MISSISSIPPI SOYBEAN PROMOTION BOARD
2019-2020 FUNDED RESEARCH/EXTENSION PROJECTS

Title: Management of soybean insect pests, 01-2019, $9,300

PI: Don Cook, dcook@drec.msstate.edu; MSU-DREC

Objective(s): Provide up-to-date information on insect management strategies and tools for producers to use to combat soybean insect pests, and conduct studies to validate/verify insect damage potentials and thresholds for soybeans

Duration: Year 1 of 3

Expected Results: Identify and disseminate up-to-date information for producers and consultants to use to make the most informed decisions for managing/controlling soybean insect pests.

Title: Cover Crop–Minimal Tillage (CCMT) production system evaluation, 04-2019, $110,308

PI: Southern Ag Services, Inc., alan@southernaginc.com, private firm

Objective(s): Implement a Systems Agronomy approach to identify yield limiting/driving factors in CCMT systems, to include 1) assessment of pest and weed presence and cost effectiveness of threshold-based treatments, 2) evaluation of CCMT effects on soil properties and soil water characteristics in irrigated soybean production systems, and 3) assessment of N-fixation potential in soils under these systems to improve N management strategies in high-yielding (irrigated) soybean production systems.

Duration: Year 2 of 3

Expected Results: Development of management strategies to maximize production from high-yielding soybeans grown in CCMT systems.

Title: Stepwise evaluation of high technology production systems by omission research techniques, 06-2019, $82,142

PI: M. Wayne Ebelhar, webelhar@drec.msstate.edu, MSU-DREC

Objective(s): Determine the value/importance of specific inputs, through addition or omission, to both agronomic and economic productivity of soybeans under dryland and irrigated conditions across years

Duration: Year 3 of 4

Expected Results: Demonstration of the agronomic and economic implications from adding or omitting various technologies, both alone and in combination, associated with proven yield enhancement of soybean

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Title: Developing future agronomy leaders through day camp and individualized learning projects, 07-2019, $8,279

PI: Bill Burdine bill.burdine@msstate.org, MSU Extension Service

Objective(s): Develop an agronomy day camp emphasizing hands-on training for young people through projects and contests

Duration: Year 1 of 3

Expected Results: Day Camp at NMREC, handouts and presentations by participants to provide results from hands-on activities

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Title: Using weeds as a resource to develop herbivore-resistant soybean, 08-2019, $66,590

PI: Te-Ming Paul Tseng t.tseng@msstate.edu, MSU-PSS

Objective(s): Determine if extracts from weed species can be used to formulate repellents that will prevent deer and insect feeding on soybean, and use UAV and camera technology to assess effectiveness of these repellents when applied to soybean in the field

Duration: Year 3 of 3

Expected Results: Field testing of extracts from various weed species will identify candidate species that have anti-herbivory potential that can be commercially developed; also a provisional patent application for the identified materials.

Title: Understanding in-field soil moisture variability and its effect on irrigation, 10-2019, $49,815

PI: Mary Love Tagert, mltagert@abe.msstate.edu, MSU-ABE

Objective(s): Measure in-field spatial and temporal variability of rooting zone soil moisture of soybeans to determine 1) correlation with soil and crop variables, and 2) if the potential variability is great enough to indicate different irrigation schedules for different areas of a given field.

Duration: Year 2 of 3

Expected Results: Determination of placement and density of soil moisture sensors needed within non-Delta irrigated fields to ensure application of evenly distributed irrigation to soybeans in a given field.

Title: Managing iron deficiency chlorosis (IDC) through a cropping system approach, 12-2019, $23,210

PI: Dennis Reginelli, dennis.reginelli@msstate.edu, MSU Extension Service

Objective(s): Determine effect of selected cropping systems on yield of IDC-tolerant and -intolerant soybean varieties, and evaluate soil moisture sensor data relationship to IDC symptoms in these cropping systems.

Duration: Year 1 of 3

Expected Results: MAFES and MCES publications that will outline management practices that should be used to stabilize yields from soybeans grown on IDC-susceptible sites.

Title: Determination of organisms affecting soybean seed quality and fungicide efficacy in reducing associated losses, 14-2019, $66,116

PI: Tessie Wilkerson, twilkerson@drec.msstate.edu, MSU-DREC

Objective(s): Determine causal agent(s) of reduced quality of mature soybean seed and efficacy of fungicides for controlling these pathogens, evaluation of mechanisms for pathogen entry into maturing/mature soybean seed, and evaluation of response of new soybean germplasm that is exposed to conditions that promote reduced seed quality

Duration: Year 2 of 3

Expected Results: Determination of the fungal complex responsible for and its association with seed rot in conducive environments; determination of specific environmental conditions and associated pathogens 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; and identification of germplasm lines that can be used to develop varieties that are less susceptible to causes of seed damage.

Title: 2,4-D and dicamba resistant soybeans: stewardship and testing, 18-2019, $41,472

PI: Ashli Brown, abrown@msstate.edu, MSU-BMBEPP

Objective(s): Determine best sampling procedure for detection of auxin herbicide injury on soybeans; develop and validate testing methods to differentiate 2,4-D and dicamba herbicide formulations; design off-target field sampling program to determine best practices and participate in grower education program to promote stewardship of auxin herbicide use.

Duration: Year 4 of 4

Expected Results: Development of methodologies for identifying low-volatility 2,4-D and dicamba formulations, and design and implementation of a stewardship program for effective weed management with auxin herbicides.

Title: Evaluation of soybean varieties for resistance to *Cercospora* blight, frogeye leaf spot, stem canker, and seed quality, 19-2019, $44,644

PI: Tom Allen, tallen@drec.msstate.edu, MSU-DREC

Objective(s): Evaluate Miss. OVT entries for resistance to *Cercospora* blight and frogeye leaf spot (natural infestations), and stem canker (inoculated trials); collect and maintain stem canker isolates from infestations (when they occur) throughout Mississippi; and evaluate OVT entries for differences in mature seed quality when/if conditions promoting poor seed quality occur.

Duration: Continuous

Expected Results: Data that will provide producers information about the level of varieties' disease resistance and/or susceptibility so that tolerant/resistant varieties can be selected to avoid yield losses associated with the above pathogens, and identification of varietal differences in mature seed quality.

Title: Weed management programs for Mississippi soybean production, 20-2019, $104,562

PI: Jason Bond, jbond@drec.msstate.edu, MSU-DREC

Objective(s): Evaluate new and/or currently registered herbicides and herbicide-resistant (HR) technologies for use in Mississippi soybean weed management programs; identify production practices that optimize GR Palmer amaranth control when RR2 Xtend soybean varieties are used; and designing grass weed control strategies that mesh with current herbicide programs in Miss. soybean.

Duration: Continuous

Expected Results: Identification/development/dissemination of cost effective control strategies for various weed control problems that occur in soybeans, to include control options for GR/HR weeds, management options to prevent or delay development of HR weeds, and assessment of new herbicide technologies and traits in consort with management practices that provide new weed management options.

Title: Effect of cover cropping systems on dryland soybean plant vigor, growth, and yield, 21-2019, $62,328

PI: Mark Shankle, shankle@ra.msstate.edu, MSU-PRFBES

Objective(s): Determine the effects of cover cropping systems on dryland soybean growth, yield, soil health, and determine their potential economic benefit

Duration: Year 3 of 6

Expected Results: Identification of an affordable, effective cover cropping system that will contribute to the minimization of inconsistent dryland soybean yield.

Title: Development of fertilization practices for sustaining Miss. soybean production, 22-2019, $57,720

PI: Bobby Golden, bgolden@drec.msstate.edu, MSU-DREC

Objective(s): Evaluate soybean yield response to P and K fertilization rate; continue to build the Miss. soil test responsiveness database in order to update soil test recommendations for soybean in varying cropping systems; determine the appropriate sulfur (S) source and application rate and timing; determine influence of in-season K application on soybean yield and seed quality.

Duration: Year 3 of 5

Expected Results: Updated P, K, and S fertilization recommendations for soybeans grown in monocropped and rotational cropping systems in Miss.

Title: Enhancement of Mississippi Soybean Variety Trials through entry standardization, 23-2019, $42,661

PI: Brad Burgess, bburgess@pss.msstate.edu, MSU-MAFES

Objective(s): Conduct standardized soybean variety trials at multiple Mississippi locations to result in unbiased yield data with varied soybean cultivars.

Duration: Continuous

Expected Results: Soybean yield and trait results data, and seed quality data, that can be used by producers to select varieties for individual production environments throughout Mississippi, and that can be entered into the MSPB soybean variety selection tool on www.mssoy.org.

Title: Development and dissemination of an irrigation schedule on smartphones for soybean irrigation water management in the Miss. Delta, 27-2019, $13,340

PI: Saseendran Anapalli, saseendran.anapalli@ars.usda.gov, USDA-ARS

Objective(s): Continue studies to quantify long-term soybean crop water requirements and variations across crop seasons, and develop and implement a smartphone app that integrates real-time weather, soil water data, plant biomass, and canopy temperature to schedule irrigations in the region.

Duration: Year 1 of 5

Expected Results: Development and implementation of a smartphone app that can be accessed/used for scheduling soybean irriagtion

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Title: Crop rotation and risk management for Miss. soybean production, 28-2019, $35,200

PI: Andrew Stevens, a.stevens@msstate.edu, MSU–Ag. Econ.

Objective(s): Quantify the effect of different crop rotations on crop yield, and determine how crop rotation effects depend on/interact with other production factors such as soil type and input use.

Duration: Year 2 of 2

Expected Results: Provide soybean producers with information about how specific crop rotations with soybeans can increase yield and profit.

Title: Delta Agricultural Weather Center, 29-2019, $30,000

PI: Mark Silva, marks@ext.msstate.edu, MSU-DREC

Objective(s): Continue data collection and dissemination of pertinent agricultural weather data and products required by Delta researchers and producers.

Duration: Continuous

Expected Results: Collection of weather data for Miss. Counties that will be assimilated into the DREC weather website archive to be available as a source for both current and historical weather data for researchers, producers, and consultants.

Title: Evaluation of soybean breeding lines for resistance to Phomopsis seed decay (PSD) and for high seed germinability, 31-2019, $25,000

PI: Shuxian Li, (shuxian.li@ars.usda.gov), USDA-ARS

Objective(s): Evaluate/test soybean breeding lines for resistance to PSD, and identify PSD-resistant lines that can be used in developing PSD-resistant varieties

Duration: Year 1 of 3

Expected Results: Support for the identification of soybean breeding lines that have resistance to PSD and high seed quality that can be used in the development of high-yielding varieties with PSD resistance.

Title: Effects of harvest aids on seed composition and seed damage in soybean grown in Miss., 32-2019, $23,210

PI: Nacer Bellaloui, nacer.bellaloui@ars.usda.gov

Objective(s): Evaluate effect of application timing of paraquat on seed composition and mineral nutrition, and damage, hardseededneess, wrinkling, and disease infection to and of mature soybean seed.

Duration: Year 1 of 2

Expected Results: Information obtained from this research will determine if paraquat application as a harvest aid adversely affects quality of mature soybean seed.

Title: Developing improved soybean lines for seed composition, quality, and heat tolereance in Miss., 33-2019, $22,210

PI: Nacer Bellaloui, nacer.bellaloui@ars.usda.gov

Objective(s): To phenotype seed composition constituents and seed quality traits, the presence of seed pathogens, and physical characteristics of mature soybean seed in order to identify heat tolerant lines to improve mature seed quality.

Duration: Year 1 of 3

Expected Results: Identifying/development of inbred lines with improved heat tolerance and better seed composition and quality that can be incorporated into a soybean breeding program to develop improved cultivars.

Title: Identification of mycotoxins used in soybean root infection by charcoal rot pathogen and other fungi, 34-2019, $62,961

PI: Maria Tomaso-Peterson, mariat@pss.msstate.edu, MSU-BMBEPP

Title: Determine mechanisms of soybean root infection from the soil reservoir by the charcoal rot pathogen and other fungi by identifying/understanding the range of mycotoxins used by these fungi to facilitate root infection.

Duration: Year 2 of 2

Expected Results: Understanding/identifying mechanism(s) of root infection by soil-borne pathogens that can contribute to development of soybean cultivars that are resistant to these mechanisms.

Title: Provide in-field soybean diagnostic service for Mississippi soybean producers and researchers, 35-2019, $12,500

PI: Billy Moore, wfm1888@aol.com, Private Consultant

Objective(s): To provide soybean disease diagnostic assistance to soybean producers and leaders of MSPB-funded projects.

Duration: Continuous

Expected Results: Disease problems that occur in producer and MSPB-funded project fields will be evaluated to provide disease management assistance to MSU researchers and extension personnel.

Title: Soybean management by application of research and technology (SMART), 36-2019, $210,726

PI: Trent Irby, tirby@pss.msstate.edu, MSU-ES

Objective(s): Identify and apply key management practices that increase soybean production profitability, provide a hands-on educational opportunity to assess profitable best management practices (BMP's) for soybean producers, collect long-term data for determining specific BMP's that consistently increase yields and profits, and promote BMP's that are proven to sustain profitable Mississippi soybean production.

Duration: Continuous

Expected Results: Demonstrating and showcasing BMP's that are proven to consistently and sustainably improve soybean production in all Mississippi regions, and disseminating this information to producers, extension personnel, and consultants.

Title: Completion of molecular characterization of charcoal rot fungus mycoviruses, 37-2019, $23,500

PI: Nina Aboughanem, nja62@msstate.edu, MSU-IGBB

Objective(s): Complete genome sequencing for mycoviruses that naturally infect the charcoal rot fungus (CRF) so that potential sustainable tools can be developed for biocontrol of the CRF.

Duration: Year 3 of 3

Expected Results: Selected isolates that contain viruses with possible virulence toward the CRF will be identified for use in further studies designed to develop possible biocontrol agents for the CFR.

Title: Irrigation scheduling of soybean–A dual threshold method to eliminate yield-reducing stresses and maximize water use efficiency, 40-2019, $38,597

PI: H.C. Pringle, III lpringle@drec.msstate.edu, MSU-DREC

Objective(s): Determine a dual threshold based on heat and moisture deficit-related stresses to use to maximize irrigated soybean yield while simultaneously ensuring the greatest water use efficiency and economic return.

Duration: Year 3 of 3

Expected Results: Irrigation scheduling thresholds will be developed that will ensure proper furrow irrigation in order to minimize both number of irrigations and amount of irrigation water applied to soybeans.

Title: Video support for Mississippi soybean producers, 41-2019, $16,259

PI: Leighton Spann, leightons@ext.msstate.edu, MSU-OAC

Duration: Continuous

Objective(s) Identify important soybean production topics and produce video segments that will provide producers with current, timely information needed to address issues related to those topics; video presentations of results from MSPB-funded research projects that will be posted on the MSSOY YouTube channel

Expected Results: Video segments featuring projects and presentations of results from MSPB-funded projects posted on the MSPB website.

Title: Dicamba volatility under field conditions, 44-2019, $43,475

PI: Dan Reynolds, dreynolds@pss.msstate.edu, MSU–PSS

Duration: Year 2 of 3

Objective(s): 1) Compare volatilities of all available formulations of dicamba, 2) determine the effect of potential tank mix partners on volatility of new dicamba formulations, and 3) determine effect of spray target and temperature on dicamba volatility.

Expected Results: Provide documentation that can be used to make recommendations to alleviate off-target movement of dicamba herbicide products

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Title: Herbicide efficacy and economic return as affected by Precision Agricultural Technology, 45-2019, $46,560

PI: Dan Reynolds, dreynolds@pss.msstate.edu, MSU–PSS

Duration: Year 2 of 3

Objective(s): Compare weed control, application efficiency, drift potential, and economic returns from using various precision spray systems.

Expected Results: Findings that will affect the spray system purchasing decisions of soybean producers in Mississippi

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Title: Evaluation of Palmer amaranth control with summer and winter annual cover crops alone and coupled with herbicides, 46-2019, $40,860

PI: Dan Reynolds, dreynolds@pss.msstate.edu, MSU-PSS

Duration: Year 3 of 5

Objective(s): Evaluation of indigenous and exotic cover crop species for establishment, growth rate, biomass production, and persistence; Evaluation of effect seeding time of summer and winter annual cover crops on pigweed control; and development and evaluation of precision planting practices for planting soybeans into standing cover crops.

Expected Results: Development of an alternative production system that utilizes the best cover crop management practices to control problematic weeds in Mississippi soybeans.

Title: Assessing soybean injury from dicamba applications using multispectral imaging on a small UAV, 48-2019, $13,220

PI: Yanbo Huang, yanbo.huang@ars.usda.gov, USDA-ARS

Duration: Year 2 of 2

Objective(s): Develop a UAV-based multispectral imaging system for assessing injury resulting from dicamba applied at different growth stages and rates to non-dicamba-tolerant soybeans.

Expected Results: Rapid acquisition of data that can be used to determine/assess soybean yield losses resulting from dicamba application at different growth stages to non-tolerant varieties.

Title: Farm Families of Mississippi, MFBF, 50-2019, $15,000

Title: Cover crop and tillage effects on irrigation application efficiency, irrigation scheduling, soil physical properties, runoff, soybean yield, and economic return, 52-2019, $71,353

PI: Jeff Johnson, jjohnson@drec.msstate.edu, MSU-DREC

Duration: Year 5 of 5

Objective(s): Determine the effect of cover crops and tillage alone and combined with each other on irrigation efficiency, soil properties, runoff, and soybean yield and economic return.

Expected Results: Development of BMP's for using a combination of cover crops and tillage system in irrigated soybean production systems.

Title: Evaluation of the effects of flooding on soybean growth and yield, 56-2019, $11,811

PI: Daryl Chastain, drc373@msstate.edu

Duration: Year 1 of 2

Objective(s): Identify physiological mechanisms related to flood tolerance in soybean germplasm, and develop flood-tolerant, high-yielding germplasm that can be used to develop MG III and IV soybean varieties with this trait.

Expected Results: Availability of soybean breeding lines that can be used to develop soybean varieties with improved tolerance to flooding, plus a management guide that can be used by producers to identify and adopt BMP's to deal with flooding.

Title: Management of Redbanded stink bug (RBSB) in Miss. soybean production systems, 58-2019, $56,147

PI: Angus Catchot, acatchot@ext.msstate.edu, MSU-ES

Duration: Year 2 of 3

Objective(s): Determine RBSB damage potential by soybean growth stage, determine insecticidal efficacy to control RBSB, and determine insecticide termination timing to protect soybean yield from RBSB infestations and subsequent damage.

Expected Results: Guidelines for managing RBSB in Miss. soybean fields to prevent yield and seed quality losses.

Title: Characterization of antifungal activity of endophytic bacteria associated with the charcoal rot disease system in soybean, 60-2019, $36,355

PI: Shi-En Lu, sl332@msstate.edu, MSU-BMBEPP

Duration: Year 3 of 4

Objective(s): Develop biologically-based approaches to plant disease management, determine effect of inoculation of bacteria and fungi on charcoal rot disease development on soybean, and characterize the genes associated with this potential antifungal activity

Expected Results: Identification and development of a charcoal rot control package based on microbe-based systems.

Title: Stabilizing dryland soybean yield and profit in dominant soils across Mississippi, 62-2019, $29,125

PI: Gary Feng, gary.feng@ars.usda.gov, USDA-ARS

Duration: Year 3 of 3

Objective(s): Determine cost-effective, optimal management practices to stabilize dryland yield and economic return from soybean grown on the major soil types/growing environments across Mississippi.

Expected Results: Determination/identification of optimum soil management practices that should be used to stabilize yield, production costs, and economic return from dryland soybean production across years.

Title: Characterization of soybean taproot decline pathogen; a new disease and pathogen in Mississippi soybean production fields, 78-2019, $80,972

PI: Maria Tomaso-Peterson, mariat@pss.msstate.edu, MSU-BMBEPP

Duration: Year 4 of 4

Objective(s): Define optimal temperature for pathogen (*Xylaria sp.*) development, evaluate its pathogenicity against soybean, and determine its host range and sensitivity to fungicides.

Expected Results: Determine effect of continuous vs. rotated soybeans on residual *Xylaria* sp. inoculum which may negatively impact pressure from this disease in future soybean production fields, and determine approaches to timing and methods of applications of potential efficacious fungicides to prevent yield loss caused by the pathogen.

Compiled by Larry G. Heatherly, Feb. 2019, larryheatherly@bellsouth.net