
Mid-South Soybean Board
2012-2013
Research Project Summary



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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

Investigators: Kristofor Brye, Jennie Popp: University of Arkansas, Fayetteville

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.

Anticipated Impact:

1.) To demonstrate the long-term productivity and environmental and economic competitiveness and benefits of alternative compared to traditional soybean production practices. 2.) To provide soybean producers with guidance and tangible evidence of the potential long-term water conservation and soil quality benefits of alternative residue management practices in the Arkansas Delta. 3.) To quantify soil carbon sequestration rates and estimate.

Location of Studies: Lon Mann Cotton Research Station, Marianna

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$32,400

2. Improving Yield and Yield Stability for Irrigated Soybeans

Investigators: Chris Henry, Paul Francis, Leo Espinoza, Dharmendra Saraswat: University of Arkansas Division of Agriculture

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, verification farms, and on producer's fields. Technology transfer using the ET gage and soil moisture sensors for scheduling will be compared to the Arkansas irrigation scheduling program on soybean verification farms. 2.) Develop mobile and web-based decision making tools for growers to obtain critical in-season information about crop water use and irrigation needs. Disseminate information to growers, consultants, and end users through Extension meetings and workshops.

Anticipated Impact:

To define reliable, affordable, and practical methods of irrigation scheduling for the various production systems and conditions in Arkansas that optimize yield, yield stability, and seed quality.

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

Amount Funded: \$107,200

3. Fertilization of Soybean in Arkansas

Investigator: 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 trifoliolate 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.

Anticipated Impact:

Research results will be published annually in the Wayne Sabbe Arkansas Soil Fertility Studies Research Series to serve as a permanent, accessible record of results that will also serve to inform clientele within and outside of Arkansas. Information will also be disseminated annually via county educational meetings and at regional and international professional meetings as deemed appropriate. Each year results from P and K rate trials will be added to the existing database to update correlation and calibration recommendations for these nutrients. Recommendations will be reviewed at the end of each year and adjusted as appropriate.

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
Amount Funded: \$37,700

4. Optimizing Lime Requirements for Soybeans and Variable Rate Applications

Investigator: Leo Espinoza, 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.

Anticipated Impact:

To measure the long term effect of lime applications and also the effect of sampling time on fertilizer recommendations; the proposed work aims at providing information on the effect of soybean rotation, soil type, and soil sampling approach on the resultant variable rate maps and associated soybean yields.

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

Amount Funded: \$22,000

5. Defining Potassium Nutritional Requirements For Soybeans with Indeterminate Growth Habit

Investigator: Nathan Slaton, University of Arkansas Division of Agriculture

Project Focus:

Objectives: 1.) Compare the sensitivity of indeterminate (Maturity Group (MG) IV mid and late) and determinate (MG V) soybean varieties to K deficiency. 2.) Evaluate season-long dynamic of K uptake and allocation to aboveground plant parts in representative MG IV and V soybean varieties. 3.) Determine proper sampling time of soybean trifoliolate leaves to assess K deficiency of indeterminate soybean cultivars.

Anticipated Impact:

Development of diagnostic trifoliolate leaf K concentrations and identifying the proper growth stage to sample indeterminate (MG4) varieties will help eliminate K deficiency as a yield limitation and enable growers to accurately assess and rescue K-deficient soybean with timely fertilization during the growing season.

Location of Studies: Pine Tree Research Station Station, Colt, AR
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2012-2014
Amount Funded: \$32,500

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

Investigator: Normie Buehring, 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.

Anticipated Impact:

Information that can be used by producers to make informed decisions (based on soil quality and economic returns) regarding tillage-crop residue management practices in a corn/soybean rotation production system

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

Amount Funded: \$28,285

7. Improving Soybean Nutrient Management Using Timely Soil Testing Programs

Investigator: Larry Oldham, 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 test 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.

Anticipated Impact:

New or improved guidelines that will be used to improve fertilizer use efficiency by reducing either over- or under-fertilization of soybeans in varied Mississippi soybean production environments.

Location of Studies: Multiple research station locations throughout the state

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2010-2012

Amount Funded: \$15,000

8. Validity of Current Potassium Recommendations for High Yielding Soybeans With Respect to Grain Yield and Soybean Disease Control.

Investigator: 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.

Anticipated Impact:

Improved recommendations for soil K fertilization that will maximize yield in high-yield environments and improve soybean health and resistance to foliar diseases.

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

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2011

Amount Funded: \$30,725

9. Managing Soybean Production on Low Nutrient Status Soils in Mississippi.

Investigator: Mark W. Shankle, 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 K₂O 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.

Anticipated Impact:

Determination of the economic K fertility rate for low-K soils, and determination of the correct K fertilizer rate based on recommendations from different soil testing labs.

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

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2010-2012

Amount Funded: \$48,210

10. Validity of Current K Recommendations for High Yielding Soybeans with Respect to Grain Yield and Disease Control

Investigator: Gabe Sciumbato, Mississippi State University

Project Focus:

Determine soil K level necessary for high-yielding environments and lowest foliar disease levels; determine optimum soil K level to minimize foliar disease occurrence and dependence on late-season foliar fungicide applications.

Anticipated Impact:

Improved recommendations for soil K fertilization that will maximize yield in high-yield environments and improve soybean health and resistance to foliar diseases.

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

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$30,725

11. Agronomic and Economic Evaluation of Soybean/Corn Rotation with Twin-Row Production and Increased Nutrient Management

Investigator: M. Wayne Ebelhar, Mississippi State University

Project Focus:

Determine agronomic implications of soybean/corn rotations in twin-row planting systems under standard and high soil fertility with irrigation; evaluate impact of soybean/corn rotation system on whole-farm profitability.

Anticipated Impact:

Determination of the feasibility of a soybean/corn rotation system for increasing yields and profits when used on irrigated soils in Mississippi.

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

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2012-2017
Amount Funded: \$14,445

12. Correlation of Soil Test K and P Indices with Plant Tissue Concentrations and Soybean Yield

Investigator: Bobby Golden, Mississippi State University

Project Focus:

Evaluate soybean yield response to P and K fertilization rate; correlate Lancaster and Mehlich-3 soil test P and K with plant indices (tissue concentration and seed yield).

Anticipated Impact:

Provide a set of soil test recommendations that can be applied to soil test data from laboratories that use the Mehlich-3 extractant; update current P and K fertility recommendations for soybean that are based on the Lancaster extraction method; develop prescription fertilizer application guidelines for variable rate equipment.

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

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2012-2017

Amount Funded: \$33,977

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

Investigator: Donna S. Morgan: Louisiana State University AgCenter

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.

Anticipated Impact:

By evaluating the best timing and application methods, soybean producers can better manage their nutrients and nutrient availability, controlling costs, minimizing soil loss, and minimizing nutrients effects on streams.

Location of Studies: LSU AgCenter Dean Lee Research Station

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013

Amount Funded: \$8,000

14. The Importance of Soil Sampling, Soil Testing and Soil Test Recommendations for Soybean and Grain Crops in Louisiana

Investigator: J. Cheston Stevens, Louisiana State University AgCenter

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 on fields where soybeans and rotational crops are planted. These samples will be submitted to the LSU AgCenter Soil Testing and Plant Analysis Laboratory (STPAL) and A & L Laboratory, Memphis, TN for comparison purposes on soil test recommendations. 3) Soil test recommendations, from each laboratory will be discussed with the producers and County Agents. Producers will be made well aware of their soil fertility status on the fields tested. A thorough evaluation will be performed on all fields as to the economic benefits and costs based on a comparison of the two fertilizer recommendations. 4) Producer fields will be retested in coming years to evaluate the changes in the soil fertility status, based on the recommendations of the two labs. The data from these analyses will be communicated at local, state, and regional soil testing meetings and training sessions.

Anticipated Impact:

An improved understanding of soil fertility by producers

Location of Studies: Various fields throughout the state

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013

Amount Funded: \$50,000

15. Soil Test Calibration and Fertilization Research for Sustainable Soybean and Corn Production in Louisiana

Investigator: Brenda S. Tubaña, Louisiana State University

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.

Anticipated Impact:

Updated and new fertilizer management and recommendations will result in more sustainable and profitable soybean and corn production in Louisiana.

Location of Studies: LSU AgCenter Red River Research Station and others

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013

Amount Funded: \$28,668

B. Variety Development and Evaluation

1. Comprehensive Disease Screening of Soybean Varieties in Arkansas

**Investigators: Terry Kirkpatrick, Travis Faske: 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.

Anticipated Impact:

This program provides comprehensive information on the disease package that each new cultivar contains prior to widespread planting of the cultivars in the state, lowering the risk of severe disease losses due to incorrect cultivar selection.

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

Amount Funded: \$125,700

2. Breeding New Soybean Cultivars with High Yield and Disease Resistance

**Investigator: Pengyin Chen, 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).

Anticipated Impact:

With the current magnitude of our breeding program (approx. 200 acres field plots and breeding nurseries at seven breeding stations, 5,000 entries in 15,000 plots), we anticipate releasing a conventional or RR cultivar every 2-3 years.

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: 2011-2013

Amount Funded: \$180,000

3. Approaches to Determining Salt Tolerance in Arkansas Soybean Varieties

Investigators: Ken Korth, Pengyin Chen: University of Arkansas Division of Agriculture

Project Focus:

Salt and drought damage to soybeans in Arkansas continue to be important problems. Our overall goal is to develop soybean breeding materials that will result in selection of existing varieties, and/or development of new varieties, with enhanced tolerance to environmental stress such as chloride toxicity. Objectives: 1.) To screen for and confirm the chloride-uptake responses of commercial lines of soybeans currently grown in Arkansas. In addition, we will screen and identify advanced lines in the Arkansas soybean breeding program with natural variation in salt tolerance. 2.) To pursue the genetic basis and inheritance characteristics of salt tolerance using populations derived by crossing salt-tolerant with salt-sensitive lines, with the goal of developing markers to be used in the breeding program. 3.) To assess soybean responses to salt treatments and use that information to identify and improve salt exclusion mechanisms in Arkansas soybeans through improved breeding tools.

Anticipated Impact:

Resistance to salt has often been linked to tolerance of other environmental conditions such as drought and cold, and so this work might also help in the development of improved varieties resistant to other important abiotic stresses.

Location of Studies: University of Arkansas - Fayetteville

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2012-2014

Amount Funded: \$66,400

4. Drought Tolerance Research – Developing Rapid Screening Methods

**Investigators: Larry C. Purcell, 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 N₂ 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.

Anticipated Impact:

The goal of this research is to develop high throughput screening methods for drought tolerance that can be used in molecular breeding.

Location of Studies: University of Arkansas- Fayetteville

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$47,100

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

**Investigator: Steven Green, 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.

Anticipated Impact:

This program is dedicated to providing accurate chloride reaction screenings required to select cultivars genetically resistant to chloride toxicity, and to provide producers with valuable information needed to select a suitable cultivar for areas affected by elevated chloride salts.

Location of Studies: Pine Tree Research Station, Colt; Arkansas State University,
Jonesboro

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2012-2014

Amount Funded: \$30,500

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

**Investigators: John Rupe, Jeremy Ross, et al.: University of Arkansas
Division of Agriculture**

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

Anticipated Impact:

A balanced and comprehensive research and education program on seed quality would benefit soybean growers in this state and, in the long term, the soybean industry by making soybean production more dependable and efficient in Arkansas.

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

Amount Funded: \$174,000

7. Determining Environmental Management Schemes to Influence the Development of Poor Seed Quality in MG IV and MG V Soybean

Investigator: Tom Allen, Mississippi State University

Project Focus:

Create environments (controlled and natural settings) conducive to the development of seed rot; determine specific pathogenic organisms that infect soybean plants in the different environments, and their pathogenicity; determine if plant nutrition status is correlated with seed rot.

Anticipated Impact:

Determination of the fungal complex responsible for and its association with seed rot in

high moisture environments; determination of specific environmental conditions that promote seed rot in soybeans; development of strategies involving fungicide/insecticide applications and application timing that can be used to reduce the impact of seed rot on harvest seed quality of soybeans when conducive environmental conditions are anticipated.

Location of Studies: Winnsboro, LA; Verona, MS; Starkville, MS; Stoneville, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2012-2016
Amount Funded: \$184,523

8. Enhancement of Mississippi Soybean Variety Trials through Entry Standardization

Investigator: 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.

Anticipated Impact:

Published yield results that can be used by producers to select varieties for individual production environments throughout Mississippi.

Location of Studies: Various throughout state
Funding Source: Mississippi Soybean Promotion Board
Length of Project: Ongoing
Amount Funded: \$36,125

9. Identification of Soybean Varieties with Resistance to Phomopsis Seed Decay to Enhance Soybean Seed Quality

Investigator: Shuxian Li, USDA-ARS

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.

Anticipated Impact:

Varieties with PSD resistance will be identified, and this information will be made available to producers and the seed industry.

Location of Studies: Stoneville, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2012

Amount Funded: \$33,428

10. 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

Investigator: Gabe Sciumbato, Mississippi State University

Project Focus:

Evaluate entries (>200) in the Mississippi Soybean Variety Trials (MSVT) for resistance/reaction to stem canker, frogeye leaf spot, purple leaf and pod stain, and black root rot; evaluate MSVT entries for resistance to soybean rust.

Anticipated Impact:

Development of data that will be published in the annual MSVT publication to provide producers information about varieties' disease susceptibility, which can be used as an additional aid in selecting varieties.

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

Funding Source: Mississippi Soybean Promotion Board

Length of Project: Ongoing

Amount Funded: \$49,093

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

Investigator: Boyd Padgett, Louisiana State University AgCenter

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.

Anticipated Impact:

Identifying factors that affect seed quality will result in the development of methods that will enable growers to improve 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

Amount Funded: \$38,689

12. Soybean Breeding and Variety Development

Investigator: Blair Buckley, Louisiana State University AgCenter

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

Anticipated Impact:

Developing varieties suited for Louisiana will result in increased production potential

Location of Studies: LSU AgCenter Red River Research Station

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013

Amount Funded: \$22,700

13. Evaluation of Soybean Cultivars and Fungicides for Disease Management in Northeast Louisiana

Investigator: Boyd Padgett, Louisiana State University AgCenter

Project Focus:

Objectives: 1) Evaluate soybean varieties entered in the LSU AgCenter Experiment Station official variety trials for resistance to disease pathogens common to Northeast, Northwest, and Central Louisiana. 2) Evaluate for commercially available and

experimental fungicides for soybean disease management. 3) Quantify disease losses in selected soybean varieties adapted for Louisiana to determine when fungicides are necessary.

Anticipated Impact:

Definition of the extent diseases impact soybeans and determination of when fungicide applications will be most economical.

Location of Studies: LSU AgCenter Red River Research Station

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013

Amount Funded: \$26,006

14. Developing a Disease Screening Protocol for the Evaluation of Cultivars for Resistance to *Phytophthora sojae* in Arkansas

Investigators: Craig Rothrock, John Rupe, Terry Kirkpatrick: 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.

Anticipated Impact:

After three years, it is expected that an efficient screening protocol will have been developed to give producers information on cultivar resistance to races of *Phytophthora sojae* found in Arkansas to aid in cultivar selection for fields infested with *Phytophthora sojae* that frequently encounter saturated or flooded conditions due to poor drainage.

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

Amount Funded: \$33,000

C. Germplasm Research

1. Screening Soybean Germplasm and Breeding Soybeans for Flood Tolerance

Investigators: Pengyin Chen, et al.: 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.

Anticipated Impact:

This project will identify cultivars with flood tolerance so that specific recommendations can be made to producers. This project will also identify new sources of flood tolerance from diverse germplasm and incorporate such tolerance into high yielding background.

Location of Studies: Rice Research and Extension Center, Stuttgart, AR

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$45,000

2. Soybean Germplasm Enhancement Using Genetic Diversity

Investigators: Pengyin Chen, et al.: 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.

Anticipated Impact:

The germplasm identified and developed under this objective will greatly enhance the efficiency of public and private breeding programs that aim to improve soybean productivity and profitability.

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: 2011-2013
Amount Funded: \$130,000

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

Investigator: Anne M. Gillen, 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.

Anticipated Impact:

Germplasm with resistance to PSD that can be used in a breeding program to develop resistant varieties.

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

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2012

Amount Funded: \$15,500

4. Development of Reniform Nematode Resistant Soybean Adapted for Mississippi and the Mid-South

Investigator: Salliana R. Stetina, 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.

Anticipated Impact:

Development of tools/materials that can be used to develop resistant germplasm that in turn can be used to develop soybean varieties that have resistance to the reniform

nematode.

Location of Studies: USDA, Stoneville, MS
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2011-2013
Amount Funded: \$24,500

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**

Investigator: Craig Rothrock, University of Arkansas Division of Agriculture

Project Focus:

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.

Anticipated Impact:

If a system of this kind could be developed it would provide a baseline for a practical and effective strategy for aerial blight and sheath blight management in soybean and rice, respectively.

Location of Studies: Newport Research Station, Newport, AR; Rice Research and Extension Center, Stuttgart, AR

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2010-2012

Amount Funded: \$35,100

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

Investigators: Burt Bluhm, Travis Faske: 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

Anticipated Impact:

The deliverables of this project– tools to monitor fungicide resistance, information about the potential impact of fungicide resistance on yield, and new sources of genetic resistance – will provide the information and experimental resources required to most effectively manage these important diseases in the present and in the long-term, thus maximizing producers' profits and reducing the chance that an event such as fungicide resistance will take Arkansas producers by surprise.

Location of Studies: Newport Research Station, Newport, AR

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$32,400

3. Foliar Disease Management in Full and Double Crop Production Systems in Arkansas

Investigators: Travis Faske, Terry Kirkpatrick: University of Arkansas, Division of Agriculture, Plant Pathology Department, Cooperative Extension Service

Project Focus:

Improving soybean profitability by determining appropriate timing and fungicide combination to control foliar diseases of soybean. This will have 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 such as the anthracnose/pod & stem blight complex, *Cercospora* leaf blight and frog-eye leaf spot. 2.) To investigate evaluate the effectiveness of fungicide rotation to control the late-season diseases in light of recently documented resistance to "strobilurin" fungicides. 3.) To refine fungicide application strategies for maximum efficacy in full season and double crop production systems.

Anticipated Impact:

To answer questions such as: "Which fungicide MOA's are effective against late-season foliar diseases?", "Are multiple applications of same MOA or tank mixes of different MOA's better?", "What rate of fungicides is most economical for Arkansas conditions?", and "When should fungicides be applied to realize the most "bang for the buck"?"

Location of Studies: Southeast Branch Station, Rohwer, AR; Newport Research Station, Newport, AR

Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013
Amount Funded: \$43,400

4. Understanding Neocosmospora, Thielaviopsis, and Fusarium Virguliforme in Early Season Production Systems

**Investigators: Terry Kirkpatrick, Travis Faske: University of Arkansas
Division of Agriculture**

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 importance of Neocosmospora Rot, Black Root Rot, and Sudden Death Syndrome in the yield of soybeans in an ESPS. 2.) To develop screening techniques to evaluate new and existing soybean varieties and lines for resistance to these three soilborne pathogens.

Anticipated Impact:

Strategies have not been developed for managing Neocosmospora or Thielaviopsis, but cultivar resistance could provide the most effective means of control for all three of these diseases.

Location of Studies: Southeast Research and Extension Center, Monticello, AR, Southeast Branch Station, Rohwer, AR; Lonoke Agricultural Center, Lonoke, AR

Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2012-2014
Amount Funded: \$56,600

5. Integrated Management of Soybean Nematodes in Arkansas

**Investigators: Terry Kirkpatrick, Travis Faske: University of Arkansas
Division of Agriculture**

Project Focus:

Our goals are as follows: 1) To determine the significance and potential risk of plant-parasitic nematodes in Arkansas soybeans. 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.

Anticipated Impact:

We will evaluate both existing and new soybean cultivars with reported resistance to the economic nematodes to determine their actual level of performance in production fields. We will identify those cultivars that will provide mitigation of nematode damage under our field environments and with local races and biotypes of the pathogens. We

will also begin to develop an experience base as well as an experimental data base on the use and impact of nematicides in managing soybean nematodes, and we will look at novel chemicals and strategies for existing chemicals in more effective management. We will also begin a search for potential biological control organisms that could provide more environmentally sound nematode control methods in the future.

Location of Studies: Southwest Research and Extension Center, Hope, AR and throughout Arkansas

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2012-2014

Amount Funded: \$45,100

6. Commercialization and Discovery of Biocontrol Agents for Soybean Nematodes

Investigators: Robert Robbins, Burt Bluhm, 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.

Anticipated Impact:

If effective, this biocontrol fungus could save growers millions, potentially with a single application, or at least very infrequent application over the years. Field research is needed to support commercialization but at least one biocontrol company is currently interested, if additional field testing is positive.

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

Amount Funded: \$53,000

7. Control of New Soybean Cyst Nematode Races using Rotation of Different Roundup Ready and Conventional Soybean Varieties

**Investigators: Robert Robbins, 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.

Anticipated Impact:

Rotation of soybean cyst nematode (SCN) resistance sources is showing to be effective in lowering population numbers, and thus far preventing race changes that occur when a single resistance source is used repeatedly. Thus the need for rotation to less profitable non-host crops may be reduced or eliminated.

Location of Studies: University of Arkansas – Fayetteville; Pine Tree Research Station, Colt.

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$42,200

8. Effects of Genotype on Severity of Charcoal Rot and Yield in Soybean

**Investigators: John Rupe, Craig Rothrock: University of Arkansas
Division of Agriculture**

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.

Anticipated Impact:

Development of effective greenhouse and field screening procedures will allow scientists to identify new and better sources of charcoal rot resistance and incorporate that resistance into commercially viable soybean cultivars.

Location of Studies: Lon Mann Cotton Research Station, Marianna

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$20,300

9. Soybean Disease Monitoring for Mississippi Soybean Producers

Investigator: Tom Allen, 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.

Anticipated Impact:

Notification of producers through media outlets within hours of detection of significant outbreaks of yield-limiting diseases so that timely treatment decisions can be made.

Location of Studies: Multiple locations throughout the state.

Funding Source: Mississippi Soybean Promotion Board

Length of Project: Ongoing

Amount Funded: \$56,500

10. Rapid Identification of Soybean Fungi by Spectroscopic Techniques

Investigator: Ashli E. Brown, 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.

Anticipated Impact:

Generation of spectral libraries that will allow the rapid identification of a specific fungus specie on soybeans in the field.

Location of Studies: Starkville, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$77,764

11. Characterization of Frog Eye Leaf Spot (FLS) Isolates and Identification of Soybean Resistance Genes

Investigator: Jeffrey Ray, USDA-ARS

Project Focus:

Characterize the pathogenicity of FLS isolates; develop genetic markers that can be used to differentiate among the isolates; identify race-specific sources of resistance to FLS that can be used in a breeding program; and initiate crosses to create race-specific populations for mapping; and identify markers in parental lines of crosses.

Anticipated Impact:

The planned characterization of FLS isolates is a necessary first step and lays the foundation for the development of FLS-resistant germplasm that can be used to develop FLS-resistant varieties. Development of FLS-resistant germplasm/varieties may be the only effective alternative to managing this pathogen in the face of developing resistance to fungicides.

Location of Studies: MidSouth Genomics Center, Stoneville, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$24,428

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

Investigator: Zhi-Yuan Chen, Louisiana State University

Project Focus:

Objectives: 1) To identify soybean lines showing consistently high levels of tolerance to *C. kikuchii* infections. 2) Screen four tolerant and four susceptible lines under greenhouse conditions. 3) To investigate the effect of water/humidity/moisture on CLB development. 4) Determine the source of *Cercospora kikuchii* inoculums.

Anticipated Impact:

Pinpointing the exact source of inoculums could help us develop measures to reduce inoculum, therefore, limiting the exposure of soybean leaves to the pathogen.

Location of Studies: LSU, Red River Research Station

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013
Amount Funded: \$32,000

13. Measuring Yield Losses Due to Diseases of Soybeans

Investigator: Clayton Hollier, Louisiana State University

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.

Anticipated Impact:

Efforts will emphasize the area of disease forecasting and yield loss assessments.

Location of Studies: Various, throughout the state

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013

Amount Funded: \$21,000

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

Investigator: Clayton Hollier, Louisiana State University

Project Focus:

Objectives: 1) To establish twenty (25) 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.

Anticipated Impact:

By monitoring for diseases, we can potentially reduce losses and increases profits for growers.

Location of Studies: Various, throughout the state

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013

Amount Funded: \$27,500

15. Evaluation of Cercospora Leaf Blight and Purple Seed Stain in Louisiana

Investigator: Boyd Padgett, Louisiana State University AgCenter

Project Focus:

Objectives: 1) To further define *C. kikuchii* disease development at all stages of soybean development. 2) To evaluate the effect of seed treatment on *C. kikuchii*. 3)

To explore possible alternative hosts and overwintering sites of *C. kikuchii*. 4) To explore possible interactions between *C. kikuchii* and soybean insect pests. 5) To determine the effects of cultivation techniques on *C. kikuchii*.

Anticipated Impact:

Cultivation methods and the effect on CLB and PSS need to be understood to prevent deterioration of seed quality.

Location of Studies: Various, throughout the state

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013

Amount Funded: \$21,630

16. Biology and Control of Major Diseases of Soybean

Raymond Schneider, Louisiana State University

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.

Anticipated Impact:

Understanding the biology and genetics of pathogens will equip specialists to develop methods of combating diseases as they change.

Location of Studies: Ben Hur Research Farm, Baton Rouge

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2013-2013

Amount Funded: \$83,525

17. Using Molecular Biology to Control Soybean Diseases: *Cercospora* Leaf Blight and Rust

Investigator: Zi-Yuan Chen, Louisiana State University

Project Focus:

Objectives: 1) Determine the importance of two light induced genes in cercosporin toxin production. 2) Use mutants lacking cercosporin toxin production to determine the importance of cercosporin toxin in causing leaf blight disease in soybean. 3) Explore a new approach to control *Cercospora* leaf blight (CLB) and rust diseases in soybean.

Anticipated Impact:

Discovering the impact of cercosporin in soybean will enable specialists to develop more effective control options for CLB.

Location of Studies: LSU, Baton Rouge, LA

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2013-2013

Amount Funded: \$54,500

18. Control of Seedling Diseases by Fungicide Seed Treatment and Cultivar Selection Across Soybean Production Systems.

Investigators: John Rupe, Craig Rothrock, Pengyin Chen, and Michael Popp: University of Arkansas Division of Agriculture

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 soil moisture on seedling diseases and seed treatment effectiveness. 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

Amount Funded: \$68,000

19. Development of a Rapid Genetic Field Race Test for Soybean Cyst Nematode (SCN) and Generation of SCN Resistance Through Gene Inactivation.

Investigator: Vincent Klink, 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.

Anticipated Impact:

Provide a molecular diagnostic tool that can rapidly and accurately detect SCN presence, race, and infestation level in soil samples, as well as determine the presence of other nematode species.

Location of Studies: Mississippi State University, MS, and MWG Operon, Huntsville, AL

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2010-2012

Amount Funded: \$97,124

b.) Insects

1. Developing a New Threshold for Corn Earworm, *Helicoverpa zea*

**Investigators: Gus Lorenz, Glenn Studebaker, Scott Akin: University
Arkansas Division of Agriculture**

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.

Anticipated Impact:

To develop a new threshold not solely based on insect levels but one that also takes into account the value of the crop and cost of control.

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: 2011-2013

Amount Funded: \$37,300

2. Lepidopteran Insect Pest Management in Soybeans

Investigator: Don Cook, 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".

Anticipated Impact:

Development of data that will be used to update soybean insect control guidelines in 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: 2011-2014

Amount Funded: \$69,993

3. Three-cornered Alfalfa Hopper (TCAH) Management in Soybeans

Investigator: Fred Musser, Mississippi State University

Project Focus:

Refine current TCAH thresholds in soybeans; estimate sweep net sampling efficiency for TCAH in soybeans.

Anticipated Impact:

Refined thresholds to enable consultants and growers to apply insecticides when

economically justified, and the ability to translate sweep net catches of TCAH into reliable threshold estimates.

Location of Studies: To be determined
Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2012-2014
Amount Funded: \$9,455

4. Biology, Distribution, and Management of Soybean Insect

Investigator: Jeff Davis, Louisiana State University

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 at different planting dates. 3) Determine upper and lower development thresholds and supercooling points for Louisiana soybean stink bug complex. 4) Monitor soybean looper populations throughout Louisiana for resistance to Intrepid 2F and cross resistance to alternate chemistries.

Anticipated Impact:

Gaining a greater understanding of insect complexes will enable specialists to develop better guidelines for treating insect populations.

Location of Studies: Various, throughout the state
Funding Source: Louisiana Soybean and Grain Research and Promotion Board
Length of Project: 2013-2013
Amount Funded: \$52,000

5. Optimizing Chemical Control Strategies for Louisiana Soybean Pests

Investigator: B. Rogers Leonard, Louisiana State University AgCenter

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 three-cornered alfalfa hopper injury on soybeans during vegetative/reproductive stages. 5) To initiate an experiment to determine the impact of spider mites on soybean yield.

Anticipated Impact:

This research should clearly define the thresholds of seed injury at different soybean growth stages and provide opportunities to further refine IPM strategies.

Location of Studies: Macon Ridge Research Station/Northeast Region
Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-3013
Amount Funded: \$19,655

6. An Integrated Multiple-Tactic Strategy for Managing Stink Bugs in Soybean

Investigator: Jeff Davis, Louisiana State University AgCenter

Project Focus:

Objectives: 1) To quantify in-field stink bug immigration and population increase on variety DP 4888 RR (moderately stink bug resistant) and variety P4906 RR (stink bug susceptible) receiving five different treatments. 2) Determine treatment effects on seed yield and seed quality.

Anticipated Impact:

The potential for making over applications of insecticide could be lessened or eliminated if response differences to stink bug among soybean varieties are better understood.

Location of Studies: Various, throughout the state

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-3013

Amount Funded: \$26,000

c.) Virus and Other

1. Detection and Characterization of Mycoviruses as a Soybean Cyst Nematode Bio-Control Agent with Commercialization Potential

Investigator: Ioannis Tzanetakis

Project Focus:

Detect and characterize mycovirus(es) (fungal viruses) and confirm their effect on their fungal host, Arkansas fungus-18 (ARF-18), a biocontrol agent for the soybean cyst nematode (SCN). This knowledge will be used to alter fungal physiology as the fungus sporulates. This will make ARF-18 propagation to commercial-scale feasible.

Objectives: 1.) Identify and characterize mycovirus(es) in ARF-18. 2.) Eliminate virus(es) from ARF-18. 3.) Determine the phenotype related to the sporulation of ARF-18 isolates and virulence to different SCN races.

Anticipated Impact:

A successful biocontrol agent such as ARF-18 can be the ultimate weapon against SCN. The fungus has been discovered some 20 years ago and although it has shown great potential as a biocontrol agent, its inability to sporulate has minimized that potential. If the fungus sterility is caused by mycovirus(es) as predicted, the ability to eliminate the virus(es) can ultimately lead to the commercialization of ARF-18.

Location of Study: University of Arkansas Fayetteville

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2012-2014
Amount Funded: \$40,028

2. Surveying Louisiana Soybeans for Soybean Vein Necrosis: Biology of the Virus and Characterization of Tobacco Ringspot Virus

Investigator: Rodrigo A. Valverde, Louisiana State University

Project Focus:

Objectives: As a continuation of last year's findings: 1) Generate more data on the incidence and biology of Soybean vein necrosis virus. 2) Characterize the kudzu strain of Tobacco ringspot virus.

Anticipated Impact:

Information of the properties and biology of these two viruses will provide tools to manage the diseases they cause.

Location of Studies: Throughout the state

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013

Amount Funded: \$9,500

d.) Weeds

1. A Team Approach to Weed Management in Soybean

**Investigators: Robert Scott, Ken Smith, Jason Norsworthy, Nilda 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.

Anticipated Impact:

The project will allow growers to closely follow the discovery of resistant and new weed species through timely information for the control and management of these weeds on their farms.

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

Amount Funded: \$213,900

2. Managing Transgenic Crops as Weeds in Soybean Cropping Systems

Investigator: Daniel Reynolds, Mississippi State University

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.

Anticipated Impact:

Determination of level of effect of volunteer crop plants on soybean growth and yield, and development of management strategies that can be used to control volunteer plants of herbicide-resistant crop species that act as weeds in soybean production fields.

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

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2010-2012

Amount Funded: \$35,003

3. Addressing Critical Weed Control Issues in Soybean

Investigator: Tom Eubank, Mississippi State University

Project Focus:

Develop strategies for management of glyphosate-resistant (GR) weeds; assess burndown options for management of early-season weeds; determine utility of Liberty Link soybeans in the management of GR weeds; evaluate emerging weed control products and technologies for soybeans.

Anticipated Impact:

Identification/development of cost effective control strategies for the various weed control problems that occur in soybeans, to include burndown options to control problem weeds, alternative control options for GR weeds, management options to prevent or delay development of herbicide-resistant weeds, and assessment of new herbicide technologies and traits that provide new weed management options.

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

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2010-2012

Amount Funded: \$79,345

4. Bufkin Fellowship—Effect of Fall-seeded Cereal Cover Crops When Used in Soybeans for Control of Palmer Amaranth in Mississippi Soybeans

Investigator: Ryan Edwards, Recipient

Project Focus:

Determine effectiveness of cover crops for controlling underlying weed populations in conjunction with PRE residual herbicide applications in soybeans.

Anticipated Impact:

Determine if cover crops can be used as a viable weed management component for Mississippi soybeans, and determine which cover crop species may provide the most benefit if this option is viable.

Location of Studies: To be determined

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2012-2014

Amount Funded: \$65,806

5. Weed Management and Biology Research in Soybeans

Investigator: James L. Griffin, Louisiana State University

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.

Anticipated Impact:

Understanding the interaction between pest management practices and use of harvest aids is critical to maximizing soybean yield potential and economic return.

Location of Studies: Various, throughout the state

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013

Amount Funded: \$40,000

6. Soybean Weed Control Research in Northeast Louisiana

Investigator: Donnie Miller, Louisiana State University AgCenter

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.

Anticipated Impact:

Assessing the impact of herbicide co-applications on weed control efficacy could provide more economical control options.

Location of Studies: Northeast Research Station

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013

Amount Funded: \$36,800

7. Soybean Weed Management Systems in Louisiana

Investigator: Daniel O. Stephenson IV, Louisiana State University AgCenter

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.

Anticipated Impact:

Determination of weed management systems that utilize herbicide-tolerant crops along with various chemical and cultural weed control methods will provide Louisiana soybean producers with effective weed management strategies.

Location of Studies: Multiple LSU AgCenter Research Stations

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013

Amount Funded: \$48,550

E. Cultural Practices

1. Achieving Maximum Yield Potential in Soybean

Investigators: Larry Purcell, Lanny Ashlock, 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.

Anticipated Impact:

The research described in this proposal offers a unique opportunity to determine the production practices used by Mr. Cullers, how these practices are affecting crop growth, and how these practices can be implemented in other locations.

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

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$92,700

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

Investigators: Trenton Roberts, Jeremy Ross, Nathan Slaton: 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.

Anticipated Impact:

The development of new soil test methods can become a key decision management tool for producers that will allow better use of resources, while optimizing soybean yields.

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

Amount Funded: \$63,900

3. Investigating Emerging Production Recommendations for Sustainable Soybean Production using the Early-Season, Full-Season, and Double Crop Soybean Production Systems

Investigators: Jeremy Ross, Gus Lorenz: University of Arkansas Division of Agriculture

Project Focus:

To investigate new and untested management inputs to improve soybean production using all soybean production systems. Specific Objectives: 1) Continue to initiate test demonstrations for controlling economically damaging insect pests that often impact all production systems. 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 all systems. 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, alternative fertilizer sources (poultry litter) and other soybean production inputs currently not being tested in Arkansas for soybean production sustainability with all soybean production systems.

Anticipated Impact:

Each year Arkansas soybean producers are encouraged by industry to implement new and often untested management inputs to improve soybean production. This industry has the potential of costing the Arkansas soybean producers million of dollars each year without accurate research trials to support or refute the use of these products or practices.

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

Amount Funded: \$141,100

4. Addressing Sustainability of Mid South Soybean Production with Regard to Water Use Efficiency Utilizing the Arkansas Discovery Farm Program

Investigators: Mike Daniels, Andrew Sharpley, Chris Henry: University of Arkansas Division of Agriculture

Project Focus:

To document the impact of water management and irrigation on water quality and quantity as it relates to sustainable soybean production in Arkansas, and if necessary, to develop strategies that lessen the impact of water use and management in soybean production while maintain agricultural profitability.

Anticipated Impact:

One difficulty of addressing these sustainability issues is that very limited data exists that actually quantifies the impact of soybean farming on real, working farms in Arkansas. Without scientifically sound data that quantifies impact, it is difficult to either substantiate or defend agriculture's role in influencing natural resource sustainability. We are proposing to build on existing efforts in Arkansas to expand the Arkansas Discovery Farm to initiate the collection of impact data of soybean production on both water quantity and quality at the edge of fields on three real, working row crop Discovery Farms in three distinct soybean production areas of Arkansas.

Location of Studies: Throughout Arkansas

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2012-2014

Amount Funded: \$50,000

5. Irrigation Use and Efficiency in Soybean Production Systems in Mississippi

Investigators: Thomas Eubank, 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.

Anticipated Impact:

Identification of (a) conservation measures to use to reduce total amount of irrigation water applied to soybeans in the Delta in order to halt drawdown of the alluvial aquifer and also lower irrigation costs and associated energy usage, and (b) identify soybean varieties best suited for flood-irrigated environments.

Location of Studies: Multiple locations throughout the state

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2010-2012

Amount Funded: \$48,375

6. Evaluation of Effects of Residual Glyphosate and Its Soil Metabolites on Growth and Development of

Investigator: 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.

Anticipated Impact:

Determination of soil amendments for and their effectiveness in improving soybean health and yield following long-term glyphosate use.

Location of Studies: Multiple locations throughout the state to be determined

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$15,000

7. On-farm Validation of the Mississippi Irrigation Scheduler Tool (MIST)

Investigator: Amy Schmidt, Mississippi State University

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.

Anticipated Impact:

Development of a validated online irrigation scheduling tool for Mississippi soybean producers.

Location of Studies: To be determined

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$77,231

8. Evaluation of Seasonal Irrigation Requirements and Impact on Yield and Seed Quality of Soybeans

Investigator: Daniel K. Fisher, USDA, ARS

Project Focus:

Determine seasonal water requirements for soybeans, and examine impacts of irrigation management on soybean seed yield and quality.

Anticipated Impact:

Establish relationships between water use and soybean yield and seed quality, and subsequently establish guidelines for more efficient and economical irrigation of soybeans.

Location of Studies: To be determined

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2012-2014

Amount Funded: \$13,600

9. Mitigating Herbicide Spray Drift Under Field Conditions

Investigator: Dan Reynolds, Mississippi State University

Project Focus:

Compare effect of various spray tips on herbicide drift, and the efficacy of these spray

tips when used with contact, auxin, and systemic herbicides; compare efficacy of light and non-light activated herbicides when applied during both daytime and nighttime hours.

Anticipated Impact:

Recommendations to optimize efficacy and avoid off-target deposition when applying herbicides that can be used with new transgenic herbicide traits.

Location of Studies: To be determined

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2012-2014

Amount Funded: \$37,179

10. Wheat Residue Management Impacts on Soil Quality and Soybean Yield in a Double Crop System

Investigator: Theophilus Udeigwe, Louisiana State University

Project Focus:

Objectives: 1). To evaluate the impacts of five selected post-harvest residue management techniques namely a.) residue burning-no till, b.) residue burning-conventional tillage, c.) full residue retention-no till, d.) full residue retention-conventional tillage, and e.) residue shredding-no till-no burn, in wheat-soybean double crop system on soil quality. Key soil quality indicators that would be evaluated include: total phosphorus, plant available phosphorus, total nitrogen, total carbon, organic matter, dissolved organic carbon, particulate organic carbon, cation exchange capacity, pH, electrical conductivity, extractable nutrients (nitrogen, phosphorus, potassium), bulk density, infiltration, and top soil depth. 2). Evaluate the impact of the selected wheat post-harvest residue management techniques on soybean yield in a double crop system.

Anticipated Impact:

The potential impacts of the various residue management techniques in wheat-soybean double system on a) soil quality (using the various indicators) and b) soybean yield will be available to producers for making production decisions. Information gathered from this study will help producers maintain a balance between maximizing output and maintaining environmental quality.

Location of Studies: Northeast Research Station, St. Joseph, LA

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012

Amount Funded: \$12,412

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

Investigator: Roberto Barbosa, Louisiana State University

Project Focus:

Objectives: To investigate current pesticide application efficiency in cotton and soybeans and suggest drift reduction techniques for both air and ground equipment.

Anticipated Impact:

The development of drift management guidelines will improve operational efficiency of co-applications of different crop protectants.

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: 2012-2013

Amount Funded: \$10,500

12. Electrically-Charged Fungicide Adjuvants

Investigator: Roberto Barbosa, Louisiana State University

Project Focus:

It is our goal to extend the micro, nanotechnology to the field of agriculture, with the specific purpose of improving pesticide/herbicide functionality to be used in soybeans.

Objectives: 1.) Nanoparticle synthesis 2.) Nanoparticle characterization

Anticipated Impact:

Improved pesticide/herbicide functionality.

Location of Studies: Louisiana State University, Baton Rouge, LA

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013

Amount Funded: \$26,000

13. Agronomic Research to Improve Soybean Production in Louisiana

Investigator: Sterling B. Blanche, Louisiana State University AgCenter

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.

Anticipated Impact:

Soybean varieties (each of which has a unique assortment of genes) differ in their response to stresses commonly encountered in Louisiana growing regions. For example, some of these stresses include disease and nematode pressure. It would be valuable information to know, in addition to yield potential, which soybean varieties benefit from inherent resistance to the factors.

Location of Studies: LSU AgCenter Dean Lee Research Station
Funding Source: Louisiana Soybean and Grain Research and Promotion Board
Length of Project: 2012-2013
Amount Funded: \$25,000

14. The Arkansas Discovery Farm Program

**Investigator: Mike Daniels, Andrew Sharpley: University of Arkansas
Division of Agriculture**

Project Focus:

To document sustainable and viable row crop farming systems on real, working farms that promote agricultural profitability and natural resource protection. 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.

Anticipated Impact:

Documenting environmental impacts of Arkansas farming systems, as well as evaluating the efficacy and cost-effectiveness of alternative practices, will bridge a knowledge gap that now keeps farmers, natural resource managers and decision-makers alike from confidently taking effective actions that ensure both economic and environmental sustainability.

Location of Studies: Throughout Arkansas
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2011-2013
Amount Funded: \$18,300

15. Yield and Economic Responses of Soybean to Irrigation Initiation on Clay Soil in Mississippi

Investigator: H.C. (Lyle) Pringle, Mississippi State University

Project Focus:

Determine the relationship of irrigation initiation timing to yield and economic return from soybean grown on clay.

Anticipated Impact:

Irrigation initiation timing recommendations that will lead to maximum economic yields and conservation of irrigation water (increased irrigation efficiency) for producers growing early-planted MG 4 soybean varieties.

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

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2012-2015

Amount Funded: \$25,322

16. Determining the Effect of Low Concentrations of Dicamba and 2,4-D on Soybean Growth and Yield

Investigator: Dan Reynolds, Mississippi State University

Project Focus:

Determine effect of simulated drift and volatility of dicamba and 2,4-D on soybean growth and yield, and the most sensitive soybean growth stage to these herbicides; compare the effectiveness of various clean-out procedures for sprayers that have been used to apply these herbicides.

Anticipated Impact:

With the advent of new transgenic herbicide technologies, results from this research will demonstrate to producers the importance of good stewardship in the application of auxin herbicides, as well as the importance of and methodology for cleaning spray equipment used in their application.

Location of Studies: To be determined

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2012-2014

Amount Funded: \$36,975

17. Estimation of Deer Damage to Soybean Production in Mississippi: A Spatial and Temporal context

Investigator: Bronson Strickland, Mississippi State University

Project Focus:

Quantify deer abundance and utilization of soybean fields during browsing, and estimate/quantify subsequent loss of soybean yield ; characterize deer habitat surrounding soybean fields to establish relationship with soybean damage; and test various deer-damage mitigation techniques for potential economic benefit.

Anticipated Impact:

A reliable estimate of the impact of deer depredation on soybean fields that will be used to develop cost-effective management practices, and information for producers to use for accurately targeting areas for damage mitigation.

Location of Studies: To be determined

Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2012-2014
Amount Funded: \$68,186

18. Optimal Timing of Aerial Spray Application to Avoid Inversion-induced Far-field Movement of Spray

Investigator: Steve Thomson, USDA, ARS

Project Focus:

Obtain and apply data to track atmospheric stability during a cropping season, and translate results into meaningful guidelines for agricultural pilots and producers to use to avoid spraying in conditions that will result in inversion-induced movement of spray.

Anticipated Impact:

Pinpoint times of day and weather trends that can be used to spray in “safe” conditions, or conditions unfavorable for temperature inversions.

Location of Studies: To be determined

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2012-2013

Amount Funded: \$13,224

19. Developing Scientific Irrigation Scheduling Methods for Mississippi Soybean Production Systems

Investigator: Jason Krutz, Mississippi State University

Project Focus:

Evaluate existing and new irrigation scheduling tools for improving soybean yield, seed quality, and irrigation water use efficiency under Midsouth growing conditions.

Anticipated Impact:

Identification of best method(s) that can be used by soybean producers to schedule soybean irrigation for optimum yield and returns, and water conservation.

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

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2012-2014

Amount Funded: \$34,977

20. Developing Profitable Deficit Irrigation Guidelines for Mississippi Soybean Production Systems

Investigator: Jason Krutz, Mississippi State University

Project Focus:

Increase soybean yield potential and profitability by developing production systems that require up to 25% less irrigation water through 1) determining optimum physiological period for initiating irrigation, 2) determining critical physiological period for terminating irrigation, and 3) determining growth stage(s) when deficit irrigation adversely affects yield and profitability.

Anticipated Impact:

Identification of those periods of soybean development when irrigation water can be withheld or curtailed in order to reduce seasonal irrigation application amounts.

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

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2012-2014

Amount Funded: \$52,301

21. Effect of Planting Date, Latitude, and Environmental Factors on Choice of Maturity Group in Mid-South Soybean Production

Investigator: Larry Purcell, University of Arkansas Division of Agriculture

Project Focus:

This regional effort will result in increased understanding of the effect of planting date (across a range of latitudes) on grain yield, crop growth, and phenology (stage x date), and will not only illustrate the variable agronomic responses but also document any differential exposures to weed, insect and disease pests (and could result in the refinement of scouting protocol for these pests). A better understanding of the maturation of the soybean plant would also be useful in ascertaining environmental effects upon seed composition and seed quality. At the conclusion of the study the entire results will be compiled, analyzed, summarized, and extended to producers, consultants and agri-businesses via a MSSB/USB publication.

Anticipated Impact:

Producers need information about which MGs and which varieties within a MG they should use across the extended planting window and range of latitudes (29° to 36° N) across the Midsouthern U.S.

Location of Studies: College Station, TX (Texas A&M), St. Joseph, LA (LSU), Stoneville, MS (MSU), Rohwer, AR (U of A), Verona, MS (MSU), Keiser, AR (U of A), Portageville, MO (U of M), Martin, TN (UT Martin)

Funding Sources: Mid-South Soybean Board and United Soybean Board

Length of Project: 2012-2014

Amount Funded: \$253,300 (\$40,000 MSSB, \$213,300 USB)

F. Composition and Alternate Uses

a.) Bio-fuels

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

**Investigators: Don Edgar, Don Johnson, George Wardlow, Leslie Edgar:
University of Arkansas Division of Agriculture**

Project Focus:

To educate professionals involved in agriculture about the performance and usability of biofuels. Specific target objectives include 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.

Anticipated Impact:

The value of this project is the role that the soybean industry plays towards a more sustainable energy supply which produces a viable energy source for producers and demonstrating the capabilities of this alternative energy source.

Location of Studies: University of Arkansas — Fayetteville, Northwest Arkansas

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$24,000

2. Pumping Plant Efficiency and On-Farm Generated Biodiesel as an Alternative Fuel Source

Investigator: Chris Henry, University of Arkansas Division of Agriculture

Project Focus:

The goal of this project is to study irrigation pumping plant cost and efficiency, to evaluate the use of on-farm produced biodiesel as an alternative fuel source and to develop Extension resources for producers for making decisions about pumping plants changes. Objectives: 1.) Evaluate pumping plant efficiency and performance using current pump monitoring installations by the White River Irrigation District. 2.) Develop a decision-making tool for growers to evaluate existing plants and upgrades.

3.) Investigate the possibility of using on-farm generated soy-biodiesel as a substitute in irrigation pumping plants.

Anticipated Impact:

Arkansas producers need a better understanding of the current status of sustainability of water and energy, so that informed decisions about operating, replacing and maintaining pumping plants can be made. Improving efficiency and reducing irrigation costs is the goal of this project.

Location of Studies: University of Arkansas Fayetteville

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2012-2014

Amount Funded: \$36,325

b.) Nutraceuticals

1. Intensification of Protein Content in Soybean Meals

Investigator: 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.

Anticipated Impact:

Soybean meals with high protein content and low carbohydrate levels would allow for more flexibility in the formulation of traditional animal feed and the expansion into new markets such as aquaculture. A high-protein soybean meal could be sold at a premium in comparison to traditional soybean meals, which would contribute to increase the profits of soybean process.

Location of Studies: Department of Food Science, UAF

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2010-2012

Amount Funded: \$19,200

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

Investigator: Andrew Proctor, University of Arkansas Division of Agriculture

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.

Anticipated Impact:

Industrial CLA rich oil production would promote the demand for soy products beyond common food and feed use, to the creation of novel soy based health foods, nutraceuticals and pharmaceuticals which would create significant value added profitability.

Location of Studies: University of Arkansas - Fayetteville

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$78,800

3. Characterization of the Functionality of Soybean Seed Coats and Evaluation of Novel Prebiotic Fibers from Soy in Humans

Investigators: Sun-Ok Lee, Phil Crandall and Steve Ricke, University of Arkansas Division of Agriculture

Project Focus:

To understand the genetic variability and physical properties of soybean seed coats and search for marketable functional food ingredients that can be made from soybean seed coats. Objectives: 1) Screen current soybean breeding lines for physical and chemical variations in seed coats; select the best lines to recover functional food ingredients. 2) Characterize major physical and chemical constituents in seed coats and manufacture functional fibers for pure bacterial and a human feeding study. 3) Characterize pure bacterial culture responses to soybean fiber from seed coats. 4) Assess the functionality of consuming soybean fibers to ameliorating blood glucose and insulin levels in humans which may play a role in controlling diabetes.

Anticipated Impact:

This proposal is designed to address the practical application of soybean seed coats to improve the health benefits such as lower blood glucose and weight reduction through increased satiation. In 2011, the production of soybean seed coats in Arkansas was over 10 million bushels. Both soybean growers and soy processing industry in the state will benefit from the sales of co-products from soybean seed coats can be added to sales of oil and soybean meal.

Location of Studies: University of Arkansas – Fayetteville

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2012-2014

Amount Funded: \$35,000

4. The Promotion of Edamame and other Specialty Soybeans in Arkansas

Investigators: Jeremy Ross, Hank Chaney, Lanny Ashlock, Pengyin Chen, Terry Kirkpatrick: University of Arkansas Division of Agriculture

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.

Anticipated Impact:

The economic impact from the income generated by the new Arkansas edamame industry should exceed 6 million dollars the first year of operations.

Location of Studies: Throughout Arkansas

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2012

Amount Funded: \$24,600

5. Optimizing the Finishing Period and Dietary Inclusion Level of CLA-Soybean Oil to Produce CLA-Enhanced Channel Catfish as a Functional Food

Investigator: Rebecca Lochmann, University of Arkansas Pine Bluff

Project Focus:

To determine whether diets enriched with higher levels (4 or 6%) of CLA-enriched soybean oil can improve the fatty acid composition of farmed channel catfish for human health relative to a diet with traditional soybean oil, while maintaining or improving catfish growth, health, and product quality. In addition, the minimum finishing period required to achieve target levels of CLAs in the fillet must be determined.

Anticipated Impact:

Production of catfish as functional foods using CLA-soy oil should further increase their competitiveness in the lucrative seafood market.

Location of Studies: University of Arkansas Pine Bluff

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2012

Amount Funded: \$26,400

6. Minimizing Use of Fishmeal in Hybrid Striped Bass Using Non-GMO Soybeans

Investigator: Rebecca Lochmann, University of Arkansas Pine Bluff

Project Focus:

This is the first phase of a two-phase project to optimize feed formulations that maximize replacement of fishmeal (FM) in aquafeeds with novel non-GMO soy products produced by Schillinger Genetics. In this first phase, we will determine the nutrient availability, growth performance, and digestive and physiological effects of new soybean cultivars in hybrid striped bass (HSB) reared in replicate indoor tank systems, while in the second year we will pursue separate funding for a similar set of objectives for channel catfish while extending the first-phase results in HSB to pond trials.

Anticipated Impact:

These novel SBM cultivars are promising plant-based protein sources for use in the aquaculture industry that are already opening the door to new soy markets in aquafeeds for salmonids and specialty marine species. Scientific testing is needed before conducting commercial trials in either species. Schillinger Genetics' new soybean lines with 70-90% fewer oligosaccharides are expected to result in improved fish health and nutrient utilization and this hypothesis will be tested in these studies.

Location of Studies: University of Arkansas Pine Bluff

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2012

Amount Funded: \$34,153

7. Prebiotics and Anti-Inflammatory Compounds from Soybean for Obesity Prevention

Investigator: Jack Losso, Louisiana State University

Project Focus:

The overall objective of this proposed study is to optimize the preparation of water soluble soybean powder rich in prebiotic and anti-inflammatory compounds used in various food and beverage applications including: smoothies, snack bars, beverages, cereals, yogurts, and other food products.

Anticipated Impact:

We expect the oligosaccharide- and anti-inflammatory-rich soy whey to promote the growth of bifidobacteria in the yogurt. This will translate in higher number of bifidobacteria in the consumer's gut and a healthy colon.

Location of Studies: Louisiana State University, Baton Rouge, LA

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012

Amount Funded: \$26,000

G. Economics and Marketing

1. Economic Analysis of Soybean Production Practices

Investigators: Robert Stark, University of Arkansas Division of Agriculture

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)

Anticipated Impact:

Economic analysis of Board-funded production projects will add value to the projects and increase the return for check-off dollars invested. The results will enable producers to make management decisions based on profit maximization rather than just maximizing yield.

Location of Studies: University of Arkansas- Fayetteville

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2012

Amount Funded: \$13,000

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

Investigators: Bruce Ahrendsen, Bruce Dixon: University of Arkansas Division of Agriculture

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.

Anticipated Impact:

This project will have an important contribution to a further understanding of the economic issues faced by Arkansas soybean farms and in improving farm profitability and efficiency.

Location of Studies: University of Arkansas - Fayetteville

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$13,000

3. Soybean Enterprise Budgets and Production Economic Analysis

Investigator: 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.

Anticipated Impact:

Incorporating changing information and circumstances into budget analysis will assist producers in making decisions that manage financial risks inherent in agricultural production.

Location of Studies: Northeast Research and Extension Center, Keiser

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$13,500

4. Evaluation of Commodity Programs, Crop Insurance, and Forward Pricing Alternatives for Mississippi Soybean Farms

Investigator: Keith Coble, Mississippi State University

Project Focus:

To develop data and subsequent simulation models that can be used to quickly evaluate proposed alternative farm policy proposals.

Anticipated Impact:

Production of policy briefs and decision-making tools that producers can use to evaluate farm bill options and how the combination of crop insurance and new commodity programs may affect optimal forward pricing and risk management.

Location of Studies: Starkville, MS

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2012

Amount Funded: \$30,726

5. 2012 Farm Bill Proposals Analysis

**Investigator: Eric J. Wailes, Brad Watkins: University of Arkansas
Division of Agriculture**

Project Focus:

Objectives: 1) Develop descriptive analyses on each of the 2008 Food, Conservation and Energy Act. Identify to the extent possible the effects of these titles on all Arkansas producers. 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.

Anticipated Impact:

This study will help prepare Arkansas producers to be informed and to actively participate in this discussion.

Location of Studies: University of Arkansas

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2012

Amount Funded: \$7,700

H. Technology Transfer

a.) Verification

1. Soybean Research Verification Program

Investigators: Jeremy Ross, Chris Grimes, 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.

Anticipated Impact:

The SRVP provides for faster adoption of new and existing technology for improved soybean production efficiency for both irrigated and non-irrigated production. The SRVP also demonstrates the profitability of recommended production systems in "real world" high-yield (irrigated environments and also the variable non-irrigated environments and offers an opportunity to enhance cooperating producers' and county Extension agents' marketing expertise.

Location of Studies: Various producer field locations throughout Arkansas

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$147,500

2. Soybean Management by Application of Research and Technology (SMART): Support of On-farm Soybean Verification Programs and Other Extension Activities

Investigators: Trent Irby, Mississippi State University

Project Focus:

Identify and apply key management practices that will increase profitability of Mississippi soybean production; collect long-term data that can be used to identify sustainable management practices that can be applied to producer fields to enhance

profitable soybean production.

Anticipated Impact:

Continual updating of recommendations for practices that will enhance profitable and sustainable soybean production in Mississippi.

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

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2012-2015

Amount Funded: \$139,319

3. Louisiana Soybean Research Verification Program

Investigator: 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 recommendations. 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.

Anticipated Impact:

Validating LSU AgCenter recommendations to producers will prove that our strategies can be used to improve profitability.

Location of Studies: Various, throughout the state

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013

Amount Funded: \$34,750

b.) Educational

1. Improving Technology Transfer for Profitable and Sustainable Soybean Production

Investigators: Jeremy Ross, Chris Grimes, Steve Kelley: 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 adaptation 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.

Anticipated Impact:

Improved timeliness of producing and disseminating these materials needs to be more efficient.

Location of Studies: University of Arkansas Cooperative Extension Service, Little Rock

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2011-2013

Amount Funded: \$45,600

2. Soybean Real-Time Weed and Disease Alerts

Investigators: Ken Smith, Jeremy Ross and Bob Reynolds: University of Arkansas Division of Agriculture

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.

Anticipated Impact:

Specialists, through the podcasts, will display for viewing what the specialist is seeing in the field, which will better enable soybean producers with immediate information enabling producers to better manage weeds or diseases.

Location of Studies: University of Arkansas Cooperative Extension Service, Little Rock

Funding Source: Arkansas Soybean Promotion Board

Length of Project: Ongoing

Amount Funded: \$51,700

3. Development of a Soybean Variety Database and Interactive Selection Website

**Investigators: Terry Kirkpatrick, Jeremy Ross: University of Arkansas
Division of Agriculture**

Project Focus:

Soybean growers have indicated the need for a user-friendly and interactive website that searches existing data from Arkansas and other Mid-South variety testing programs and provides useful, summarized variety selection information. Our goal is to develop such a website and underlying database during 2012. Objectives: 1.) Develop a summarized database of variety testing data from Arkansas, Mississippi, SE Missouri and western Tennessee as applicable. Data include yield, disease resistance, and other traits of interest. 2.) Develop a interactive website structure that utilizes the database, yielding useful information per grower queries including ranked variety lists; brand searches; region-specific data summaries and so forth.

Anticipated Impact:

A useful and user-friendly website based on Mid-South data would be a welcome tool to many producers as they plan for the spring planting season each year. The ability to choose the correct cultivar in a timely and efficient manner would have great value, according to many growers.

Location of Studies: University of Arkansas Cooperative Extension Service, Little Rock

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2012

Amount Funded: \$30,000

4. Educating Growers and Consultants on Insect Monitoring and Control

**Investigators: Terry Kirkpatrick, Jeremy Ross: University of Arkansas
Division of Agriculture**

Project Focus:

To educate growers, consultants, and other ag industry on the proper techniques for monitoring and management of soybean insect pest populations and to help provide them with the tools they need to make effective and economical decisions. Objectives: 1.) Increase awareness of the impact soybean insects can have on production. 2.) Provide growers and other decision-makers with the proper tools to make decisions on insect pest populations in their fields. 3.) Overall improvement of soybean insect pest management in Arkansas and increased adoption of IPM in soybean production.

Anticipated Impact:

Changes in production have created a need to educate growers and other decision makers on the proper methods for monitoring insects and increase the awareness of the proper management techniques for effective and economical insect control. We want to make sure Arkansas soybean producers money is wisely spent for insect management.

Location of Studies: University of Arkansas Cooperative Extension Service, Little Rock

Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2012
Amount Funded: \$4,800

5. Technological Aids for Information Dissemination to Soybean Producers

Investigator: Dharmendra Saraswat, University of Arkansas Division of Agriculture

Project Focus:

The goal in the first year of the project (2012) is to develop pilot smartphone apps and their associated server-based backends. This would include developing, testing and making available an application to assist with weed identification and their control practices and an additional app for fertilizer decision making and identification of nutrient deficiencies and corrective measures. Applications to assist in the identification and recommended control practices for insects and diseases that impact soybeans will also be developed once the pilot applications are fully developed. The specific objectives for the first year of the project are as follows: 1.) Develop a pictorial e-field guide of weeds and their control practices for Arkansas by consulting with experts and using information contained in the MP-44 publication (Recommended Chemicals for Weed and Brush Control) 2.) Develop and test a “weed app” for Windows Phone 7, iOS (iPhone) and Android smartphones that can be used for identifying weeds and their control practices. 3.) Develop and test a fertilizer application to provide current recommendations based on soil sample test results, yield goal, and soil type. 4.) Develop a pictorial e-field guide of soybean typical nutrient deficiencies symptoms and associated tissue sampling protocols, and nutrient threshold levels in plant parts. 5.) Develop the backend database and server scripting framework to feed and analyze data from the smartphone applications. 6.) Organize focus group meeting to collect their feedback and incorporate inputs into the smartphone application development process based on feasibility evaluation. 7.) Advertise the smartphone app through web, email, extension publications, local newsletters and further disseminate the methodology of smartphone apps through conference presentations.

Anticipated Impact:

This proposal aims to develop several smartphone based applications (short name “apps”) and their associated backends (i.e. server side code) to disseminate the latest research- based information developed by the University of Arkansas Division of Agriculture to soybean producers, crop consultants and county agents.

Location of Studies: University of Arkansas Cooperative Extension Service, Little Rock
Funding Source: Arkansas Soybean Promotion Board
Length of Project: 2012-2014
Amount Funded: \$37,318

6. Flag the Technology

**Investigators: Bob Scott, Dharmendra Saraswat: University of Arkansas
Division of Agriculture**

Project Focus:

To provide county agents with materials and funding to support the Flag the Technology program also to further develop GPS, web-based applications that would make field maps available to commercial applicators that would identify fields based on the herbicide trait technology planted in the field.

Anticipated Impact:

The overall goal of this project is to help growers, consultants, private applicators and commercial applicators prevent the unintentional spraying of soybean fields with the wrong herbicides and prevent problems with associate with drift. The Goal of this proposal is to help the University of Arkansas County Agent system promote the existing “Flag the Technology” program.

Location of Studies: University of Arkansas Cooperative Extension Service, Little Rock

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2012

Amount Funded: \$199,000

7. From the Ground Up

**Investigator: Karen Ballard: University of Arkansas Division of
Agriculture**

Project Focus:

To conduct research with Arkansas soybean producers to support the development, integration, and extension of soybean production information, research and technology that is timely and relevant. Objectives: 1.) Examine the use of emerging and innovative technologies to support new agents, young farmers and seasoned producers through web-based instructional strategies and support. 2.) Evaluate digital strategies to insure that new and seasoned agents are informed of emerging issues and knowledgeable of current research-based production recommendations, to support the economic viability of producers. 3.) Improve communication including emerging biosecurity information, research findings, updates, etc., to improve the efficiency and timeliness of communication with the Soybean Board, soybean producers, and agents.

Anticipated Impact:

This project will develop, integrate, and extend soybean production information, research and technology that is timely and relevant statewide, for effective consultation and decision-support for soybean producers, through diverse digital channels.

Location of Studies: University of Arkansas Cooperative Extension Service, Little Rock

Funding Source: Arkansas Soybean Promotion Board

Length of Project: 2012

Amount Funded: \$84,432

8. Provide In-field Soybean Diagnostic Service for Mississippi Soybean Producers

Investigator: Billy Moore, Mississippi State University

Project Focus:

To provide soybean disease diagnostic assistance to soybean producers and leaders of MSPB-funded projects.

Anticipated Impact:

Disease problems that occur in producer and MSPB-funded project fields will be evaluated to provide assistance to MSU researchers and Extension personnel

Location of Studies: Throughout Mississippi

Funding Source: Mississippi Soybean Promotion Board

Length of Project: Ongoing

Amount Funded: \$10,000

9. Video Support for Mississippi Soybean Producers

Investigator: Bob Ratliff, Mississippi State University

Project Focus:

Identify important soybean production topics and produce video segments that will provide producers with current, timely information to address issues related to those topics; video presentations of results from MSPB-funded research projects that will be posted on the MSPB website (www.mssoy.org).

Anticipated Impact:

Production of approximately 35 video segments for posting on the MSPB website.

Location of Studies: Throughout Mississippi

Funding Source: Mississippi Soybean Promotion Board

Length of Project: Ongoing

Amount Funded: \$15,430

10. Development of Agricultural Applications for Use on Apple iPhone and iPad

Investigator: Dan Reynolds, Mississippi State University

Project Focus:

Research and secure mechanism for offering MSU-developed agricultural applications (apps) on the iTunes store; develop two prototype apps to demonstrate the usefulness of this technology, and to increase awareness of its application.

Anticipated Impact:

Development of two successful apps as well as the infrastructure necessary for development of additional agricultural apps.

Location of Studies: Throughout Mississippi

Funding Source: Mississippi Soybean Promotion Board
Length of Project: 2012-2014
Amount Funded: \$10,000

11. 2012 Louisiana Soybean and Grain Research and Promotion Board Report

Investigator: Frankie Gould, Louisiana State University AgCenter

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.

Anticipated Impact:

An enhanced producer, industry, and stakeholder awareness and support of board activities.

Location of Studies: LSU AgCenter Communications

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013

Amount Funded: \$4,500

12. 2012 Pocket Field Guide to Soybean and Grain Weed, Pest and Disease Identification

Investigator: Frankie Gould, Billy Williams, Louisiana State University AgCenter

Project Focus:

Objectives: 1) To develop a full color pocket guide for weed, pest and disease identification and control in soybeans. 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. 5) To investigate the development of a mobile device application and eBooks.

Anticipated Impact:

An easily portable identification guide will aid agents and consultants in timely diagnosis of a problem and will therefore, be an integral component to quick and effective treatment.

Location of Studies: LSU AgCenter Communications

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: 2012-2013

Amount Funded: \$21,450

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

Investigator: Ronald J. Levy, Louisiana State University AgCenter

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.

Anticipated Impact:

Research results from demonstrations can be delivered to the grower in a timely, useful and convincing manner.

Location of Studies: Various, throughout the state

Funding Source: Louisiana Soybean and Grain Research and Promotion Board

Length of Project: Ongoing

Amount Funded: \$39,950

14. Delta Agricultural Weather Project

Investigator: Steve Martin

Project Focus:

Continue data collection and dissemination of pertinent agricultural weather data and products required by Delta researchers and producers.

Anticipated Impact:

Continual collections of weather data for Delta Counties will be assimilated into the DREC weather website archive to be available as a historical weather source for researchers, producers, and consultants.

Location of Studies: Various, throughout the state

Funding Source: Mississippi Soybean Promotion Board

Length of Project: 2012-2014