

	MISSISSIPPI SOYBEAN PROMOTION BOARD 2018-2019 FUNDED RESEARCH/EXTENSION PROJECTS
Title:	Evaluation of alternative management tactics for early season insect pests of soybeans and impact of seed treatments on stand establishment and replant prevention, 01-2018, \$14,155
PI:	Don Cook, <u>dcook@drec.msstate.edu;</u> MSU-DREC
Objective(s):	Evaluate at-planting insecticides as alternatives to neonicotinoid seed treatments; determine impact of neonicotinoid seed treatments on stand establishment and minimizing risk of replanting
<b>Duration:</b>	Year 3 of 3
Expected Results:	Identify alternatives to neonicotinoid seed treatments, and determine the benefit of seed treatments for minimizing failed stands/replanting.
Title:	Refinement/validation of soybean looper thresholds in Miss. Soybeans, 02-2018, \$52,338
PI:	Don Cook, <u>dcook@drec.msstate.edu;</u> MSU-DREC
Objective(s):	Refine/validate soybean looper thresholds in soybeans, evaluate alternative insecticides (non- diamide products) for looper management, and monitor response of soybean looper populations to diamide insecticides in lab. assays.
<b>Duration:</b>	Year 2 of 3
Expected Results:	Refinement/validation of management strategies for soybean looper infestations in soybeans.
Title:	Cover Crop-Minimal Tillage (CCMT) production system evaluation, 04-2018, \$106,938
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, and 3) assessment of N-fixation potential in soils under these systems to improve N management strategies in high-yielding (irrigated) soybean production systems.
<b>Duration:</b>	Year 1
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, 06-2018, \$73,821
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 2 of 4 **Expected** Demonstration of the agronomic and economic implications from adding or omitting various **Results:** technologies, both alone and in combination, associated with proven yield enhancement of soybean Title: Using weeds as a resource to develop herbivore-resistant soybean, 08-2018, \$65,173 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 2 of 3 **Expected** Field testing of extracts from various weed species will identify candidate species that have Results: anti-herbivory potential. Title: Understanding in-field soil moisture variability and its effect on irrigation, 10-2018, \$62,631 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 1 of 3 **Expected** Determination of placement and density of soil moisture sensors needed within non-Delta **Results:** irrigated fields to ensure application of evenly distributed irrigation to soybeans. **Title:** Practical application of sensor-based irrigation scheduling method in soybean, 11-2018, \$20,000 PI: Ruixiu Sui, ruixiu.sui@ars.usda.gov; USDA-ARS **Objective(s):** Develop practical applications for using soil moisture sensors to schedule soybean irrigation; compare soil moisture sensor-based scheduling with Arkansas Irrigation Scheduler **Duration:** Year 3 of 3 **Expected** Guidelines for using soil moisture sensors to schedule soybean irrigation-to include sensor **Results:** installation, data collection, and data interpretation-so that resulting data can be used to schedule most efficient irrigation.



- **Title:** Influence of cover crops on early season insect pest dynamics in Mississippi soybeans, 13-2018, \$50,121
  - PI: Angus Catchot, acatchot@ext.msstate.edu; MSU-ES
- **Objective(s):** Determine 1) influence of cover crops on early-season insect pest dynamics, 2) how cover crops affect efficacy of foliar spray programs for control of early-season insect pests, and 3) effect of cover crops on growth and yield of soybeans in conjunction with IPM insect control programs.
  - **Duration:** Year 3 of 4
  - Expected Information on the effect (risks or benefits) of cover crops use on early-season insect management strategies in soybean production systems, and guidelines to manage insect-related risks if they occur.
    - **Title:** Determination of organisms affecting soybean seed quality and fungicide efficacy in reducing associated losses, 14-2018, \$61,176
      - 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 1 of 3
  - **Expected** 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, 18-2018, \$40,838
      - 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 3 of 3



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 root-knot nematode, 19-2018, \$39,414
PI:	Tom Allen, <u>tallen@drec.msstate.edu</u> , MSU-DREC
Objective(s):	Evaluate Miss. OVT entries for resistance to Cercospora blight and frogeye leaf spot (natural infestations), stem canker (inoculated trials), and root-knot nematode (naturally infested field, if available); and collect and maintain stem canker isolates from infestations (when they occur) throughout Mississippi.
<b>Duration:</b>	Continuous
Expected Results:	Data that will provide producers information about the level of varieties' disease/nematode resistance and/or susceptibility so that tolerant/resistant varieties can be selected to avoid yield losses associated with the above pathogens.
Title:	Weed management programs for Mississippi soybean production, 20-2018, \$91,019
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; characterize soybean performance following exposure to rates of dicamba; assess management of GR Italian ryegrass in soybeans with cover crops, different planting dates, and applications of residual herbicides
<b>Duration:</b>	Year 2 of 3
Expected Results:	Identification/development 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 that provide new weed management options.
Title:	Effect of cover cropping systems on dryland soybean plant vigor, growth, and yield, 21-2018, \$62,328
PI:	Mark Shankle, shankle@ra.msstate.edu, MSU-PRFBES
Objective(s):	Determine the effects of cover cropping systems on dryland soybean growth and yield, soil health, and determine their potential economic benefit
<b>Duration:</b>	Year 2 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, 22-2018, \$57,062
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; evaluate potential soil test variability associated with soybean rotations and possible need to adjust soil test recommendations based on rotational crop history.
<b>Duration:</b>	Year 2 of 3
Expected Results:	Updated P, K, and S fertilization recommendations for soybeans grown in monocropped and rotational cropping systems.
Title:	Enhancement of Mississippi Soybean Variety Trials through entry standardization, 23-2018, \$32,317
PI:	Brad Burgess, bburgess@pss.msstate.edu, MSU-MAFES
Objective(s):	Conduct standardized soybean variety trials at multiple Mississippi locations.
<b>Duration:</b>	Continuous
Expected Results:	
Title:	Incorporating crop rotation decisions into a comprehensive model of soybean yields, 28-2018, \$34,076
PI:	Andrew Stevens, <u>a.stevens@msstate.edu</u> , 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.
<b>Duration:</b>	1 year initial project, with potential follow-up
Expected Results:	Provide soybean producers with information about how specific crop rotations with soybeans can increase yield and profit.
Title:	Delta Agricultural Weather Center, 29-2018, \$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



-	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:	A novel technique to measure dicamba and glyphosate drift and influence of new formulations on dicamba absorption in dicamba-resistant soybean, 30-2018, \$15,000
PI:	Vijay Nandula, <u>vijay.nandula@ars.usda.gov</u> , USDA-ARS
Objective(s):	Use addition of a fluorescent additive to herbicide sprays to measure dicamba and glyphosate drift, and determine influence of new formulations of dicamba on absorption and retention in dicamba-resistant soybean.
<b>Duration:</b>	Year 1 of 1
-	Refined methodology to detect herbicide drift away from application site, and baseline knowledge on the amount of potential drift following dicamba applications.
Title:	Evaluation of soybean breeding lines for resistance to Phomopsis seed decay (PSD) and for high seed germinability, 31-2018, \$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
<b>Duration:</b>	Year 3 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:	Identification of mycotoxins used in soybean root infection by charcoal rot pathogen and other fungi, 34-2018, \$60,756
PI:	Hamed Abbas, hamed.abbas@ars.usda.gov, USDA-ARS
Objective(s):	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
<b>Duration:</b>	Year 1 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, 35-2018, \$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 Disease problems that occur in producer and MSPB-funded project fields will be evaluated **Results:** to provide disease management assistance to MSU researchers and extension personnel. Title: Soybean management by application of research and technology (SMART), 36-2018, \$194,228 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), 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** Demonstrating and showcasing BMP's that are proven to consistently and sustainably **Results:** improve soybean production in all Mississippi regions, and disseminating this information to producers, extension personnel, and consultants. **Title:** Quest for an alternative, environmentally friendly control method for charcoal rot fungus: mycoviruses, 37-2018, \$30,500 PI: Nina Aboughanem, nja62@msstate.edu, MSU-IGBB **Objective(s):** Identify and characterize mycoviruses that naturally infect the charcoal rot fungus (CRF) so that potential sustainable tools can be developed for biocontrol of the CRF. **Duration:** Year 2 of 2 **Expected** Selected isolates that contain viruses with possible virulence toward the CRF will be **Results:** 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, 40-2018, \$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



- -

<b>Duration:</b>	Year 2 of 3
-	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
Title:	Video support for Mississippi soybean producers, 41-2018, \$16,258
PI:	Leighton Spann, leightons@ext.msstate.edu, MSU-OAC
<b>Duration:</b>	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 MSPB website ( <u>www.mssoy.org</u> )
-	Video segments featuring projects and presentations of results from MSPB-funded projects posted on the MSPB website.
Title:	Dicamba volatility under field conditions, 44-2018, \$42,854
PI:	Dan Reynolds, <u>dreynolds@pss.msstate.edu</u> , MSU-PSS
<b>Duration:</b>	Year 1 of 2
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.
-	Provide documentation that can be used to make recommendations to alleviate off-target movement of dicamba herbicide products
Title:	Herbicide efficacy and economic return as affected by Precision Agricultural Technology, 45-2018, \$46,657
PI:	Dan Reynolds, <u>dreynolds@pss.msstate.edu</u> , MSU-PSS
<b>Duration:</b>	Year 1 of 3
Objective(s):	Compare weed control, application efficacy, drift potential, and economic returns from using various precision spray systems.
Expected Results:	
Title:	Evaluation of Palmer amaranth control with summer and winter annual cover crops alone and coupled with herbicides, 46-2018, \$40,235
PI:	Dan Reynolds, <u>dreynolds@pss.msstate.edu</u> , MSU-PSS



## <u>WWW.MSSOY.ORG</u> → MSPB WEBSITE WITH UP-TO-DATE SOYBEAN PRODUCTION INFORMATION

**Duration:** Year 2 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** Development of an alternative production system that utilizes the best cover crop Results: management practices to control problematic weeds in Mississippi soybeans. **Title:** Ultra-low altitude plant sensing through UAV's with portable hyperspectral imagers for detection of glyphosate-resistant and susceptible weeds in soybean fields, 47-2018, \$19,972 PI: Yanbo Huang, yanbo.huang@ars.usda.gov, USDA-ARS **Duration:** Year 2 of 2 **Objective(s):** Develop a UAV-based hyperspectral system for differentiating GR weeds from GS weeds in soybean fields: determine optimal flight altitude, classify GR and GS weeds using fieldacquired hyperspectral data, map GR and GS weed distribution based on this classification, and evaluate the technical and economic feasibilities of UAV imaging systems for this purpose. **Expected** Combining hyperspectral sensing techniques with UAV's to provide rapid, consistent, and Results: accurate field identification of GR and GS weed populations in soybean fields in order to implement site-specific weed management practices. **Title:** Assessing soybean injury from dicamba applications using multispectral imaging on a small UAV, 48-2018, \$13,220 PI: Yanbo Huang, yanbo.huang@ars.usda.gov, USDA-ARS **Duration:** Year 1 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** Rapid acquisition of data that can be used to determine/assess soybean yield losses resulting **Results:** from dicamba application at different growth stages to non-tolerant varieties. Title: Maturity stage estimation with UAV systems, 49-2018, \$23,548 PI: Joby Czarnecki, (joby.czarnecki@msstate.edu), MSU-GRI **Duration:** Year 1 of 1 **Objective(s):** Evaluate the ability of UAV systems to determine when soybean have reached stages (R6/6.5) sufficient for harvest aid application, as well as other agronomically important growth stages used for the timing of management inputs.



## $\frac{\text{SPB}}{\text{SPB}}$ $\frac{\text{WWW.MSSOY.ORG}}{\text{WWW.MSSOY.ORG}} \rightarrow \text{MSPB WEBSITE WITH}$ $\frac{\text{WWW.MSSOY.ORG}}{\text{UP-TO-DATE SOYBEAN PRODUCTION}$ $\frac{\text{INFORMATION}}{\text{INFORMATION}}$

Expected Results:	A tool and concomitant methodology/user protocol that can be used to make a whole-field determination of near-maturity and mature soybean growth stages.
Title:	Farm Families of Mississippi, MFBF, 50-2018, \$15,000
Title:	Cover crop and tillage effects on irrigation application efficiency, irrigation scheduling, soil physical properties, runoff, soybean yield, and economic return, 52-2018, \$70,772
PI:	Jeff Johnson, jjohnson@drec.msstate.edu, MSU-DREC
<b>Duration:</b>	Year 4 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:	Row crop irrigation science extension and research (RISER) program, 55-2018, \$99,090
PI:	Jeff Johnson, jjohnson@drec.msstate.edu, MSU-DREC
<b>Duration:</b>	Continuous
Objective(s):	Work with Mississippi soybean producers to apply/install irrigation best management practices (BMP's) using onsite farm application and training programs to transfer and facilitate wide-spread adoption of these BMP's and complementary water conservation tools.
Expected Results:	Increased adoption of irrigation BMP's by soybean producers through hands-on activities with Mississippi producers who irrigate soybeans.
Title:	Management of Redbanded stink bug (RBSB) in Miss. soybean production systems, 58-2018, \$56,161
PI:	Angus Catchot, acatchot@ext.msstate.edu, MSU-ES
<b>Duration:</b>	Year 1 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.
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, 60-2018, \$53,923
PI:	Shi-En Lu, sl332@msstate.edu, MSU-BMBEPP



<b>Duration:</b>	Year 2 of 2
Objective(s):	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, 62-2018, \$29,125
PI:	Gary Feng, gary.feng@ars.usda.gov, USDA-ARS
<b>Duration:</b>	Year 2 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:	On-farm, interactive soybean Management Verification Program (MVP), 63-2018, \$61,552
PI:	MSU-DREC-ES
<b>Duration:</b>	Continuous
Objective(s):	Work with growers to increase adoption of MSU-ES recommendations by soybean producers in Mississippi to increase profitability and efficiency of soybean production on individual farms
Expected Results:	Adoption of MSU-ES best management practices by multiple grower participants, which will eventually lead to widespread adoption of these practices
Title:	Maximizing soybean yield in Mississippi: Influence of plant populations, seed treatment, and stand loss on overall profitability, 74-2018 (Moore Fellowship), \$71,970
PI:	Angus Catchot, acatchot@ext.msstate.edu, MSU-ES
<b>Duration:</b>	Year 3 of 3 (Started Jan. 1, 2016–ends Dec. 31, 2018)
Objective(s):	Effect of plant population (with precision planting), seed treatments, and planting date on soybean yield; identification of alternatives to neonicotinoid seed treatments; and effect of stand loss (often caused by insects) and timing of stand loss in different plant populations on soybean yield



## WWW.MSSOY.ORG → MSPB WEBSITE WITH UP-TO-DATE SOYBEAN PRODUCTION INFORMATION

Expected Results:	Identify plant populations that will maximize soybean yield potential from differing soybean production systems, provide information on potential replacement products or practices for neonicotinoid seed treatments, and provide information that can be used to make replant decisions that are specific to specific plant populations.
Title:	Characterization of soybean taproot decline pathogen; a new disease and pathogen in Mississippi soybean production fields, 78-2018, \$67,755
PI:	Maria Tomaso-Peterson, mariat@pss.msstate.edu, MSU-BMBEPP
<b>Duration:</b>	Year 3 of 3
Objective(s):	Define optimal temperature for pathogen ( <i>Xylaria sp.</i> ) development, evaluate its pathogenicity against soybean, and determine its host range and sensitivity to fungicides.
Expected Results:	A description of the timing of interaction between the soybean host and the taproot decline pathogen, and determine approaches to timing and methods of fungicide applications to prevent yield loss caused by the pathogen.
Title:	Mississippi soybean forum, 80-2018, \$10,000
PI:	Gip Carter, gcarter873@bellsouth.net, President, MSA
<b>Duration:</b>	Year 3
Objective(s):	Provide a venue and program to discuss topics pertinent to soybean production in Mississippi, and to recognize Miss. Soybean Yield Contest winners
-	Presentation and discussion of topics pertinent to soybean production in Mississippi, and recognition of winners of Mississippi Soybean Yield Contest.
Title:	Mississippi soybean yield contest, 82-2018, \$22,000
PI:	Gip Carter, gcarter873@bellsouth.net, President, MSA
<b>Duration:</b>	Year 2
Objective(s):	Promote soybean production in Mississippi by having a yield contest that provides insight into producer practices/BMP's used to obtain high yields
Expected Results:	A yield contest summary that identifies high-yield winners and other top entries, and their production practices used to achieve the winning yields.

Compiled by Larry G. Heatherly, Feb. 2018, <u>larryheatherly@bellsouth.net</u>