identify the causal agent of the disorder. 3) Identify vectors of the soybean green bean syndrome agent. 4) Characterize conditions that make the disorder prominent.
Location of Studies: Various producer fields throughout Arkansas, Mississippi, and Louisiana
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2009-2011

2. Epidemiology of Soybean vein necrosis virus

Dr. Ioannis Tzanetakis, University of Arkansas
Collaborator: Dr. Reza Hajimorad, University of Tennessee, Knoxville

Project Focus:
Identify vectors, evaluate seed transmission, find alternative hosts and study yield losses caused by a new virus associated with leaf necrosis in soybean. Specific Objectives: 1) Development of detection tests. 2) Vector identification. 3) Presence of the virus in the field. 4) Seed transmission and effect in seed vigor. 5) Identification of alternative hosts. 6) Study of host reaction and yield losses caused in major cultivars. 7) Cultivar reactions to mixes infections with Soybean mosaic and Bean pod mottle viruses.
Location of Studies: University of Arkansas, Fayetteville; various field locations throughout Arkansas, Mississippi, and Louisiana
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2010-2012

3. Surveying Louisiana Soybeans for Soybean Vein Necrosis and Soybean Mottle Mosaic: Two New Viral Diseases of Soybean in the United States Reported in Arkansas and Mississippi

Rodrigo A. Valverde, LSU Department of Plant Pathology and Crop Physiology

Project Focus:

Objectives: The main objective of this proposal is to determine whether Soybean vein necrosis virus is present in Louisiana and if that is the case, determine the virus incidence. While surveying for SVNV, selected samples showing virus-like symptoms will be tested for Soybean yellow mottle mosaic virus.

Location of Studies: Throughout the state

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2011

d.) Weeds

1. A Team Approach to Weed Management in Soybean

R. Scott, K. Smith, J. Norsworthy, and N. Burgos, University of Arkansas Division of Agriculture

Project Focus:

The overall goal of this project is to evaluate new and emerging technologies, rapidly identify herbicide-resistant weeds, determine their distribution, determine their mechanisms of resistance, and develop viable solutions for managing herbicide-resistant weeds, reducing the soil weed seedbank and controlling other problematic weeds for double crop soybean producers in Arkansas. A major goal will be providing a rapid information exchange between the grower, extension personnel, and researchers. Specific Objectives: 1) To quantify the potential of glyphosate-resistant Palmer amaranth, giant ragweed, johnsongrass, and other confirmed resistant and problematic weeds to spread in Arkansas by determining control programs, ecological fitness, geographic distribution of resistant biotypes, resistance mechanisms, and dispersal mechanisms most likely to cause population expansion. 2) To continue testing suspected resistant weed biotypes sent from county agents and soybean producers for herbicide resistance, documenting the level of resistance, and determining the effectiveness of alternate herbicide modes of action on resistant biotypes. 3) To evaluate the effectiveness of fall vegetation management for suppressing the most problematic weeds of double crop Arkansas soybean production systems. 4) To determine how preplant burndown and in-crop herbicide performance and selectivity are affected by planting date, soil texture, application procedure, herbicide combination, weed species, growth stage, and climatic conditions to develop more efficient and reliable herbicide practices. 5) To evaluate long term programs to reduce the soil weed seedbank ("Zero Tolerance"). 6) To provide rapid transfer of weed control information to growers and to conduct a grower survey to evaluate specific needs for this program in the future.

Location of Studies: Southeast Branch Research Station, Rohwer; Newport Research Station; Rice Research and Extension Center, Stuttgart; Lonoke Agricultural Center; Northeast Research and Extension Center, Keiser and others as needed
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

2. A Team Approach to Weed Management in Soybean (in Double Crop, Early Season and Full Season Production Systems)
R. Scott, K. Smith, J. Norsworthy, and N. Burgos, University of Arkansas Division of Agriculture

Project Focus:
The overall goal of this project is to evaluate new and emerging technologies, rapidly identify herbicide-resistant weeds, determine their distribution, determine their mechanisms of resistance, and develop viable solutions for managing herbicide-resistant weeds, reducing the soil weed seedbank and controlling other problematic weeds for three (double crop, early season, and full season) cropping in Arkansas. A major goal will be providing a rapid information exchange between the grower, extension personnel, and researchers. Specific Objectives: 1) To quantify the potential of glyphosate-resistant Palmer amaranth, giant ragweed, johnsongrass, and other confirmed resistant and problematic weeds to spread in Arkansas by determining control programs, ecological fitness, geographic distribution of resistant biotypes, resistance mechanisms, and dispersal mechanisms most likely to cause population expansion. 2) To continue testing suspected resistant weed biotypes sent from county agents and soybean producers for herbicide resistance, documenting the level of resistance, and determining the effectiveness of alternate herbicide modes of action on resistant biotypes. 3) To evaluate the effectiveness of fall vegetation management for suppressing the most problematic weeds of three Arkansas soybean production systems. 4) To determine how preplant burndown and in-crop herbicide performance and selectivity are affected by planting date, soil texture, application procedure, herbicide combination, weed species, growth stage, and climatic conditions to develop more efficient and reliable herbicide practices. 5) To evaluate long term programs to reduce the soil weed seedbank ("Zero Tolerance"). 6) To provide rapid transfer of weed control information to growers and to conduct a grower survey to evaluate specific needs for this program in the future.
Location of Studies: Southeast Branch Research Station, Rohwer; Newport Research Station; Rice Research and Extension Center, Stuttgart; Lonoke Agricultural Center; Northeast Research and Extension Center, Keiser and others as needed
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

3. Managing transgenic crops as weeds in soybean cropping systems
Dr. Daniel B. Reynolds, Dr. Tom Eubank, Jon Trenton Irby, Mississippi State Univeristy

Project Focus:
To develop weed control programs that will control corn, cotton, and volunteer soybean growing as weeds in Roundup Ready, Liberty Link, and conventional soybean varieties. This will be of value to producers who need to replant a crop due to failed stands or who encounter volunteer crops containing various herbicide resistance traits.
Objectives: 1) Determine the effect of volunteer corn, cotton, or soybean on soybean growth and yield. This component of the research will determine the actual effects of these undesirable crop plants on the desirable plants. 2) Develop herbicide programs to control failed soybean stands and volunteer crop species. This is pretty straight forward in that we will have specific control recommendations available for various crop/trait combinations.
Location of Studies: Delta Research and Extension Center, Stoneville, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2010-2012

4. Weed Management and Biology Research in Soybeans
James L. Griffin, LSU AgCenter, School of Plant, Environmental, and Soil Science

Project Focus:
Objectives: 1) To evaluate crop safety, weed control, and fit of experimental herbicides in Louisiana production systems and to develop cost effective weed management programs. 2) To evaluate future transgenic technologies for weed control and non-target crop response. 3) To monitor weed population shifts and weed resistance associated with herbicide-resistant crops. 4) To evaluate possible interactions that may occur with use of insecticides, fungicides, and harvest aids.
Location of Studies: Various, throughout the state
Funding Source: Louisiana Soybean and Grain Research and Promotion Board
Length of Project: Ongoing

5. Soybean Weed Control Research in Northeast Louisiana
Donnie Miller, LSU AgCenter Northeast Research Station

Project Focus:
Objectives: 1) To continue evaluation of experimental compounds for weed efficacy and crop tolerance. 2) To continue evaluation of burndown programs, emphasizing control of henbit with spring and fall programs. 3) To continue evaluation of dicamba co-application effects with additional pesticides on weed control. 4) To evaluate soil residual effects from dicamba drift on non-resistant soybean. 5) To evaluate tillage and chemical removal on post harvest weed germination. 6) To conduct cooperative work verifying resistant weed species and identification of control measures.
Location of Studies: Northeast Research Station
Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: Ongoing

6. Soybean Weed Management Systems in Louisiana

Daniel O. Stephenson IV, LSU AgCenter Dean Lee Research Station

Project Focus:

Objectives: 1) To identify and investigate weed management with new and/or currently registered herbicide-tolerant soybeans in Louisiana. 2) To elucidate the potential of currently registered and/or new herbicide products for weed management in Louisiana soybeans. 3) Investigation and confirmation of herbicide resistant weeds in Louisiana and identification of methods to control and/or mitigate this issue. 4) Dissemination of weed management systems to Louisiana soybean producers and the scientific community through county agents, consultants, commodity meetings, popular press, online publications, professional meetings, and scientific journals.

Location of Studies: Multiple LSU AgCenter Research Stations

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: Ongoing

E. Cultural Practices

1. Achieving Maximum Yield Potential in Soybean

Larry C. Purcell and Nathan Slaton
University of Arkansas Division of Agriculture

Project Focus:

Soybean producer Kip Cullers in SW Missouri has reported yields of 139 (2006), 155 (2007), and 160 bushel/acre (2010), and these yields are substantially greater than any other reported maximum yields. For the past 3 years, we have made measurements in Mr. Cullers' contest field with the intent of documenting crop growth characteristics that would result in these yields. While these observations have provided some hints of unique features of Mr. Cullers crop, more detailed and more frequent measurements are required. We are proposing that a PhD student will characterize fully Mr. Cullers' production system. This research will provide unbiased documentation of Mr. Cullers yield, establish crop growth characteristics of his crop, and provide a scientific basis for understanding how (and if) these yields are attainable. Specific objectives: 1) Characterize environmental conditions and crop growth at Kip Cullers record yielding production field. 2) Evaluate specific management practices and inputs that are used on the Cullers farm to determine their effectiveness in defined experimental conditions. 3) Utilize a crop simulation model to predict theoretical yield using parameters derived from measurements made in his contest field.

Location of Studies: Kip Cullers Farm, Southwest Missouri and University of Arkansas-Fayetteville

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

2. Investigating Efficacy of Inoculants and the use of Winter Cover Crops to Improve Soybean Performance and Yield Following Rice in the Full Season Soybean Production System

Trenton Roberts, Jeremy Ross, Nathan Slaton, and other select Extension Soybean Personnel, University of Arkansas Division of Agriculture

Project Focus:

To evaluate novel inoculants and investigate the influence of winter cover crops to improve nutrient availability and soybean growth following rice using the Full Season Soybean Production System. Specific Objectives: 1) Initiate field trials to compare and evaluate inoculants in a variety of production settings. Production practices and environmental conditions that will be evaluated include; irrigation method, soil texture, nutrient availability and previous crop. 2) Investigate the potential of winter cover crops to increase nutrient availability and improve soil conditions following rice in the Full Season Soybean Production System. 3) Evaluate newly developed soil analysis methods and their relationship to soybean yield and performance. Correlation of

soybean response with soil test values will be used to determine the need for specific management practices in order to increase yield.

Location of Studies: Agricultural Research Station, Fayetteville; Northeast Research and Extension Center, Keiser; Newport Research Station; Pine Tree Research Station, Colt; Southeast Branch Research Station, Rohwer

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

3. Investigating Emerging Production Recommendations for Sustainable Soybean Production using the Double Crop Soybean Production System
Jeremy Ross, Gus Lorenz, and other select Extension Soybean Commodity Committee Members, University of Arkansas Division of Agriculture

Project Focus:

To investigate new and untested management inputs to improve soybean production using the Double Crop Soybean Production System. Specific Objectives: 1) Continue to initiate test demonstrations for controlling economically damaging insect pests that often impact the Double Crop Soybean Production System. These pest complexes include Dectes Stem Borer, Grape Colaspis, Thrips, Potato Leaf Hopper, Soybean Looper, and Stink Bug. 2) Continue to investigate optimum seeding rates and planting methods of soybean under a wide range of geographic regions and soil textures for the Double Crop Soybean Production System. 3) Examine the potential of using new and innovative production factors, and how they influence soybean yields and profitability. Detail research is needed to advise producers in the use of plant growth regulators, alterative fertilizer sources (poultry litter) and other soybean production inputs currently not being tested in Arkansas for soybean production sustainability with the Double Crop Soybean Production System.

Location of Studies: Northeast Research and Extension Center, Keiser; Newport Research Station; Pine Tree Research Station, Colt; Southeast Branch Research Station, Rohwer

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

4. Investigating Emerging Production Recommendations for Sustainable Soybean Production using the Early Crop Soybean Production System
Jeremy Ross, Gus Lorenz, and other select Extension Soybean Commodity Committee Members, University of Arkansas Division of Agriculture

Project Focus:

To investigate new and untested management inputs to improve soybean production using the Early Soybean Production System. Specific Objectives: 1) Develop production recommendations for early-maturing soybean cultivars (MG III and early-MG IV) in

Arkansas production systems. These would include optimum planting date, seeding rate, row spacing for the Early Soybean Production System. 2) Implement an early-season variety test (125-135 entries) for silt-loam soils in Northeast Arkansas. 3) Continue to initiate test demonstrations for controlling economically damaging insect pests that often impact the Early Soybean Production System. These pest complexes include Dectes Stem Borer, Grape Colaspis, Thrips, Potato Leaf Hopper, Soybean Looper, and Stink Bug. 4) Continue to investigate optimum seeding rates and planting methods of soybean under a wide range of geographic regions and soil textures for the Early Soybean Production System. 5) Examine the potential of using new and innovative production factors, and how they influence soybean yields and profitability. Detail research is needed to advise producers in the use of plant growth regulators, alterative fertilizer sources (poultry litter) and other soybean production inputs currently not being tested in Arkansas for soybean production sustainability with the Early Soybean Production System.

Location of Studies: Northeast Research and Extension Center, Keiser; Newport Research Station; Pine Tree Research Station, Colt; Southeast Branch Research Station, Rohwer

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

5. Investigating Emerging Production Recommendations for Sustainable Soybean Production using the Full Season Crop Soybean Production System

Jeremy Ross, Gus Lorenz, and other select Extension Soybean Commodity Committee Members, University of Arkansas Division of Agriculture

Project Focus:

To investigate new and untested management inputs to improve soybean production using the Full Season Soybean Production System. Specific Objectives: 1) Continue to initiate test demonstrations for controlling economically damaging insect pests that often impact the Early Soybean Production System. These pest complexes include Dectes Stem Borer, Grape Colaspis, Thrips, Potato Leaf Hopper, Soybean Looper, and Stink Bug. 2) Continue to investigate optimum seeding rates and planting methods of soybean under a wide range of geographic regions and soil textures for the Full Season Soybean Production System. 3) Examine the potential of using new and innovative production factors, and how they influence soybean yields and profitability. Detail research is needed to advise producers in the use of plant growth regulators, alterative fertilizer sources (poultry litter) and other soybean production inputs currently not being tested in Arkansas for soybean production sustainability with the Full Season Soybean Production System.

Location of Studies: Northeast Research and Extension Center, Keiser; Newport Research Station; Pine Tree Research Station, Colt; Southeast Branch Research Station, Rohwer

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

6. The Mississippi "YIELD" Project
Dr. Alan Blain, Dr. Billy Moore, Mississippi State University

Project Focus:
Soybean yields over the last several years have made significant strides. The state average yield for Mississippi exceeds the neighboring states in the midsouth by 8-10 bushels per acre. Many producers today are averaging 60+ bushels per acre (irrigated average). Over the last three years many have exceeded this level. The efforts of the SMART program have aided producers in achieving these higher yield levels. These increases are due to the utilization of sound agronomic practices, timeliness, and overall increased management. Much of this increase is due to the use of new earlier maturing higher yielding varieties, earlier planting dates, and improved irrigation scheduling. Although yields are on the rise there are many who have yet to achieve these levels as there are those who are consistently producing above average yields. The purpose of this project is to identify the factors that are limiting yields from increasing to the next level. Objectives**:** To determine what management practices/inputs are essential to allow yields in both a dryland and irrigated setting to increase to the next level. This project will investigate as many avenues as possible to determine what is required to move yields to the next level.
Location of Studies: Starkville, MS and other locations to be determined.
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011

7. Irrigation Use and Efficiency in Soybean Production Systems in Mississippi
Dr. Thomas Eubank, Dr. Joseph Massey, Dr. Lyle Pringle, Dr. Jason Krutz, Mississippi State University

Project Focus:
Objectives: 1) To evaluate and substantiate conservation irrigation practices, such as Phaucet, which promote water use efficiency, as compared to conventional irrigation practices. Projected benefits may include reduced water demands and irrigation costs while maintaining soybean yields. 2) To assess varietal response of soybean varieties to prolonged flooded/wet soil conditions. Projected benefits would be to determine flood tolerance of commercially available soybean varieties so as to maximize soybean yields on poorly drained soils.
Location of Studies: Multiple locations throughout the state
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2010-2012

8. The Influence Of Long Term Glyphosate Use In Soybean.
Dr. Ernest H. Flint, Mississippi State University

Project Focus:

Objectives: 1) To evaluate the effectiveness of using gypsum, lime, and poultry litter as sources of calcium and other elements which have been shown to reduce the chelating effect of glyphosate and/or its metabolites, thereby increasing the uptake of several plant nutrients that have been linked to yield and seed quality. 2) To evaluate the effectiveness of using gypsum, lime, and poultry litter as sources of calcium and other elements which have been shown to influence the incidence of several commonly occurring soybean diseases. 3) To evaluate the effectiveness of using gypsum, lime, and poultry litter as sources of calcium and other elements to reduce the troublesome condition commonly referred to as "greenstem syndrome". No direct reference to this has been found in work that has been done by others.
Location of Studies: Multiple locations throughout the state to be determined
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011

9. On-farm Validation of the Mississippi Irrigation Scheduler Tool (MIST)
Dr. Amy Schmidt, Mississippi State University, Dr. Gretchen Sassenrath, USDA-ARS

Project Focus:
Objectives: 1) Develop water moisture release curves for typical Mississippi soils planted to soybeans and calibrate soil moisture sensors to known moisture contents of these soils. 2) Test and validate the new Mississippi Irrigation Scheduling Tool (MIST) for common soybean production practices and soil types in Mississippi using developed water moisture release curves. 3) Confirm irrigation system application rates recommended by the MIST on cooperators' fields.
Location of Studies: To be determined
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011

10. Agronomic Factors Involved in Soybean Production Along the Texas Gulf Coast
W. James Grichar, Joe Janak, Brent Batchelor – Texas AgriLife Research

Project Focus:
Objectives: 1) Continue to evaluate variety response to planting dates in counties along the upper Texas Gulf Coast. 2) Continue to investigate the effect of early plantings on soybean yield and the development of the flat pod syndrome compared with April or May plantings. 3) Continue to evaluate Headline and other fungicides for disease control and soybean response. 4) Continue to evaluate soybean herbicides for control of volunteer cotton. 5) Continue with education meetings in the Lower Rio Grande Valley in cooperation with Rio Farms and respond to any production issues that grower may experience.
Location of Studies: Various in Texas Gulf Coast region
Funding Source: Texas Soybean Board
Length of Project: 2011-2012

11. Evaluation and improvement of *Bradyrhizobium* inoculants for desiccation tolerance using a newly developed molecular marker system

Woo-Suk Chang – University of Texas-Arlington and Jim Heitholt – Texas A&M University

Project Focus:

Objectives: 1) Evaluate *Bradyrhizobium* inoculants for their ability to deal with desiccation and heat stress. 2) Isolate native desiccation/heat-tolerant *Bradyrhizobium* strains from Texas soils. 3) Determine economic return of soybean production expense for native vs. commercial inoculation. 4) Provide the Texas soybean industry with fact sheets that will help producers obtain and apply efficient *Bradyrhizobium* strains.

Location of Studies: Northeast Texas, Upper Gulf Coast, High Plains regions

Funding Source: Texas Soybean Board

Length of Project: 2011-2012

12. Pesticide Application Efficiency and Drift Potential from Aerial and Ground Sprayers

R. Barbosa, LSU, Department of Biological and Agricultural Engineering

B. Roger Leonard, LSU Ag Center

Project Focus:

Objectives: To investigate current pesticide application efficiency in cotton and soybeans to improve nozzle arrangement as well as develop drift reduction techniques for both air and ground equipment.

Location of Studies: LSU Biological and Agricultural Engineering Dept. and Macon Ridge Research Station

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2011-2012

13. Agronomic Research to Improve Soybean Production in Louisiana

Dr. Sterling B. Blanche, LSU Dean Lee Research and Extension Center

Project Focus:

Objectives: 1) To investigate the effect of various agronomic, cultural, and management factors on soybean production in Louisiana. 2) To evaluate soybean varieties for their strengths and weaknesses, in addition to yield potential, and develop strategies to optimize their production. 3) To disseminate research findings to Louisiana soybean producers, other agricultural personnel, and the scientific community through county agents, consultants, commodity meetings, popular press, online publications, professional meetings, and scientific journals.

Location of Studies: LSU AgCenter Dean Lee Research Station

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2011-2012

14. Arkansas Discovery Farm Program: Addressing Sustainable Water Issues Associated with Crop Production

Dr. Mike Daniels, Dr. Andrew Sharpley-University of Arkansas

Project Focus:

To document the impact of water and crop management on water quality and quantity as it relates to sustainable crop production on real, working farms in Arkansas.

Objectives: 1) Conduct on-farm research and monitoring to assess the need for and effectiveness of best management practices (BMPs) for production and water sustainability. 2) Provide on-farm verification and documentation of nutrient and sediment loss reductions and water conservation in support of sound environmental farm stewardship and sustainability. 3) Develop and deliver educational programs from on-farm data that will assist producers in achieving both production and environmental goals in support of sustainable farming in Arkansas.

Location of Studies: Throughout Arkansas

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2012

F. Composition and Alternate Uses

a.) Bio-fuels

1. Arkansas Biodiesel Promotion and Education Project: Phase III (2011-2012)

Edgar, D.W.; Johnson, D.M.; Wardlow, G.W.; & Edgar, L.E.-University of Arkansas, Department of Agricultural and Extension Education

Project Focus:
To educate professionals involved in agriculture about the performance and usability of biofuels. Specific target objectives include disseminating knowledge to present and future farmers/producers, extension groups, and other professionals involved in agriculture and creating a mobile classroom to educate professionals involved in agriculture about alternative energy solutions in agriculture. Developed curriculum will be presented to targeted professionals to encourage adoption rates and performance capabilities of biofuels. Furthermore, the demonstration and educational presentations showcase actual performance and valid research conducted through previous successful projects. An overall objective of this progressive project is to compile previous research and curriculum materials to improve knowledge and communication towards alternative energy approaches utilized in the agriculture sector.

Location of Studies: University of Arkansas — Fayetteville, Northwest Arkansas
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2009-2011

2. Fuelling irrigation engines by biomass - derived producer gas using downdraft gasifiers

Dr. Samy Sadaka, Dr. Donald Johnson and Dr. Don Edgar, University of Arkansas

Project Focus:
The goal of this project is to evaluate the feasibility of replacing fossil fuel by producer gas to power irrigation engines. Specific Objectives: 1) Build a downdraft gasifier that produces engine quality producer gas. 2) Install the required equipment to clean the gas from tar and char. 3) Optimize the parameters influencing the quality of the producer gas. 4) Test the engine performance powered by diesel/natural gas and/or producer gas. 5) Test the engine emission rate. 6) Demonstrate the project outcomes to soybean growers.

Location of Studies: Bob Wayne Farm, Scott, AR; Rice Research and Extension Center, Stuttgart
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2012

b.) Nutraceuticals

1. Intensification of protein content in soybean meals

Ruben O. Morawicki, University of Arkansas Division of Agriculture

Project Focus:
Increase the protein content of soybean meals by selectively removing carbohydrates compounds by combined chemical and enzymatic methods while preserving the color.
Location of Studies: Department of Food Science, UAF
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2010-2012

2. Commercialization of Conjugated Linoleic Acid (CLA) Rich Soy Oil Production and Use

Andrew Proctor, University of Arkansas, Department of Food Science

Project Focus:
Commercialization of Conjugated Linoleic Acid (CLA) Rich Soy Oil Production and Use Specific objectives: 1) Optimize a membrane separation technique for industrial separation of iodine catalyst from CLA-rich oil. 2) Obtain sufficient membrane treated oil to produce food products in an industrial research and development facility (ADM) and university facilities. 3) Obtain high purity trans, trans, CLA for nutraceutical or pharmaceutical commercial use.

Location of Studies: University of Arkansas - Fayetteville
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

3. Production and Evaluation of Novel Prebiotic Fibers from Soy on the Digestive Microbiota

Sun-Ok Lee, Phil Crandall and Steve Ricke, University of Arkansas
Cooperators: Tim Bowser and William McGlynn, Oklahoma State University

Project Focus:
Produce, novel, marketable food ingredient from soy that can beneficially modulate microbiota capability to prevent chronic disease, especially Type II diabetes. Objectives: 1) Manufacture four prebiotic fibers from soybeans' structural and non-structural carbohydrate components, conduct chemical laboratory analysis to document fiber's functional characteristics. 2) Test these fibers' ability to function as prebiotic and promote pure cultures of healthy bacteria in the gut. 3) Determine the fermentation patterns of novel probiotic fibers by fecal microbiota obtained from human subjects and human gut microbial populations.
Location of Studies: University of Arkansas – Fayetteville; Robert M. Kerr Food and Agricultural Products Center - Oklahoma State University, Stillwater, Oklahoma.
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

4. Purification, Characterization and Food Product Application of Anti-cancer, and screening for Anti-Obesity, Anti-Alzheimer's Activities of Bioactive Peptides from Soybean Meals of High Oleic Acid Soybean Lines Developed in Arkansas

Navam Hettiarachchy and Pengyin Chen, University of Arkansas Division of Agriculture

Project Focus:

Characterize pure gastrointestinal resistant peptide(s) for enhanced anticancer, anti-obesity and anti-Alzheimer's activities, and investigate its interaction and stability in orange juice. Specific Objectives: 1) Purify soy peptides from the fractions that showed promising anticancer activities and fully characterize to determine amino acid composition and sequence the single pure peptide(s) to enhance its activities (90% completed for the first year 2010). 2) Test pure peptides for anti-cancer (enhancement) against breast, prostate, lung, colon and liver human cell lines. (2011-2012) 3) Incorporate pure peptide(s) in orange juice beverage and evaluate shelf-life stability and interactions of peptide(s) with components of orange juice.(2012-2013) 4) Screen the pure peptide(s) for anti-obesity and Anti-Alzheimer's activities. (2012-2013)

Location of Studies: University of Arkansas, Fayetteville
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2010-2012

5. Bioactive Nutrients and Anti-Nutrients in Pre and Post-Processed Large Size Vegetable Soybean Lines Grown In Arkansas.

Navam Hettiarachchy and Pengyin Chen, University of Arkansas Division of Agriculture

Project Focus:

Our overall goal is to select and promote high-nutrient soybean vegetable lines for increased "demand-driven" consumption and profit based on their potential health benefits. Specific goal is to select lines that are dense in nutrients, low in anti-nutritional factors (trypsin inhibitors, hemagglutinins, phytic acid) high in protein and sucrose, and low in stacchyose and, disseminate information to breeders for selective growing of those nutrient-dense vegetable lines with potential end uses. This information on various vegetable soybean lines is not available and needs investigation. Specific Objectives: 1) Quantify bioactive nutrients and anti-nutritional factors in lines with large size vegetable soybean provided by Dr. Chen, the soybean breeder (Year 2011-2012). 2) Determine the effects of processing (boiling, steaming, microwave heating) on the retention of nutrients in large size vegetable soybean (Year 2012-2013). 3) Determine sensory attributes (texture-hardness, color and sensory) of pre-and post-processed large edible vegetable soybean (2013-2014).

Location of Studies: University of Arkansas, Fayetteville
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

6. The Promotion of Edamame and other Specialty Soybeans in Arkansas
Hank Chaney, Lanny Ashlock, Kelly Cartwright and County Extension Agents in the Ozark District

Project Focus:

Soybean producers in the Arkansas River Valley (ARV) and Western Arkansas have somewhat different production and marketing options and/or constraints compared to other regions of the state. Due to these constraints, the opportunity to produce a specialty crop such as Edamame (vegetable soybean) may be more appealing than their Eastern Arkansas counterparts. With the development of two Edamame lines by the University Arkansas soybean breeding program conducted by Dr. Chen (with funding by the Arkansas soybean check-off program) there now exists an opportunity to establish a commercial Edamame industry in the ARV that may possibly incorporate these lines into the commercial venture. Funding is needed to further educate ARV soybean producers regarding the production and processing of this potential new soybean product.

Objectives: 1) Establish Extension Demonstrations in select ARV counties to evaluate production concerns and product utilization. 2) Organize and conduct county and area-wide field days to inform ARV soybean producers regarding Edamame production and marketing. 3) Develop educational materials (production fact sheets and budgets, etc.) relative to Edamame production in the ARV.

Location of Studies: Throughout Arkansas

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2012

G. Economics and Marketing

1. Economic Analysis of Soybean Production Practices

Dr. C. Robert Stark, Jr., Professor, University of Arkansas

Project Focus:

The project will assist producers as they continue to seek opportunities for decreasing costs, increasing incomes, and reducing risks. Specific Objectives: The overall objective of this study is to provide an economic analysis for the following proposed projects and other Soybean Promotion Board funded projects that would benefit from economic analysis. Specific objectives are: 1) Conduct an economic analysis of production practices used in the Arkansas Soybean Research Verification Program that impact profitability and verify Extension recommendations. (J. Ross, C. Grimes, & S. Kelley) 2) Standardize the economic analysis by integrating the 2010 verification data with data from previous years. This will continue to document the long-term benefits of the Arkansas Soybean Research Verification Program. (J. Ross, C. Grimes, & S. Kelley) 3) Provide economic assistance and interpretation for determining yield response by planting date using database created from previous Arkansas Soybean Research Verification Program annual reports. (T. Griffin) 4) Develop and analyze a historical economic database for commercial soybean production at the Rohwer Research Station (L. Earnest) 5) Provide economic assistance and interpretation of agronomic results for projects previously funded or proposed for funding by ASPB such as: "Improving Technology Transfer of Profitable and Sustainable Soybean Production." (J. Ross); "Relay Cropping System Evaluation for Arkansas Soybeans." (P. Francis); and "Improving Yield and Yield Stability for Irrigated Soybean." (P. Francis) 6) Finish adapting the Nalley portfolio analysis concept for rice variety selection to soybean using Arkansas Soybean Performance Trial data (L. Nalley)

Location of Studies: University of Arkansas- Fayetteville
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2012

2. Characteristics of Profitable Arkansas Crop Farms, 2000-2009

Bruce L. Ahrendsen and Bruce L. Dixon, Professors, University of Arkansas
Department of Agricultural Economics and Agribusiness

Project Focus:

Identify characteristics of profitable and efficient Arkansas crop farms. Specific objectives: 1) Compare the financial characteristics of crop farms by farm type, using USDA Agricultural Resource Management Survey (ARMS) data. The time series aspect of the study will investigate how these characteristics have changed over time on an annual basis. 2) Identify factors that contribute to differences in financial characteristics, using ARMS data. 3) Provide essential economic information on Arkansas crop farms to stakeholders and policy makers.

Location of Studies: University of Arkansas - Fayetteville
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

3. Soybean Enterprise Budgets and Production Economic Analysis
Dr. Archie Flanders, University of Arkansas

Project Focus:
The goal of this project is to provide crop enterprise budgets for soybeans that are flexible for representing alternative production practices of Arkansas producers. Crop enterprise budgets are developed with methods that are consistent over all field crops. Specific goals are to: 1) Determine base representative production activities of the most common production practices of soybeans in Arkansas. 2) Collect data for input prices and equipment costs associated with the base representative production activities. 3) Establish and maintain a computational budget calculator for the base representative production activities. Representative base budgets will be developed by state faculty. The budget calculator will be interactive and flexible in order to represent alternative production methods that are not included in the base production activities. 4) The budget calculator will be accessible for application by county agents and producers with minimal spreadsheet skills. 5) County agents will develop customized crop enterprise budgets that represent production activities for individual farmers.
Location of Studies: Northeast Research and Extension Center, Keiser
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

4. Economic Contribution of the Arkansas Soybean Industry
Dr. Wayne Miller, Mr. Nathan Kemper, Dr. Ron Rainey, Dr. Jennie Popp, University of Arkansas

Project Focus:
Develop an awareness and understanding of the economic contribution of the soybean industry to the state economy. Specific Objectives: 1) Estimate the total economic contribution of the soybean industry to the Arkansas economy. 2) Develop resource material which interpret and explain the findings for scientific and lay audiences. 3) develop an outreach program to disseminate this information to state, local and industry leaders and soybean growers.
Location of Studies: University of Arkansas
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

5. Evaluation of Farm Policy Alternatives for Mississippi Soybean Farms
Dr. Keith Coble, Dr. John Michael Riley, Mississippi State University

Project Focus:
To develop economic simulations models that evaluate the expected payouts and risk reduction from various farm program alternatives. The models will define a number of representative Mississippi soybean farms and evaluate alternative farm program

scenarios. The results will provide direction for Mississippi soybean producers when making management decisions that involve commodity programs and crop insurance. The results will also provide the Mississippi Soybean Promotion Board with objective information when advocating preferences for the direction of the upcoming farm bill.
Objectives: Farm policy profoundly affects soybean producers. This project will develop the data and simulation models so that we can quickly evaluate proposed alternative farm policy proposals and report the results to Mississippi soybean producers.
Location of Studies: Starkville, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011

6. Analysis for the next Farm Bill, Changes to the 2008 Food, Conservation and Energy Act

Dr. Eric J. Wailes, Dr. Brad Watkins, University of Arkansas

Project Focus:
Objectives: 1) Develop descriptive analyses on each of the 15 titles of the 2008 Food, Conservation and Energy Act. Identify to the extent possible the effects of these titles on all Arkansas producers. Special attention will focus on the commodity and conservation titles. 2) Determine the impacts of alternative proposals that would modify the 2008 Act given the prospects of reduced funding for the 2012 legislation. Particular attention will be given to modifications to the price and income safety net of existing programs—direct payments, loan deficiency payments, counter-cyclical payments and ACRE. Special attention will be given to assessing the limitation of existing crop insurance programs for southern agriculture, and alternative proposals to provide revenue assurance.
Location of Studies: University of Arkansas
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2012

H. Technology Transfer

a.) Verification

1. 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 recommendation for soybean production, and to maintain an economic data base of production practices on a large-scale field basis. Specific Objectives: 1) To conduct field trials to verify that high yields can be profitably produced by coordinating the implementation of all research-based recommendations. 2) To aid researchers in identifying areas of soybean production and marketing that need further study. 3) To improve recommendations which contribute to profitable soybean production utilizing both irrigated and non-irrigated production of both early season (indeterminate) and conventional (determinate) varieties into economically sustainable soybean production systems for the Arkansas farmers. 4) To utilize the Soybean Research Verification Program (SRVP) concept to maintain and improve producers, County Extension Agents' and other crop advisors' soybean production and marketing expertise.
Location of Studies: Various producer field locations throughout Arkansas
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

2. Louisiana Soybean Research Verification Program
Ronald J. Levy, LSU Dean Lee Research Station

Project Focus:
Objectives: 1) To conduct on-farm field trials to verify the research-based recommendations from the LSU AgCenter with the goal of maximizing profitability. 2) To increase the confidence of producers, county agents and specialists in LSU AgCenter recomendations. 3) To continue to build a good cost data base for soybean production in Louisiana. 4) To provide data on various production systems as to yields and cost. 5) To demonstrate what the higher-yielding fields have in common in addition to refining existing recommendations. 6) To aid researchers in identifying areas of soybean production that may need additional research.
Location of Studies: Various, throughout the state
Funding Source: Louisiana Soybean and Grain Research and Promotion Board
Length of Project: Ongoing

b.) Educational

1. Improving Technology Transfer for Profitable and Sustainable Soybean Production

Jeremy Ross, Chris Grimes, Steve Kelley, and other select Extension soybean commodity committee members, University of Arkansas Division of Agriculture

Project Focus:
To ensure that improved production practices for soybean production in Arkansas are distributed in a timely manner. Specific Objectives: 1) To ensure timely development and distribution of the Soybean Update publications (Early-Planted and Conventional/Doublecrop Production Systems) as well as the *SOYVA* computer assisted variety selection program. 2) To improve the rate of technology transfer and adaption by the implementation of educational programs that impart critical decision-making information at advisory and producer level for improved profitability for sustainable soybean production systems (non-irrigated and irrigated), including the use of weekly electronic soybean reports (e-mail and web versions) and timely newsletters such as Arkansas Weekly Soybean Report, Soybean Notes, and Arkansas Soybean Rust Working Group Update. 3) Continue to coordinate state and regional meetings to facilitate the latest soybean production updates. These will include the Arkansas Soybean Research Conference, Tri-State Soybean Forum, as well as other events deemed necessary by emerging production problems. 4) To increase the awareness of county extension agents, consultants, agribusiness representatives, concerned producers of the status, direction, and value of current soybean research and Extension efforts.
Location of Studies: University of Arkansas Cooperative Extension Service, Little Rock
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

2. Soybean Real-Time Weed and Disease Alerts

Ken Smith, Jeremy Ross and Bob Reynolds, University of Arkansas Cooperative Extension Service

Project Focus:
Provide producers with real-time information and recommendations regarding weeds, pests and diseases that affect soybean production. Specific Objectives: 1) To improve the ability of county agents, specialists and producers to access information that has immediate impact on soybean production – information provided through Internet and handheld devices. 2) To provide producers real-time status of weed growth and control options through the Internet and handheld devices to positively affect soybean production. 3) To provide producers real-time status of plant disease and pest occurrences and movement during the growing season through the Internet and handheld devices to positively impact the production of soybeans.
Location of Studies: University of Arkansas Cooperative Extension Service, Little Rock
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2009-2011

3. 2011 Louisiana Soybean and Grain Research and Promotion Board Report

Frankie Gould, LSU AgCenter Communications

Project Focus:

Objectives: 1) To develop a full color tabloid that highlights Louisiana Soybean and Grain Research and Promotion Board funded projects. 2) To distribute this report to producers, political leaders, industry and stakeholders. 3) To develop news stories based on board funded projects that are distributed through LSU AgCenter news service. 4) To post these articles and press releases to the LSU AgCenter website.

Location of Studies: LSU AgCenter Communications

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: Ongoing

4. 2011 Pocket Field Guide to Soybean and Grain Weed Identification and Control

Frankie Gould, LSU AgCenter Communications and Dr. Billy Williams, Weed Management Specialist, LSU AgCenter

Project Focus:

Objectives: 1) To develop a full color pocket guide for weed identification and control in soybeans and grains. 2) To distribute this pocket guide to producers, political leaders, industry and stakeholders. 3) To develop news stories that promote this new guide and build awareness of weed identification and control. 4) To post this pocket guide in a PDF and HTML format and press releases to the LSU AgCenter website.

Location of Studies: LSU AgCenter Communications

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2011

5. Soybean and Grain On-Farm Demonstration Program – 2011

Ronald J. Levy and John Kruse, LSU Dean Lee Research Station

Project Focus:

Objectives: 1) To conduct soybean, corn, and grain sorghum on-farm demonstrations throughout the state. 2) To conduct field days and producers meetings to discuss and present demonstrations results. 3) Work with producers on their farms with precision ag equipment. 4) To collect data and compile it into a publication for distribution at meetings and on the LSU AgCenter website.

Location of Studies: Various, throughout the state

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: Ongoing

Projects Utilizing Molecular and Bio-Technology (across all disciplines)

1. Development of a rapid genetic field race test for soybean cyst nematode (SCN) and generation of SCN resistance through gene inactivation.

Dr. Vincent Klink, Dr. Gary Lawrence, Dr. Tom Allen, Clarissa Balbalian, Mississippi State University

Project Focus:

The SCN problem in Mississippi is being addressed in two objectives that build off of each other with success being achieved in both objectives to date. Objective 1 is a shorter term plan to manage SCN. Objective 2 is a longer term genetic engineering plan with the goal of generating interest from biotechnology companies to apply the knowledge from these studies to management and solving the SCN problem. The two objectives involve the use of a new genetic technology called massively parallel signature sequencing (MPSS). MPSS allows for the identification of genetic markers that are unique to each SCN race. The requested funding is for the specific project presented here. Objective 1: Identify molecular markers. Procedure 1a: MPSS is being used on SCN samples. Predicted/Obtained results 1a: Genetic markers are being identified for SCN races that are present in areas in Mississippi where soybeans are cultivated. Experiment impact 1a: The genetic marker strategy outlined in this research will result in a SCN race test that takes a week to complete. These markers will aid farmers in determining what soybean variety to grow because the identity of SCN races will be made at the genetic level for a particular field. Procedure 1b: qPCR is used to quantify nematodes. Predicted/Obtained results 1b: qPCR is being used to assay nematode distribution in Mississippi soybean fields. Experiment impact 1b: The genetic marker strategy is allowing for a quantitative measure of the number of nematodes in an infested field. This procedure allows a diagnostic of field soil conditions that can predict nematode infection before it happens. Objective 2: Genes that are essential for survival of all 16 of the SCN races are being identified. Importantly, the essential genes can be (and have been) used to identify genes to control reniform nematode (*Rotylenchulus reniformis*) and root knot nematodes (*Meloidiogyne* sp.) that also infect soybean. Procedure 2: a genetic procedure developed to inactivate those nematode genes is being met with positive results as a strategy for genetically engineering resistance. Predicted/Obtained results 2: All SCN races, reniform and root knot nematodes fail to grow. Expected impact 2: Farmers will have in place, a manner to control every SCN race reniform and root knot nematode.

Location of Studies: Mississippi State University, MS, and MWG Operon, Huntsville, AL
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011

2. Developing Soybeans Resistant to Asian Rust Pathogen
Dr. Svetlana Oard, LSU School of Plant, Environmental, and Soil Science

Project Focus:
Objectives: 1) Evaluate antifungal resistance of the selected transgenic soybean lines from the pilot transformation experiment. 2) Perform a formal transformation experiment using our verified transformation vector pTF2_thioB to obtain a working set of transgenic soybean. 3) Analyze the new transgenic soybean lines from Objective (b) for production of PTH. 4) Complete analysis of effects of signal peptides on PTH production in leaf tissues.
Location of Studies: LSU School of Plant, Environmental, and Soil Science
Funding Source: Louisiana Soybean and Grain Research and Promotion Board
Length of Project: 2011

3. Identification and Incorporation of Reniform Nematode Resistance into Soybeans Adapted for Mississippi and the Mid-South
Dr. Salliana R. Stetina, Dr. James R. Smith, Dr. Jeffrey D. Ray, USDA-ARS

Project Focus:
Objectives: 1) To identify sources of host plant resistance to reniform nematode in soybean. 2) To initiate germplasm development by transferring the resistance to soybean lines agronomically adapted for Mississippi. 3) To collect DNA from parent lines that will later be used to identify molecular markers that can be used for marker-assisted selection. The proposed work is the critical first step in developing an effective, environmentally friendly tool to mitigate losses to reniform nematode in Mississippi.
Location of Studies: USDA, Stoneville, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011

4. New Resources to Control Cercospora Diseases of Soybean in Arkansas
Burt Bluhm and Scott Monfort, University of Arkansas Division of Agriculture

Project Focus:
To reduce the impact of *Cercospora* diseases on soybean production in Arkansas.
Specific objectives: 1) Determine the extent to which fungicide resistance is present in Arkansas and assess the potential impact on production 2) Develop a rapid DNA-based assay to identify fungicide resistance 3) Define the diversity of pathogen populations in Arkansas 4) Identify new sources of genetic resistance to FLS and leaf blight
Location of Studies: Newport Research Station, Newport, AR
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013

5. Commercialization and Discovery of Biocontrol Agents for Soybean Nematodes Amy Thomas, Robert Robbins, Burt Bluhm, and Terry Kirkpatrick, University of Arkansas

Project Focus:
To develop unbiased information to support commercialization of an existing patented biocontrol fungus for soybean cyst nematode and to discover other biocontrol agents for potential control of all types of soybean nematodes. Specific objectives: 1) To identify the patented sterile Soybean Cyst Nematode (SCN) biocontrol fungus, ARF 18, using cultural, morphological and molecular methods. 2) To determine effectiveness of ARF 18 in field studies to support commercialization. 3) To survey for other biocontrol agents active on soybean cyst, reniform and root-knot nematodes and identify the cause of the dramatic decline of Soybean Cyst Nematode in test plots at the Pine Tree Experiment Station. 4) To assess SCN decline plots at PTES for control of 3 common SCN races and assess soil from these plots for control of SCN races, reniform and root-knot nematodes under greenhouse conditions.

Location of Studies: University of Arkansas – Fayetteville; Southwest Research and Extension Center, Hope; Vegetable Research Station, Kibler; Pine Tree Research Station, Colt.
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2010-2012

6. Detection of soybean cyst, reniform and root-knot nematodes in soil using multiplex real-time PCR.
Ron Sayler, Terry Kirkpatrick, Bob Robbins, 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 soybean. 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. Specific Objectives: 1) To develop PCR detection methods for each of the three nematode species. 2) To develop a multiplex real-time PCR assay that can detect and quantify all three species in a single reaction. 3) To incorporate these PCR based detection methods into standard nematode assays. 4) To establish routine use of these PCR methods in the nematode screening service offered by the Cooperative Extension Service (CES).

Location of Studies: University of Arkansas, Fayetteville; Southwest Research and Extension Center, Hope
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2009-2011

7. Characterization of Frog Eye Leaf spot isolates using molecular and host pathotype

Dr. Jeffrey D. Ray, Dr. Alemu Mengistu, Dr. James Smith, Dr. Renée S. Arias, USDA-ARS

Project Focus:

To characterize 100+ *C. sojina* isolates based on pathogenicity and molecular differences. Pathogenicity will be evaluated on the basis of responses to 12 soybean differentials grown and infected under controlled conditions. In order to molecularly characterize each isolate we will develop and then employ simple sequence repeat (SSR) molecular markers. The combination of pathogenicity and molecular characterizations will allow us to define specific isolates of *C. sojina*. This information will be critical to identifying sources of resistance to specific races of *C. sojina* and developing soybean cultivars with race-specific resistance. Objectives: 1) Characterize the pathogenicity of more than 100 *C. sojina* isolates. 2) Develop SSR molecular markers specifically for *C. sojina*. 3) Employ the SSR markers to molecularly differentiate *C. sojina* isolates. 4) Identify race-specific sources of resistance to *C. sojina* for use in the breeding program. Objective 4 is a long-term objective, whereas the objectives of pathologically and molecularly characterizing *C. sojina* isolates are a critical first steps in developing race specific resistance.

Location of Studies: MidSouth Genomics Center, Stoneville, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011

8. Evaluation and improvement of *Bradyrhizobium* inoculants for desiccation tolerance using a newly developed molecular marker system

Woo-Suk Chang – University of Texas-Arlington and Jim Heitholt – Texas A&M University

Project Focus:

Objectives: 1) Evaluate *Bradyrhizobium* inoculants for their ability to deal with desiccation and heat stress. 2) Isolate native desiccation/heat-tolerant *Bradyrhizobium* strains from Texas soils. 3) Determine economic return of soybean production expense for native vs. commercial inoculation. 4) Provide the Texas soybean industry with fact sheets that will help producers obtain and apply efficient *Bradyrhizobium* strains.

Location of Studies: Northeast Texas, Upper Gulf Coast, High Plains regions
Funding Source: Texas Soybean Board
Length of Project: 2011-2012