MSPB-Funded Research Projects–2011-2012

Title: The Mississippi YIELD Project $161,260

PIs: Alan Blaine and Billy Moore (alan@southernaginc.com)

Objective: Apply conventional and unconventional management practices/inputs to soybeans to determine those that contribute to sustainable high soybean yields in Mississippi.

Duration: Unknown

Expected Results: Identification of those inputs or combinations of inputs that are consistently necessary to move yields to a plateau that exceeds current levels.

Title: Lepidopteran insect pest management in soybeans (1-2011) $39,000

PI: Don Cook (dcook@drec.msstate.edu)

Objectives: Refine/validate current corn earworm thresholds in soybeans; validate simulated insect defoliation studies using soybean loopers in field cages; determine residual efficacy of new insecticides for looper control; continue testing of labeled insecticides to manage soybean insects.

Duration: Year 1 of 3

Expected Results: Development of data that will be used to update soybean insect control guidelines in the "Insect Control Guide for Agronomic Crops".

Title: Validity of current K recommendations for high yielding soybeans with respect to grain yield and disease control (3-2011) $30,922

PI: Gabe Sciumbato (Gabe@drec.msstate.edu)

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

Duration: Year 1 of 3

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

Title: Screen soybean variety evaluation entries for resistance to plant parasitic nematodes to enhance soybean production (4-2011) $17,250

PI: Gary Lawrence (glawrence@entomology.msstate.edu)

Objective: Evaluate new entries in the MSVT for resistance/reaction to plant-parasitic nematodes (root-knot, reniform, and soybean cyst).

Duration: Continuous

Expected Results: Development of data that will be published in the annual MSVT publication to provide producers information about newly-available varieties' susceptibility to the above nematode species that infest some production environments.

Title: Rapid ID of soybean fungi by spectroscopic techniques (6-2011) $75,045

PI: Ashli Brown (abrown@pch.msstate.edu)

Objective: Develop spectrometric techniques that can be used to identify specific fungi in field samples.

Duration: Year 1 of 3-5

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

Title: Improving soybean nutrient management using timely soil testing programs (9-2011) $10,480

PI: Larry Oldham (loldham@pss.msstate.edu)

Objectives: Improve soil sampling management for better utilization of increasingly more expensive inorganic fertilizer nutrients; increase awareness of the importance of soil P and K fertility management in soybean production environments.

Duration: Year 1 of 5

Expected Results: Improvement of fertilizer use efficiency by reducing either over- or under-fertilization of soybeans in the varied Mississippi soybean production environments.

Title: On-farm validation of the Mississippi Irrigation Scheduler Tool (MIST) (10-2011) $64,310

PI: Amy Schmidt (Aschmidt@abe.msstate.edu)

Objectives: Develop water release data for typical Mississippi soils and calibrate soil moisture sensors to these values; test and validate MIST for common Mississippi soybean production environments; confirm irrigation application rates recommended by MIST.

Duration: Year 1 of 3

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

Title: Evaluation of farm policy alternatives for Mississippi soybean farms (11-2011) $35,375

PI: Keith Coble (coble@agecon.msstate.edu)

Objective: Develop data and subsequent simulation models that can be used to quickly evaluate proposed alternative farm policy proposals.

Duration: Year 1 of 1

Expected Results: Production of policy briefs and decision-making tools that producers can use to make management decisions based on evolving commodity and crop insurance programs.

Title: Managing transgenic crops as weeds in soybean production systems (13-2011) $28,000

PI: Dan Reynolds (dreynolds@pss.msstate.edu)

Objectives: Develop weed management programs that will control volunteer corn, cotton, and soybean growing as weeds in fields of Roundup Ready, Liberty Link, and conventional soybean varieties; determine effect of volunteer corn, cotton, and soybean on soybean growth and yield.

Duration: Year 2 of 3

Expected Results: 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 these volunteer crops that act as weeds in soybean production fields.

Title: Preventing seed rot and poor seed quality in MG IV soybean (14-2011) $128,260

PI: Tom Allen (tallen@drec.msstate.edu)

Objectives: Conduct fungicide/insecticide rate and application timing studies to identify inputs that may improve seed quality; determine impact of agronomic inputs and pod color on seed quality; evaluate interactive effects among stink bugs, fungicides, and rainfall on seed quality.

Duration: Year 3 of 5

Expected Results: 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 in Mississippi soybeans.

Title: Soybean disease monitoring for Mississippi soybean producers (15-2011) $61,500

PI: Tom Allen (tallen@drec.msstate.edu)

Objectives: Monitor occurrence and location of foliar diseases, including rust, to provide producers with up-to-date information that can be used to make timely treatment decisions; determine effective fungicide management schemes for rust in locations where it occurs.

Duration: Continuous

Expected Results: 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.

Title: Irrigation use and efficiency in soybean production systems in Mississippi (16-2011) $47,440

PI: Tom Eubank (teubank@drec.msstate.edu)

Objectives: Evaluate and validate conservation irrigation practices such as Phaucet; assess varietal tolerance to flooded/wet soil.

Duration: Year 2 of 3

Expected Results: 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.

Title: Management and ecology of redbanded stink bug (17-2011) $42,186

PI: Fred Musser (fm61@msstate.edu)

Objectives: Determine effects of using MG III soybean varieties as a trap crop; Compare mobility of redbanded stink bug and efficacy/activity of insecticides for its control to that of southern green stink bug; determine alternative hosts.

Duration: Year 2 of 3

Expected Results: Evaluate redbanded stink bug behavior and potential control strategies in order to develop improved management strategies that minimize control costs.

Title: Development of a rapid genetic field race test for SCN and generation of SCN resistance through gene inactivation (18-2011) $91,837

PI: Vincent Klink (vklink@biology@msstate.edu)

Objective: Develop a rapid genetic field race test that can be used for on-site testing of soil samples, and that may reduce the time required for determining the presence and infestation level SCN and other nematodes.

Duration: Year 2 of 3

Expected Results: 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.

Title: Evaluation of private and public soybean varieties and breeding lines for resistance to stem canker, forgeye leaf spot, purple leaf and pod stain, black root rot, and rust (19-2011) $43,878

PI: Gabe Sciumbato (Gabe@drec.msstate.edu)

Objectives: 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.

Duration: Continuous

Expected Results: 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.

Title: Addressing critical weed control issues in soybean (20-2011) $110,300

PI: Tom Eubank (teubank@drec.msstate.edu)

Objectives: Develop strategies for management of glyphosate-resistant (GR) weeds; establish a comprehensive data base of herbicide-resistant weeds that occur in soybeans; determine mechanisms of herbicide resistance in weed populations; assess burndown options for management of early-season weeds; determine utility of Liberty Link soybeans in the management of GR weeds; screen commercial and public soybean varieties for metribuzin tolerance.

Duration: Year 2 of 3

Expected Results: 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, and management options to prevent or delay development of herbicide-resistant weeds,

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Title: Managing soybean production on low nutrient status soils in Mississippi (21-2011) $37,631

PI: Mark Shankle (shankle@ra.msstate.edu)

Objectives: Compare/validate fertility recommendations resulting from soil tests conducted at different soil testing facilities; identify optimum K fertilizer rate for soybeans grown on soils low in K; determine the economic benefits of K fertility recommendations from the different labs.

Duration: Year 2 of 3

Expected Results: 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.

Title: Enhancement of Mississippi soybean variety trials through entry standardization (23-2011) $36,209

PI: Brad Burgess (bburgess@pss.msstate.edu)

Objective: Conduct standardized soybean variety trials at multiple Mississippi locations.

Duration: Continuous

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

Title: The influence of long-term glyphosate use in soybean (24-2011) $15,750

PI: Ernie Flint (ernestf@ext.msstate.edu)

Objectives: Evaluate effectiveness of adding gypsum, lime, and poultry litter to: improve soybean yields; reduce detrimental effects of glyphosate and/or its metabolites; enhance calcium source for potential reduction in soybean diseases; reduce occurrence of “greenstem syndrome”.

Duration: Year 1 of 1

Expected Results: Determination of the effectiveness of the listed soil amendments in improving soybean health and yield.

Title: Corn and soybean crop residue management impact on soil quality, yield, and returns 25-2011) $21,000

PI: Normie Buehring (buehring@ra.msstate.edu)

Objective: Determine how tillage and management of residue in a corn/soybean rotation affect soil quality, crop yields, and economic returns.

Duration: Year 1 of 5

Expected Results: 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.

Title: Evaluation of the impact of fertility and fungicide application timing for the prevention of Phomopsis seed decay (and late season Cercospora) (26-2011) $62,550

PIs: Alan Blaine and Billy Moore (alan@southernaginc.com)

Objective: Determine correct timing regimen for application of strobilurin fungicide and role of soil-applied K to reduce in-field seed rot in an irrigated field environment.

Duration: Year 2 of 2

Expected Results: Determination of proper fungicide application timing and soil K level to reduce occurrence of seed rot.

Title: Developmentof Phomopsis seed decay-resistant soybean from new sources of resistance (28-2011) $15,500

PI: Anne Gillen (Anne.Gillen@ars.usda.gov)

Objective: Develop soybean lines with resistance to *Phomopsis* seed decay (PSD)

Duration: Year 1 of 2

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

Title: Identification of soybean varieties with resistance to *Phomopsis* seed decay (PSD) to enhance soybean seed quality (30-2011) $30,928

PI: Shuxian Li (shuxian.li@ars.usda.gov)

Objective: Identify available soybean varieties that have resistance to PSD and concurrent high seed quality when inoculated with the disease pathogen.

Duration: Year 1 of 3

Expected Results: Varieties with PSD resistance will be identified, and this information will be made available to producers.

Title: Characterization of frog eye leaf spot (FLS) isolates using molecular and host pathotype (32-2011) $28,263

PI: Jeff Ray (Jeff.Ray@ars.usda.gov)

Objective: Characterize the pathogenicity of FLS isolates, develop genetic markers that can be used to differentiate among the isolates, and identify race-specific sources of resistance to FLS that can be used in a breeding program.

Duration: Year 1 of 1

Expected Results: 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.

Title: Identification and incorporation of reniform nematode resistance into soybean adapted for Mississippi and the midsouth (33-2011) $19,895

PI: Salliana Stetina (Sally.Stetina@ars.usda.gov)

Objective: Identify sources of host plant resistance to reniform nematode in soybean, initiate development of germplasm that has resistance, and use molecular techniques to identify molecular markers that can be used in marker-assisted selection.

Duration: Year 1 of 3

Expected Results: 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.

Title: SMART Program (36-2011) $50,000

PI: Dennis Reginelli (dennisr@ext.msstate.edu)

Objective: Encourage producer adoption of enhanced management and production practices for soybean production by demonstrating the value of applying research-based recommendations in producer fields.

Expected Results: Continually update recommendations for soybean production in Mississippi in order to enhance the profit potential for Mississippi soybean producers.

Midsouth Soybean Board Projects–AR, LA, MS, TX