
# 2022 Arkansas Checkoff-Funded Research Report

ARKANSAS SOYBEAN PROMOTION BOARD

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## YOUR CHECKOFF INVESTMENT

When high-yielding harvests are not enough to secure success for today's soybean producers, checkoff dollars help ensure a strong, profitable future for producers by driving demand at home and abroad.

Administered by the *United Soybean Board*, producers invest 0.5% market price per bushel, known as a checkoff, into a fund. Used for research, market development, promotion and expansion, the *Arkansas Soybean Promotion Board* manages half of all checkoff dollars collected in the state and the USB adds the rest to the national checkoff fund.

Led by 78 volunteer farmers and directors, the USB is based in St. Louis, Missouri with activities monitored by paid staff. Nominated by their state's soybean board, or Qualified State Soybean Boards, they are appointed by the U.S. Secretary of Agriculture. Three members of the USB's board of directors hail from Arkansas.

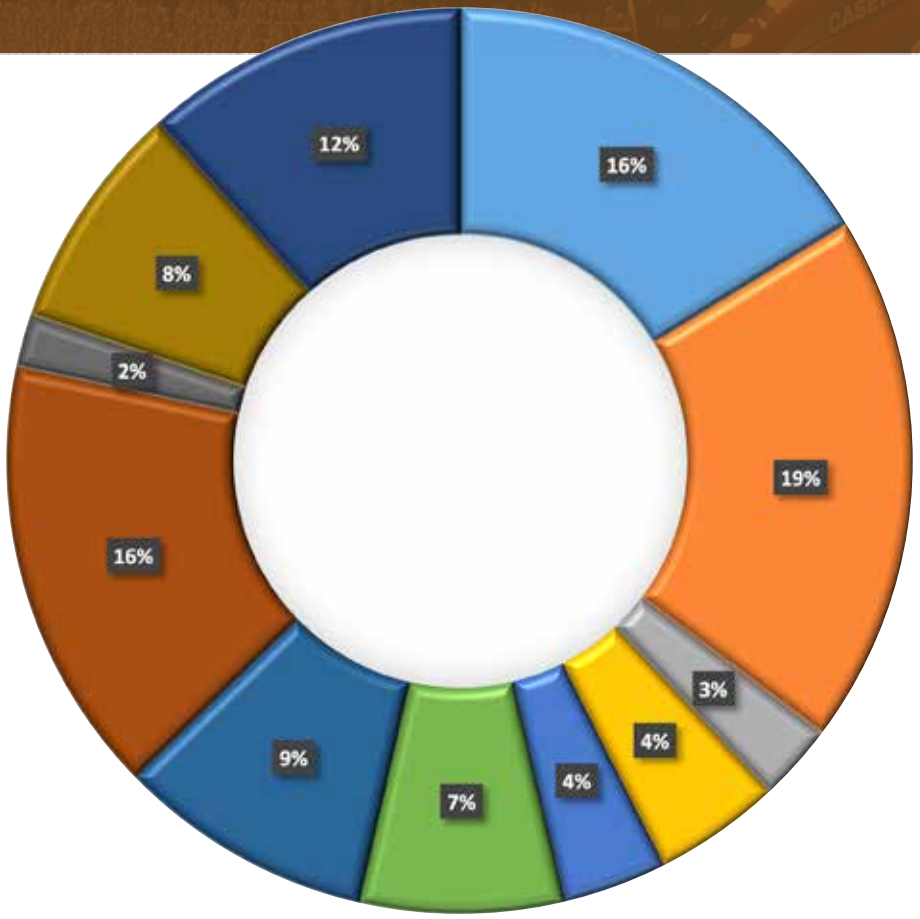
## SOYBEANS IN ARKANSAS

Traditionally one of the largest agriculture enterprises in the state with more than 3 million acres of soybean fields in 56% of the counties, Arkansas ranks 11th in soybean production in the country.

- Animal agriculture is the number one customer of soybean, 98% of soybean meal feeds livestock and poultry.
- Broiler chickens consume about 40% of the domestic supply of soybean meal.
- Approximately 30% of soybeans are considered a double crop. Following spring's wheat harvest, soybeans are planted, allowing the harvest of two row crops in one year.
- Optimum planting in Arkansas is between May 5 – July 5 and soybeans will be harvested between October 15 and November 20.
- Irrigation-furrow via flood and sprinkler is common practice across more than 2 million acres of soybeans.

# 2022 ARKANSAS SOYBEAN PROMOTION BOARD RESEARCH ALLOCATIONS

*Approved March 2022*




| | |
|---|---|
| Agronomy | $395,351 |
| Breeding | $464,648 |
| Economics | $67,233 |
| Education | $110,815 |
| Entomology | $90,701 |
| Fertility | $177,550 |
| Irrigation | $222,500 |
| Plant Pathology | $380,894 |
| Post Harvest | $46,023 |
| Verification | $199,087 |
| Weeds | $282,697 |
| Research Total | $2,437,499 |

# Meet the Board Members

### DONALD MORTON JR., CHAIRMAN

Donald Morton Jr. never wondered about the path he would take. Farming was a part of his past, and he wanted it for his future. A third-generation farmer, Donald started on his own in 1992 with 800 acres. After 29 years, his operation has grown 275% to 3,000 acres. He shares it with his wife, their children and their grandchildren. Donald hopes to see farming continue in his family.

### JOHN FREEMAN, VICE CHAIRMAN

When John Freeman said goodbye to his hometown of Dumas, Arkansas and hit the road to attend college almost eight hours away, he had little interest in careers outside of farming. He grew up on a farm and helped his dad in high school. And as the saying goes, "Farming gets in your blood." In 1989, after graduating from the University of Arkansas with an ag business degree, he planted his first crop.

His dad wasn't the best at yields, but he instilled a great farm ethic in John. John also credits Phil Tacker and Lanny Ashlock for influencing his approach to farming. But most of what John learned came from hands-on experience in the fields. He said, "It's one thing to sit in a class. It's another to apply textbook and practical knowledge."

### DOUG HARTZ, SECRETARY

For those in the soybean industry, the Hartz name started it all. For Doug Hartz, his last name means the tradition his grandfather, Jacob Hartz Sr., started 95 years ago when he planted the first soybean crop in Arkansas. Doug says, "It's pretty awesome to know your grandfather introduced soybeans to Arkansas in 1926."

In college, Doug majored in agronomy and minored in business. After graduating, he worked in the family seed business, Hartz Seed Company, before moving to Hartz Agriculture Services, the family's farm management and real estate business. Farming the land the family owned and the land they managed, Doug served as a field agronomist and salesman.

Today, Doug is keeping the family business going and keeping the Hartz name in Arkansas soybeans by serving as the eyes and ears of the land and assets Hartz Agriculture Services manages.

### RUSTY SMITH

Rusty Smith was raised with respect for agriculture, but he didn't grow up on a farm. His father worked for the University of Arkansas Division of Agriculture Extension Service, and Rusty earned his bachelor of science in agronomy. After graduation, he began working in chemical sales with a regional company. In 1989, Rusty found his love of farming and he's followed that path every day since with his wife Sarah, who is a third-generation farmer.

## BOARD MISSION

*The Arkansas Soybean Promotion Board consists of soybean producers nominated by various producer organizations within Arkansas and appointed by the governor.*

*The Arkansas Soybean Promotion Board was established to improve the sustainability and profitability of the soybean industry in Arkansas. This board is responsible for distributing funds from the checkoff.*

### JOSH CURETON

As a sixth-generation farmer, Josh Cureton has been working alongside his family on their property near Cash, Arkansas his whole life. According to him, farming is in his blood, and it is something he's known he has wanted to do since a very early age.

Josh gained the practical skills it takes to grow a crop from his father, and supplemented that knowledge with a bachelor's degree in agriculture he earned at Arkansas State University, where he graduated cum laude.

For Josh, his interest in agriculture stems from his love of growing things and watching new life emerge. This extends to his family, to which he says his work is dedicated, remarking how his efforts allow him to provide his wife and children a good life and opportunities for the future.

### WEST HIGGINBOTHOM

West Higginbothom is a third-generation farmer who returned to his family's Marianna farm in 2009. When he graduated from the University of Arkansas, West wasn't ready to return to farm life, and his father encouraged him to try a career outside of agriculture.

After college, he took his degree in business finance and insurance to a Washington, D.C., mailroom. He paid his dues and was eventually called up to work in ag policy for three different senators, including Arkansas's Blanche Lincoln. He then helped Georgia's Zell Miller with the 2002 Farm Bill before working exclusively for Mississippi's Thad Cochran.

Time ticked by, and the clock struck 10 years. West and his wife, who met in D.C., were ready to start a family and decided to move closer to their own. West got to keep his fingers in agriculture through farm bills, but he was ready to rejoin his father on the farm.

### DEREK HELMS

When it comes to understanding the complexity of the agriculture industry, Arkadelphia dairyman and soybean producer Derek Helms is one of the most well-versed advocates around. Managing a diversified operation in Clark County has given Derek valuable insight into the many ways in which soybeans are marketed and utilized; from livestock feeds to biodiesel and everything in between. As a member of the Arkansas Soybean Promotion Board, Derek's goal is to facilitate a greater connection between our farmers, researchers, and consumers while promoting opportunities that showcase the versatility of soybeans.

Derek holds an ag business degree from Southern Arkansas University and is a board member of his local Farm Bureau and the Clark County Cattlemen's Association. He enjoys educating people about the soybean industry as much as he does learning about the latest research and advancements in soybean production. However, his favorite part about being a soybean producer is harvesting his crop and reaping the reward of his hard work each year.

### JOE THRASH

Joe Thrash said he spent his childhood on the farm with his dad, wearing the paint off the fenders of a few tractors. A third-generation farmer, he didn't know what else there was to do, but after high school, Joe packed up and headed to the University of Arkansas to pursue a career in agronomy. It didn't take long for him to realize home is where the farm is.

### SHANNON DAVIS

Shannon Davis is a soybean grower from Bono, Arkansas. Davis has served on the Arkansas Soybean Promotion Board for nine years and is active in a variety of leadership roles in his community.

RESEARCH FEATURE

# Managing Worms, Bugs and Slugs in Soybean

*By Laura Temple, Soybean Research Information Network*

As farmers adopt management practices to improve soybean production, insects take advantage of favorable environments and food sources.

"In Arkansas, insect management continues to be a major focus for growers and consultants," says Dr. Ben Thrash, assistant professor and Extension entomologist, focusing on integrated pest management (IPM) in row crops for the University of Arkansas System Division of Agriculture. "We are addressing various aspects of integrated management of problem pests in soybean production and finding solutions for farmers to effectively and economically protect soybean yield and quality."

The research behind identifying solutions to insect challenges is being funded by the Arkansas Soybean Promotion Board. Thrash and his team are putting these soy checkoff dollars to work in various practical trials identifying and refining answers to current questions about managing in-season worms, protecting soybeans from potential insect infestations in cover crops, controlling slugs early in the season and more.


"Adoption of reduced tillage, cover crops, early season planting and other practices have caused changes in insect management," Thrash says. "We want to be sure growers and consultants have the information and tools they need to adjust insect management appropriately."

*"We want to be sure growers and consultants have the information and tools they need to adjust insect management appropriately."*

## IDENTIFYING THRESHOLDS AND GUIDELINES FOR VIRUS INSECTICIDES

Southern farmers have found great value in the use of a nucleopolyhedrovirus (NPV) strain to control corn earworm, also known as soybean podworm in soybeans or cotton bollworm in cotton. The viral insecticide carries the trade name Heligen, which works a bit differently than traditional insecticides.

"The virus sickens the worms so they stop feeding fairly quickly, but it takes four to six days for them to die," Thrash explains. "We are used to insecticides that control target pests within hours, so this creates a big learning curve for consultants and farmers."

Because of how the virus works, he has found that worm density and size should determine how best to control corn earworm in soybeans. Based on research, he recommends using the viral treatment when scouting finds three to five worms in 25 sweeps that are less than ½-inch.

"The virus should be applied earlier than standard insecticide timing," he says. "It doesn't work well in high worm density situations, so if there are more or larger corn earworms, we recommend a standard insecticide."

Viral insecticides are less expensive, and they can be used in any cropping system, including organic production. They also persist in the field longer than traditional insecticides.

"Viruses don't have true residual, but as worms sicken, the virus reproduces and is present to infect other worms," Thrash explains. "I've seen viruses provide protection from new infestations for a month or more."

He adds that viral strains are specific to a target pest, so they only control one species, leaving beneficial insects in the field. His team is also currently supporting development of viral insecticides to control soybean looper and fall armyworm.

## PROTECTING SOYBEANS FOLLOWING COVER CROPS

Cover crops provide many benefits for long-term soil health and sustainability. However, cover crop biomass sometimes attracts insects that can damage the following crop.

"Cover crops don't always cause insect problems, but it is hard to predict when problems may show up," Thrash says. "Cereal cover crops can foster soil insects, while legume cover crops may attract cutworms or threecornered alfalfa hoppers. And, it can be hard for insecticides to penetrate cover crop residue in the field, reducing efficacy."

His team compared use of an insecticide seed treatment in soybeans to manage potential insect problems. Regardless of active ingredient or field conditions, they found that insecticide seed treatments increased soybean yield 1.8 bushels per acre compared to plots without an insecticide seed treatment.

"We saw a benefit with insecticide seed treatments when planting soybeans into both cover crops and fallow ground," he notes. "That has become our recommendation, especially in cover crop systems."

## STUDYING ECONOMIC SLUG CONTROL

According to Thrash, slugs have become an increasing problem in Arkansas soybeans.

"We've had very wet springs, creating a favorable environment for slugs," he says. "Many fields are in no-till or minimum-till systems, and slugs like to hide

in that crop residue. Tillage can control slugs, but that isn't an option for some growers."

Molluscicides, commonly called slug bait, can be very expensive, so Thrash and Dr. Nick Bateman have been investigating ways to reduce the cost of control. They are looking at reduced rates, banding applications over the row, edge-of-field slug control and more. Soy checkoff funding will accelerate the progress of this work in 2022.

"Slug bait can cost as much as $30 per acre at the recommended application rate," he adds. "We've seen some promise with banded applications, and we will continue to explore both rates and timing. And, we will compare the costs of what we learn with the cost of replants to develop sound recommendations."

## INVESTIGATING INSECT CONTROL IMPROVEMENTS

Thrash constantly looks for additional ways research can help farmers improve insect management. For example, one of his students is currently investigating how water hardness and pH impact insecticides. Current greenhouse research is testing how water quality impacts the length of insecticide residual control.

"We know water hardness impacts herbicide efficacy, but we haven't looked at similar issues with newer insecticides," he explains. "We are currently trying to identify and define issues, like the potential for chlorantraniliprole to break down in water with high pH or high hardness. Once we know the challenges, we will look for solutions."

"It is good practice to evaluate insect thresholds every 10 to 15 years because management practices and genetics change," Thrash says. "We want to be sure farmers control pests to protect yield while still maintaining profitability." ■

# AGRONOMY

## The Arkansas Discovery Farm Program

**INVESTIGATORS:**
Mike Daniels,
Andrew Sharpley

**GOAL:** Document sustainable and viable row-crop farming systems on real, working farms that promote agricultural profitability and natural protection.

**VALUE TO SOYBEAN INDUSTRY:** Little to no data exists that addresses natural resource sustainability associated with row crop agriculture in Arkansas. 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.

## Developing Profitable Irrigated Rotational Cropping Systems for Arkansas

**INVESTIGATORS:**
Jason Kelley, Jeremy Ross

**GOAL:** Evaluate economics and feasibility of eight rotational cropping systems under irrigated conditions at the Lon Mann Cotton Branch Station near Marianna.

**VALUE TO SOYBEAN INDUSTRY:** Long-term crop rotation studies involving corn/soybean rotations have primarily been confined to the Midwest. In Arkansas and the Mid-South region, most of the crop rotation studies in past years have focused on cotton. Past research typically has shown a 5-15% greater cotton yield the year following corn. Reasons listed for increased cotton yields generally involved reduction in reniform nematodes, less disease pressure and/or increased soil fertility, or unknown reasons. As cotton acreage declines and soybean, corn, grain sorghum and wheat are planted on those acres, and as corn acreage expands into typical rice/soybean rotation systems, more information is needed for producers as to which crop rotation sequence produces the greatest yields and profitability under Mid-South irrigated conditions.

## Field-Based Determination of Chloride Tolerance in Soybeans

**INVESTIGATOR:**
Trenton Roberts

**GOAL:** Implement a field-based assessment of chloride tolerance in soybean which will provide a more accurate representation of which soybean cultivars are classified as includers, excluders and mixed reaction types.

**VALUE TO SOYBEAN INDUSTRY:** Clarifying whether a variety is truly a Cl includer or excluder is important to soybeans produced on poorly drained soils in areas with irrigation water having high Cl (most of eastern Arkansas). The current greenhouse screening method does not provide a robust rating system for varieties. A field screening technique is logical, time efficient, and a method that can be easily adopted by any seed company for in-house variety screening. The data collected from these trials will be compiled with other cultivar evaluation to provide Arkansas soybean producers with reliable field-based information to make well informed cultivar selection decisions.

## Influence of Cover Crops and Soil Health on Soybeans

**INVESTIGATOR:**
Trenton Roberts

**GOAL:** To investigate the short-term and long-term benefits of cover crop implementation on corn and soybean yield, nutrient use efficiency, water use efficiency and soil health.

**VALUE TO SOYBEAN INDUSTRY:** Winter cover crops have been promoted based on the environmental benefits of reduced erosion and nutrient loss. Limited work has been done to date on species selection and cultural management practices for effective use of winter cover crops in Arkansas corn and soybean rotational systems. Identifying the correct species, planting date and fertilization needs are essential for effective cover crop use and continued profitability of our soybean production systems. Costs and challenges of winter cover crops will be easily offset by:

1) the potential decrease in fertilizer needs
2) improved soil conditions that lead to better growth or reduced irrigation needs and
3) reduction in environmental impacts that threaten the long-term sustainability of Arkansas corn and soybean production.

Inclusion of winter cover crops can have both short-term and long-term impacts on corn and soybean production. Understanding cover crop species selection and cultural management practices is one of the most important steps in realizing the benefits of their effective use.

## Improving Technology Transfer for Profitable and Sustainable Soybean Production

**INVESTIGATOR:**
Jeremy Ross

**GOAL:** To ensure the timely development and distribution of the Soybean Update and other soybean production publications. Improve the rate of technology transfer and adaption by the implementation of educational programs that impart critical decision-making information. Continue to coordinate state and regional meetings to facilitate the latest soybean production updates. Publication of the Soybean Research Series.

# AGRONOMY

**VALUE TO SOYBEAN INDUSTRY:** Each year, the University of Arkansas Division of Agriculture tests over 200 different soybean varieties and experimental lines. Timely distribution of this information is vital for producer decision making of varieties. Every three years, Arkansas hosts the Tri-State Soybean Forum, which brings in soybean producers and industry personnel from Arkansas, Louisiana, and Mississippi to hear current research results. The Arkansas Soybean Research Series is a repository for yearly research results from projects funded by the Arkansas Soybean Promotion Board. Available at: https://arkansascrops.uada.edu/default.aspx

## Investigating Emerging Production Recommendations for Sustainable Soybean Production

**INVESTIGATORS:** Jeremy Ross, Gus Lorenz

**GOAL:** Investigate new and untested management inputs to improve soybean production.

**VALUE TO SOYBEAN INDUSTRY:** Each year Arkansas soybean producers are encouraged by industry representatives and salesmen to implement new and often untested management inputs to improve soybean production. The lack of an effective testing program for these materials can lead to uninformed applications.


This project seeks to test products and agronomic practices, develop production recommendations and provide scientifically tested results to growers for considerations on their own operations.

# BREEDING

## Purification and Production of Pre-Foundation Seed of UA Soybean Lines

**INVESTIGATORS:** Leandro Mozzoni and John Carlin

**GOAL:** Purify and increase breeder seed of promising breeding lines in preparation of release. Test purity and adventitious presence in advanced breeding lines and proposed releases.

**VALUE TO SOYBEAN INDUSTRY:** Maintain the genetic purity of UA soybean breeding lines and cultivars, and provide high-quality products to seed dealers and Arkansas farmers.

## Utilizing Chloride Tolerance Markers and Phenotypes to Develop Improved Varieties

**INVESTIGATORS:** Ken Korth, Leandro Mozzoni

**GOAL:** Develop tools and soybean breeding materials that will result in improved selection of existing varieties, and/or development of new varieties, with enhanced tolerance to environmental stresses such as chloride toxicity.

**VALUE TO SOYBEAN INDUSTRY:** Breeding lines have been regularly screened for chloride uptake and salt sensitivity, and the best evidence for impact has been the release of multiple varieties that are chloride-excluders for commercial production. Our recent work on DNA markers should help us determine the accuracy of variety designations as includer vs. excluder, and to know the level of salt-tolerance variation within populations.

## Breeding Soybean Under Reduced Irrigation Conditions

**INVESTIGATORS:** Leandro A. Mozzoni, Larry C. Purcell, Christopher G. Henry

**GOAL:** Assess if different irrigation conditions at reproductive stages influence the breeding decisions of prioritizing populations and selection within breeding populations.

**VALUE TO SOYBEAN INDUSTRY:** Help breeders understand how to better breed and select for soybean cultivars adapted to various water regimes, and to develop a practical genomic selection tool that allows for the effective selection for yield and drought traits that are controlled by a large number of genes.


## Soybean Germplasm Enhancement Using Genetic Diversity

**INVESTIGATOR:** Leandro Mozzoni

**GOAL:** To introduce genetic diversity for yield from exotic plant introductions (PIs) and from elite germplasm into high-yielding lines adapted to Arkansas environments. Incorporate unique traits of interest, including grain quality, disease and stress tolerance, early maturity and indeterminacy from diverse germplasm into elite Arkansas cultivars and lines using various breeding and selection schemes.

**VALUE TO SOYBEAN INDUSTRY:** Increase yield potential by developing locally-adapted cultivars/germplasm with diverse genetic traits for yield, maturity, increased adaptation, stress tolerance, pest and disease resistance, and quality attributes.

## Utilization of Winter Nursery for Soybean Line Development through Back-Crossing

**INVESTIGATOR:** Jeff Edwards
*(Photo courtesy of U of A System Division of Agriculture)*

**GOAL**: To utilize winter nurseries to convert MG4 breeding lines into Enlist-E3® or other herbicide technologies to support MG4 variety development.

**VALUE TO SOYBEAN INDUSTRY**: The UofA soybean breeding program has provided high-yielding conventional MG5 and MG4 cultivars at low costs to growers, but it needs to expand rapidly the footprint in traited herbicide-resistant cultivars. Supplementing the breeding efforts by generating a fourth wave of conversions into Enlist-E3® will enable the program to build a pipeline of traited materials without further straining the genetic gain realized in the conventional breeding program.

*2022 Soybean Breeding Team - From Left to right: Chengjun Wu, Ali Ablao, Daniel Rogers, Liliana Florez, Joshua Winter, Elaine Batista, Derrick Harrison, and Andrea Acuña.*

## Evaluation and Identification of Early-Maturing Soybean with Drought and Heat Tolerance

**INVESTIGATORS:** Larry Purcell, Leandro Mozzoni

**GOAL:** Develop breeding lines from populations segregating for drought tolerant traits. Evaluate yields of elite lines selected for high water use efficiency and high germinability. Introgress heat tolerance, high germinability into the UA Soybean Breeding program.

**VALUE TO SOYBEAN INDUSTRY:** Early-planted and early-maturing (MG 3 and 4) soybean have a demonstrated track record for having high yields and decreased irrigation requirements compared with full-season soybean, but seed from early-maturing varieties often has poor germination and wrinkled seed that may be docked. The research proposed is a long-term effort to develop drought tolerant MG4 varieties that produce high-quality seed when maturing under these stressful conditions.

## Fast-Tracking MG4 and Early MG5 Cultivars with Southern Root-Knot Nematode Resistance

**INVESTIGATORS**: Jeff Edwards, Travis Faske

**GOAL**: To characterize SRKN resistance in soybean and fast-track the development of soybean cultivars with resistance to SRKN in MG4 and early MG5.

**VALUE TO SOYBEAN INDUSTRY:** Developing soybean cultivars with resistance to SRKN is critical for soybean production in Arkansas. Although this proposal does not cover the complete breeding cycle, typically spanning nearly a decade from crossing to product deployment, it provides a series of goals

needed to begin selecting early maturity soybean lines with resistance to the SRKN. Such lines will be critical for improved performance and enhanced profit margins in areas where SRKN is a limiting factor for soybean production.

## Economic Analysis of Soybean Production Practices

**INVESTIGATOR**:
Brian Deaton

**GOAL**: Conduct an economic analysis of production practices used in the Arkansas Soybean Research Verification Program. Standardize economic analysis by integrating 2021 verification data with data from previous years and make interstate comparisons. Provide economic assistance and interpretation of agronomic results for projects previously funded by or proposed to ASPB. Conduct economic analysis of potential impacts of proposed 2023 Farm Bill provisions specific to AR soybeans.

**VALUE TO SOYBEAN INDUSTRY**: Benefits from economic analysis of alternative soybean production strategies assist producers in identifying opportunities to adjust individual costs and incomes while providing a significant reduction in the risk levels that producers face. Maintenance of a historical database of annual SRVP data provides valuable time series soybean data for extended research. Economic analysis of Board-funded production projects adds value to the projects and increases the return for check-off dollars invested. Results enable producers to make management decisions based on profit maximization rather than just maximizing yield.

## Soybean Enterprise Budgets and Production Economic Analysis

**INVESTIGATOR:**
Breana Watkins
*(Photo courtesy of U of A System Division of Agriculture)*

**GOAL:** Provide soybean enterprise budgets that are flexible for representing alternative production practices of Arkansas producers. Costs and returns analyses with budgets are extended by production economics analysis to investigate factors impacting farm profitability.

**VALUE TO SOYBEAN INDUSTRY:** The benefits provided by the economic analysis of alternative soybean production methods provide a significant reduction in financial risk inherent in agricultural production. Arkansas producers gain value from economic analyses of individual production activities unique to their operations. Flexible crop enterprise budgets are beneficial for planning production methods to provide greatest potential for financial success. Flexible budgets enable farm financial outlooks to be revised during the production season as inputs, input prices, yields, and commodity prices change. Thoroughness of computational methodology and straightforward application facilitates use of the budget calculator by research and extension specialists conducting economic analysis of water use efficiency, weed control, insect management, cover crops, and other aspects of crop production. The crop budget system allows for investigation of public policy changes that affect producers, such as eliminating exemptions for taxes on certain agricultural inputs.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# EDUCATION

## Soybean Science Challenge

**INVESTIGATORS:**
Julie Robinson,
Karen Ballard

**GOAL:** To engage Arkansas (and nationwide) junior high and high-school science students and teachers in "real-world" Arkansas specific soybean science education through original curriculum and a continuum of educational methods that include: classroom instruction, lab instruction, teacher workshops, teacher and student mentoring, online and virtual live-streaming education; personal mentoring, student-led research and award recognition, and partnerships with state and national educators, agencies and the popular media.

**VALUE TO SOYBEAN INDUSTRY:** The Soybean Science Challenge makes agricultural sustainability relevant and meaningful for Arkansas junior high and high-school students. The success of this project speaks to a significant void that has existed for engaging, timely and relatable curriculum and education for students that asks them to contribute to the discussion and to actively participate in scholarship that has real meaning. The greatest value to the soybean industry is that we are now "at the table" as the attitudes of our youth are being shaped. Students from across our state and nation are being challenged to understand the complexity of the evolving science undergirding production agriculture and to critically think about issues regarding food, fuel, feed, research and agricultural sustainability that will directly impact their futures. Teachers from across the state and nation can access our website and use our free educational resources. We now have the opportunity to show teachers and students nationwide the value and importance of Arkansas agriculture/soybean production.

# ENTOMOLOGY

## Educating Growers and Consultants on Insect Monitoring and Control

**INVESTIGATORS:**
Gus Lorenz, Ben Thrash,
Nick Bateman

**GOAL:** To educate growers, consultants and other agricultural industry members 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.

**VALUE TO SOYBEAN INDUSTRY:** Soybean production has changed drastically in the past 10-15 years. The adoption of reduced tillage, Roundup Ready and early season soybean production has also caused changes in soybean insect management. Few would argue that soybean insect management has become even more important in recent years and the changes in production have resulted in a need for increased awareness of soybean insect pests. These 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. This research is intended to ensure Arkansas soybean producers' money is wisely spent for insect management.

## Development of Integrated Management Strategies for Insects in Soybeans

**INVESTIGATORS:**
Ben Thrash, Gus Lorenz, Neel Joshi, Glenn Studebaker, Nick Bateman

**GOAL:** Develop cost-effective and sustainable recommendations for the management of the major insect problems in soybeans in different growing regions in Arkansas. Insect management continues to be a major focal point for growers and consultants in Arkansas soybeans, and developing sound recommendations for the most effective and economical control of insects is key to helping soybean producers be profitable. This project addresses various aspects of integrated management of problematic pests associated with soybean production.

**VALUE TO SOYBEAN INDUSTRY:** New pesticides are being released for bollworms, soybean loopers, and fall armyworms. These are viruses that are specific to the particular caterpillar and have been found to be effective with a good residual. The treatments containing these products are competitively priced as compared to chemical insecticides. Conducting on-farm trials to determine level of control, for developing a data set to help determine recommendations on use, will be important.

An increasing number of growers are adopting cover crops across the state. Soybean seed treatments and foliar insecticide applications, as well as cultural control methods, need to be evaluated in cover crops for control of commonly associated insect pests.

## Fertilization of Soybean

**INVESTIGATOR:**
Trenton Roberts

**GOAL:** The overall mission of this research is to identify potential yield limitations via soil and plant analysis and aid in the prevention of soybean yield loss attributed to insufficient (or toxic) mineral nutrition. The specific goals addressed with this project are to:
1) continue short- and long-term phosphorus (P) and potassium (K) fertilization trials
2) continue to evaluate soybean fertilization strategies with macro and micronutrients
3) investigate remote sensing technologies and
4) assess nutrient concentration variability at the production scale.

**VALUE TO SOYBEAN INDUSTRY:** Soybean fertilization costs represent about one-fifth of the total operating expenses budgeted for full-season soybean grown on silt loam soils. Accurate identification of P- and K-deficient soils and knowledge of other yield-limiting nutrients will enable recommendations to be refined so that the correct fertilizer sources and rates are applied at the times and frequency required to maximize yield and sustain soil productivity. Long-term fertilization trials are invaluable for verifying that recommended P and K fertilizer rates are sufficient for sustainable production and, as illustrated by our development of critical leaf-K concentrations for developing tissue-based interpretations to verify sufficient crop nutrition. Correlating and calibrating nutrient information from soil and tissue analyses is a long-term process that requires a large number of site-years with a wide range of soil properties to ensure soil test recommendations are as accurate and precise as possible. With current advancements in

remote sensing and the adaptability of new platforms to unmanned aerial systems there is the opportunity for assessing soybean nutritional status using aerial imagery. Developing tools that will allow producers to identify potential nutrient deficiencies before they can be detected through deficiency symptomology can help ensure that nutrients such as K are no longer yield-limiting factors in Arkansas soybean production systems.

# IRRIGATION

## Promoting Irrigation Water Management for Soybeans

**INVESTIGATORS:** C. G. Henry, M. Ismanov, P.B. Francis, L. Espinoza, T. Spurlock

**GOAL:** Demonstration and technology transfer of irrigation water management practices on grower fields. Compare yield and water use differences to document the efficacy and improved profitability of conservation practices. Develop recommendations for surge irrigation and soil moisture sensors. Disseminate information to growers, consultants, and end users through U of A Extension meetings and workshops.

**VALUE TO SOYBEAN INDUSTRY:** 205 participants have attended the surge schools and 230 attended the soil moisture schools for a total of 1025 contact hours. Surge irrigation respondents reported moderate to substantial learning (99%) in hands on exercises. In the soil moisture sensor schools, 87% reported moderate to substantial learning on how to assemble and install soil moisture sensors. Respondents reported that 40% of their irrigated acres are using computerized hole selection (CHS) and 42% of their acres could use surge irrigation and they planned to use it on 19% of their acres. This is

a very high adoption rate because unlike CHS, surge valves have a high capital cost ($3500 per 80 acres).

Those that attended our schools reported using CHS on 41% of their acres in 2018 but in 2020 adoption increased to 65%. In 2018 attendees used surge irrigation on 3% of their acres but in 2020 participants reported they use surge irrigation on 3.4% of their acres. Soil moisture sensors were used on 12% of their acres in 2018 and participants reported usage on 19% of their acreage in 2020.

Soil moisture sensor schools resulted in substantial learning, 87% reported moderate to substantial learning on how to assemble and install soil moisture sensors. Using the mobile app to interpret sensors resulted in 89% of respondents reporting substantial learning about this key skill. Participants were using sensors on 15% of their acres before the workshop and indicated that they could be used on over 32% of their acres. Since most producers have rice in their rotation, this could be interpreted to mean sensors were being used on a good portion all of their corn, cotton and soybean acres during 2019. Growers indicate intentions of using soil moisture sensors on 13% of their acres.

To supplement the interpretation of soil moisture sensors, a mobile app was developed. Over 374 irrigators are using this app to interpret soil moisture sensor readings and manage their irrigation. App downloads increased 100% in 2020.

The sap flow component of this project is providing key data that is being used to provide better termination recommendations for soybeans. Poly printer has been developed to aid implementation of CHS.

In the soybean category of the 2020 edition of the *Most Crop Per Drop* contest (sponsored by the Arkansas Soybean Promotion Board) seven contestants achieved over 4 bushels per inch. In 2019 there were three and in 2018 there were none. On average contest participants are improving their water use efficiency (WUE) over time. In soybeans especially there is a clear and defined trend of increasing WUE over time. Contest participants are increasing their adoption of irrigation water management (IWM) practices. In 2018, only 50% of the participants used soil moisture sensors. In 2021, 87% used them. CHS adoption has increased from 43% to 97%. In 2020, the winner used only 23% of the anticipated irrigation needs for soybeans. WUE increased, in previous years only one person had achieved 4 bu/in, in 2020 seven contestants and in 2021 three contestants exceeded this bar.
Contest info at https://www.uaex.uada.edu/irrigation

# PLANT PATHOLOGY

## Comprehensive Disease Screening of Soybean Varieties in Arkansas

**INVESTIGATORS:**
Travis Faske,
Terry Kirkpatrick

**GOAL:** To provide independent evaluation of new soybean cultivars for resistance to major diseases and nematodes and deliver this information in a timely manner on the Arkansas Variety Testing Website.

**VALUE TO SOYBEAN INDUSTRY:** 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.

PLANT PATHOLOGY

## Development of an Effective Program to Manage Fungicide-Resistant Diseases of Soybeans in Arkansas

**INVESTIGATORS:**
Travis Faske,
Alejandro Rojas

**GOAL:** Develop practical management strategies to manage fungicide-resistant foliar diseases. Determine the risk of DMI- and SDHI-resistance in various fungal diseases and develop guidelines to reduce the impact of all fungicide-resistant diseases to maximize profit for the Arkansas soybean producers.

**VALUE TO SOYBEAN INDUSTRY:** The detection and confirmation of new fungicide-resistant diseases would prevent the unnecessary application of an ineffective fungicide, thus saving money. Furthermore, field studies are used to provide information of fungicide efficacy against fungicide-resistant diseases of soybean. Finally, we aim to use and deploy the information collected from these studies to provide practical solutions for the control of fungicide-resistant soybean diseases in Arkansas.

## Integrated Management of Soybean Nematodes in Arkansas

**INVESTIGATORS**:
Travis Faske,
Michael Emerson,
Amanda Greer

**GOAL**: Determine the significance and potential risk of plant-parasitic nematodes on soybeans in Arkansas. To evaluate currently existing methods

for controlling nematodes in soybeans, and to test newly emerging control technology and resistant cultivars. Encourage producers and consultants to sample for nematodes in soybean fields. Develop sustainable, economically feasible nematode management strategies for Arkansas producers.

**VALUE TO SOYBEAN INDUSTRY**: We will evaluate both existing and new soybean cultivars with reported resistance to the southern root-knot nematode to determine their level of performance in the field. We will identify those cultivars that will mitigate nematode damage under our field environments and against local biotypes. We will evaluate the toxicity of nematicides and bionematicides in the lab/greenhouse and assess their field efficacy and profitability in nematode infested fields. We will evaluate the practical use of an integrated approach with the use of cultivar resistance, nematicides, and crop rotation sequences to develop effective management strategies for the Arkansas soybean farmer.

## Cover Crops and the Control of Soybean Diseases

**INVESTIGATORS:** John Rupe, Alejandro Roja

**GOAL:** Compare the effects of seed treatments on stands and yields of soybeans planted no-till into established cereal rye cover crops terminated at different times before planting. Evaluate the effect of cereal rye cover crops on soil health including soil chemical and physical characteristics, soil microbial communities, and soil-borne pathogens including nematodes.

**VALUE TO SOYBEAN INDUSTRY:** Cover crops change the soil environment. These changes may reduce some pathogens, but may increase seedling diseases especially if soils remain cool and wet due to increased biomass. Growers terminate cover crops at different times generating different amounts of biomass. This study determines the effects of cover crops alone or in combination with seed treatments on seedling diseases, soybean cyst nematode and yield over several years of no-till and cover crop use.

## Determining the Impact of Disease and Stinkbug Feeding on Soybean Quality

**INVESTIGATORS:** Terry Spurlock, Nick Bateman, Alejandro Rojas, John Rupe

**GOAL:** Determine the major factors affecting soybean seed quality and develop management strategies for growers to avoid quality losses.

**VALUE TO SOYBEAN INDUSTRY:** Soybeans were subjected to major rain events in 2017 and 2018, and timely harvest was not obtainable. Major dockage for poor seed quality was observed during

both of these years. During 2017, high densities of redbanded stink bug were observed in the central and southern regions of Arkansas. These areas were already having issues with seed quality due to the stink bug infestations, and when hurricane Harvey made landfall quality issues nearly doubled. We observed that this stink bug alone could cause upwards of 20% damaged seed in an untreated environment with no rainfall events. With poor weather conditions, percent

damaged seed increased to 35-40%, and was likely compounded by fungal disease. Soybean seed quality has been a reoccurring issue over the past several years, with some of the losses being related to disease, insects, weather, or a combination of all three. Our growers need a set of best management practices for protecting themselves against soybean seed quality loss. This project will allow best management practices to be determined to help avoid soybean quality losses and minimize profit loss. These practices will encompass sound IPM, including variety selection and determination of fungicide/insecticide application timing.

## Determining the Value of Fungicide Application on Regional, Field Level and Within-Field Scales

**INVESTIGATOR:**
Terry Spurlock

**GOAL:** Cooperate with farmers, consultants and county agents to determine when and where a fungicide application or fungicide + product(s) marketed to improve plant health protects a soybean crop and adds value above the input cost.

**VALUE TO SOYBEAN INDUSTRY:** This research aims to answer difficult questions asked by farmers and consultants as to the value added by foliar applications of various aggressively marketed products. It also will generate data that should be used to develop site-directed disease scouting tools making disease scouting more efficient and less expensive.

## Understanding Charcoal Rot and Taproot Decline; A Soybean Disease of Increasing Importance in Arkansas

**INVESTIGATORS:**
Terry Spurlock,
Alejandro Rojas

**GOAL:** To determine the conditions where Taproot decline (TRD) is most severe and implement strategies to effectively manage the disease

**VALUE TO SOYBEAN INDUSTRY:**

The regional distribution of disease occurrence and yield loss is unclear currently. However, it has been found as far north as Craighead Co. and some farmer and consultant reports indicate losses could be as high as 10 bu/A in fields. In MS and LA, losses have been significantly greater. Currently, we do not have consistent control from seed treatment or in-furrow fungicides. Varietal recommendations are likely our most effective tool and must be made from field testing of market available varieties each year to provide up to date and relevant information to our growers. In addition, establishing an understanding of the interaction with cultivars and alternative ways that symptoms express themselves on the plant will be critical to continue characterizing the diseases or potential complex interactions. Understanding the regional distribution, commercially available seed treatment efficacy, and varietal susceptibilities are necessary for successful management of this disease in Arkansas.

# VERIFICATION

## Soybean Research Verification Program

**INVESTIGATORS:**
Jeremy Ross,
Chad Norton,
Chris Elkins

**GOAL:** To verify University of Arkansas, Division of Agriculture recommendation for soybean production, and to maintain an economic database of production practices on a large-scale field basis.

**VALUE TO SOYBEAN INDUSTRY:** Soybean yields in Arkansas continue to increase, but yields can increase more if Arkansas soybean farmers adopt and implement new technology. To increase the state's yield average, new technology including "Precision Agriculture" must be quickly transferred from the university researcher to the soybean producer. The SRVP allows soybean producers to observe Division of Agriculture-recommended production practices being implemented on typical producer fields across the state. 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.

Arkansas ROW CROP VERIFICATION
UofA DIVISION OF AGRICULTURE RESEARCH & EXTENSION University of Arkansas System

ARKANSAS SOYBEAN PROMOTION BOARD

# WEEDS

## Accelerated Development of Bioherbicides to Control Palmer Amaranth (Pigweed)

**INVESTIGATORS:**
Burt Bluhm,
Kelly Cartwright

**GOAL:** Create novel, highly aggressive bioherbicide products, through unique molecular genetic approaches, that specifically and effectively suppress Arkansas populations of pigweed.

**VALUE TO SOYBEAN INDUSTRY:** Herbicide-resistant weeds are the most problematic and expensive management issues in row-crop agriculture. Weed problems, particularly pigweed, are more pronounced in Southern states such as Arkansas, where producers have witnessed more rapid increases in resistant weeds, especially in soybean, cotton, rice, and corn. Attempts to control such "super" weeds lead to as much as an extra $30-50 of input costs per acre. In some cases, extra costs can exceed $150/acre if hand-rouging is required. These costs, coupled with yield losses directly from competition, cause more than $1 billion in losses throughout the Mid-South and South in soybeans, corn and cotton.

# A Team Approach to Weed Management in Soybeans

**INVESTIGATORS:**
Thomas Butts,
Tom Barber,
Jason K. Norsworthy,
Nilda R. Burgos

**GOAL:** To evaluate new and emerging technologies, rapidly identify herbicide-resistant weeds, determine their distribution, determine their mechanisms of resistance, and develop viable, unbiased- solutions for managing herbicide-resistance in Arkansas. In addition, research focused on reducing the soil weed seedbank, understanding spray water quality and adjuvant use for improved weed control, and controlling other problematic weeds for soybean producers in Arkansas is a priority. A major goal was providing a rapid information exchange between the grower, extension personnel, and researchers through publications such as the MP-44, MP-519, various fact sheets as well as through blog posts, podcasts, and text messaging services.

**VALUE TO SOYBEAN INDUSTRY:** Proper weed control accounts for a significant portion of annual budgeted production expenses. In addition, yield loss from even moderate weed infestations can be greater than 25%. The rapid adoption and widespread use of soybean weed control information has been of great value to growers.

The project allows 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. Over the past 10 years, the discoveries of the existence of glyphosate-resistant horseweed, common ragweed, giant ragweed, Palmer amaranth, and johnsongrass and most recently, PPO-, VLCFA-inhibitor-, and glufosinate-resistant pigweed, in Arkansas soybean fields has been a direct result of Soybean Board Funding. With continued reliance on glyphosate for weed control in soybean, these resistant biotypes have become more widespread and additional weeds may develop resistance to glyphosate. Although glyphosate-resistant common ragweed, giant ragweed, and johnsongrass currently appear somewhat isolated, glyphosate-resistant horseweed now infests the entire Mississippi Delta region of Arkansas, and glyphosate/PPO-resistant Palmer amaranth has now been confirmed in all major field crop counties. Glyphosate-resistant Palmer amaranth populations are also known to be resistant to ALS-inhibiting herbicides, which comprise the largest family of soybean herbicides. A further concern is that some of these resistant biotypes are also resistant to multiple herbicide modes of action such as metolachlor in the Group 15 herbicide family. Failure to adequately control any of these weeds can result in total crop loss. The further development of herbicide resistance to new technology, such as glufosinate and auxin chemistry, is also a concern and continues to be addressed by this program. Research from this funding has provided best management practices for Palmer amaranth control and has resulted in a shift in preemerge herbicide selection to include metribuzin as a key component for multiple-resistant pigweed control. Results have also shown that multiple herbicide modes of action are necessary at planting. Soybean producers have adopted these recommendations for pigweed at a high rate across the state. Additionally, research from this funding has helped to identify diverse integrated weed management tactics and developed strategies to successfully implement them across Arkansas soybean acres.

# Screening for Soybean Tolerance to Metribuzin

**INVESTIGATORS:** J.K. Norsworthy, Jeremy Ross

**GOAL:** The goal of this project is to screen all varieties entered in the Arkansas OVT for tolerance to metribuzin, allowing growers to make informed decisions as they select varieties and develop robust weed control programs.

**VALUE TO SOYBEAN INDUSTRY:** Metribuzin (Sencor or Lexone) was used by most Arkansas soybean growers prior to adoption of Roundup Ready in the mid- to late 1990s. Metribuzin is a broad-spectrum residual herbicide that provides a high level of control of Palmer amaranth, the most problematic weed for Arkansas soybean growers today. Soybean varieties differ in tolerance to metribuzin; hence, annual testing of available varieties was routine prior to Roundup Ready soybeans to allow growers to best match a variety with their anticipated use of metribuzin.

Now that preemergence, residual herbicides are once again a major component of weed management in Arkansas soybeans, screening of soybean varieties for tolerance to metribuzin is again needed. In addition to metribuzin-alone products, such as Metri, Metribuzin, etc., a variety of metribuzin-containing products are being promoted and used by Arkansas soybean growers. Some of these products include *Canopy* (metribuzin + chlorimuron), *Authority MTZ* (metribuzin + sulfentrazone), and *Boundary* (metribuzin + S-metolachlor). The metribuzin rate in these products is less than that which will provide effective control when metribuzin is used alone. The reason for the lower rates of metribuzin in these products is because the sensitivity of the current soybean varieties to metribuzin is unknown; hence, a low rate is applied to minimize the risk of injury to the most sensitive varieties. Soybean producers in Arkansas would greatly benefit from being able to use a full rate of Metribuzin in soybean, especially considering that PPO-resistant Palmer amaranth was documented in 12 counties in northeast Arkansas. Our field research indicates that Metribuzin needs to be a major component of the preemergence weed control program on any acre for which the PPO herbicides failed, especially those north of I-40. We currently recommend a full rate of Metribuzin plus a chloroacetamide on every PPO-resistant pigweed acre.

# NCSRP: Getting into the weeds for Answers

SOYBEAN RESEARCH & INFORMATION NETWORK

Weed control in soybeans was revolutionized in the 1990s with the introduction of transgenic, herbicide-tolerant soybeans. Farmers could control weeds without killing the plants and reduce cultivation. But now as more weeds develop resistance to several popular herbicides, NCSRP is promoting what works today and exploring new innovations to enhance weed control.

## WHERE WE'RE AT

### Herbicide Resistance Management

Addressing weed resistance includes delaying potential resistance and taking control of already herbicide-resistant weeds. **Through the Take Action Herbicide Resistance Management Program** funded by the soybean checkoff, farmers get the direction needed to manage weeds most effectively. Rotating modes of action, adding in non-chemical practices and more put farmers in control.

### Non-Chemical Control

Effective herbicide-resistance management combines a variety of chemical and non-chemical management tactics to diversify selection pressure on weed populations and minimize spread of resistance genes. For example, **tillage works the soil and can control weeds through burial of small weeds**, disrupting roots and cutting or severely stunting weed growth. Tillage practices must be monitored to prevent buildup of weeds in the soil seedbank.

## WHERE WE'RE GOING

### Weed Electrocution

One non-chemical weed control option gaining traction with researchers is weed electrocution. The **technology may prevent weed seed production** for some of the most common weeds found in Midwest soybean fields; including Palmer amaranth and waterhemp. Researchers in multiple states are comparing weed electrocution to other non-chemical treatments and exploring the overall effectiveness of weed electrocution on common weeds and weed density.

### CRISPR Novel Resistance Traits

As existing and emerging weeds become tolerant to limited herbicides used in soybeans, researchers are collaborating to **equip soybeans with new genetic traits that confer tolerance** to three novel classes of herbicides. Improved cultivars amenable to a wider selection of herbicides would provide more effective weed control. Scientists are establishing a CRISPR base editing system to quickly and non-transgenically generate these new herbicide-resistant soybeans.

GET THE 411 ON SOYBEAN RESEARCH AT SOYBEANRESEARCHINFO.COM

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# Making Waves to Manage Water More Sustainably

SOYBEAN RESEARCH & INFORMATION NETWORK

**Soybean farmers proactively use conservation practices such as no-till, grass filter strips, cover crops and drainage water management to improve water quality and protect water resources. Funding from the soybean checkoff provides education to help farmers advance and expand these efforts and supports research to further enhance soybean production sustainability.**

## DIVING DEEPER INTO IRRIGATION INNOVATION

Limited water availability, especially at critical growth points, can reduce soybean yield and quality. Efficient use of irrigation and soil moisture can maximize return on water investments. Research is exploring the value and best use of soil moisture sensors, variable rate irrigation technology, best irrigation management practices based on soil type and even safe reuse of recovered tailwater during the growing season. ***There's now even an app for smart irrigation!***

## SHORING UP WATER QUALITY MONITORING

Edge-of-field monitoring stations placed in watersheds allow water samples to be collected for nutrient and sediment analyses after runoff-generating precipitation events. Such projects measure effectiveness of field practices and document and demonstrate continuous improvement farmers can share with the public and environmental regulators. A decline in impaired waters can be documented through long-term studies such as assessing poultry manure application and cover crop implementation and looking at the impact of chisel plows or strip tillage on runoff.

## TAKING NUTRIENT LOSS TO A TRICKLE

best practices TO SLOW NUTRIENT LOSS

Covers crops are known to benefit soybean farmers by saving soil, improving water storage during the summer, suppressing weeds and increasing efficient use of nutrients. Keeping crop inputs out of waterways makes farming more economically and environmentally sustainable. For example, research is exploring improved potassium management in specific soil types to identify best practices to slow nutrient loss. Other studies are evaluating phosphorus application timing, placement, source and rate to single out ways to increase profitability and reduce loss.

## SATURATING WATERSHEDS WITH BENEFITS OF CONSERVATION

Data collection can be used to determine if conservation practices have a positive effect on reducing nitrates in groundwater and subsequently improving water quality in watersheds. This includes research into understanding the efficacy of fall cover crops. Scientists are working to accurately document the effect of a variety of conservation practices on environmental conditions in watersheds nationwide to estimate full public and private benefits and costs.

## TURNING THE TIDE ON BETTER VARIETY ADAPTATION

Research allows geneticists and breeders to better understand how soybeans manage water, so they can develop varieties that adapt for all water conditions. For instance, transpiration research measures how different soybean varieties under stressful conditions release water through leaves. Flood-tolerant varieties may help farmers who plant low-lying fields or farm in other wet areas.

GET THE 411 ON SOYBEAN RESEARCH AT SOYBEANRESEARCHINFO.COM

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# BOARD MISSION

*The Arkansas Soybean Promotion Board consists of soybean producers nominated by various producer organizations within Arkansas and appointed by the governor.*

*The Arkansas Soybean Promotion Board was established to improve the sustainability and profitability of the soybean industry in Arkansas. This board is responsible for distributing funds from the checkoff.*

*For a digitally immersive experience into this research funded by the soy checkoff, explore this report online by unlocking this QR code with your phone's camera to access links to additional content and videos.*

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