2024 Arkansas Checkoff-Funded Research Report

ARKANSAS SOYBEAN PROMOTION BOARD

Letter from Chairman John Freeman

Arkansas Soybean Producers,

This year, the Arkansas Soybean Promotion Board once again funded vital research conducted by the University of Arkansas Division of Agriculture. Supported by checkoff investments, this research underscores our commitment to ensuring a prosperous future for Arkansas soybean producers. These investments advance our industry, guaranteeing every dollar spent yields the best possible returns.

Soybeans are Arkansas's top crop, playing a crucial role in making agriculture the leading industry in our state. The insights from this research are pivotal in navigating modern agricultural challenges and achieving successful harvests.

The Board allocated $3,206,314 to fund the University's soybean research this year. This report highlights a fraction of the ongoing research projects that are part of a three-year cycle. Additionally, the Board funded three new soybean research fellows at the university. The fellowship partnership aims to drive innovation in traditional farming practices related to soybean production, including areas such as animals, plants, soils, pest management, food and feed sciences, and engineering.

The findings in this report exemplify how your checkoff dollars enhance our ability to cultivate robust and resilient crops. The Arkansas Soybean Promotion Board remains steadfast in our dedication to maximizing the impact of your contributions.

Sincerely,

John Freeman
Chairman, Arkansas Soybean Promotion Board

BATTLING BILLION-DOLLAR YIELD ROBBERS?

Don't Worry. We're On It.

Sudden death syndrome, stink bugs, soybean cyst nematodes, and many other yield-robbing pests and diseases. It's a rough world out there, costing soybean farmers billions of dollars every year. Fortunately, your state soybean checkoff is on the job with research projects to develop effective traits and practices to get back as much of your yield as possible.

LEARN ABOUT THESE PROJECTS AND MORE AT
SOYBEANRESEARCHINFO.COM

SOYBEAN RESEARCH & INFORMATION NETWORK

THE HARD WORK BEHIND YOUR HARD WORK

FUNDED WITH SOYBEAN CHECKOFF DOLLARS THROUGH THE UNITED SOYBEAN BOARD AND NORTH CENTRAL SOYBEAN RESEARCH PROGRAM

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.

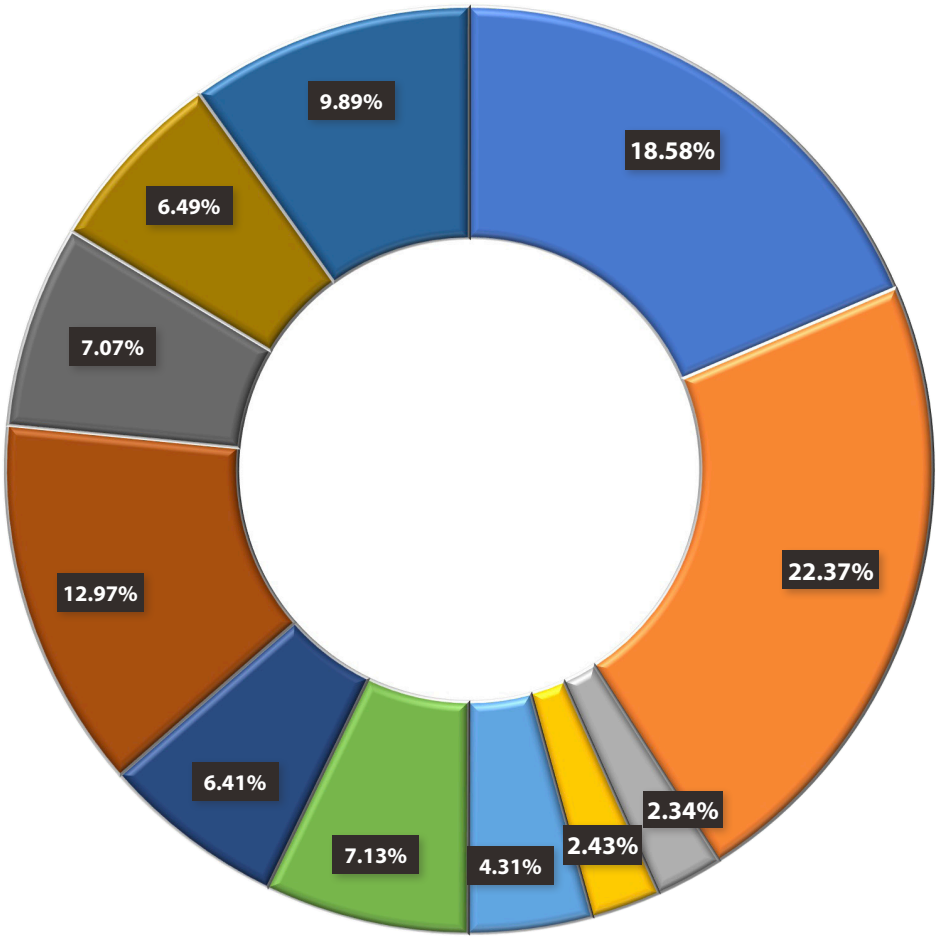
Administered by the United Soybean Board, producers invest 0.5% market price per bushel, known as a checkoff, into a fund. Used for research, market development, promotion, and expansion, the Arkansas Soybean Promotion Board manages half of all checkoff dollars collected in the state and the USB adds 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 41 of the 75 counties of the counties, Arkansas ranks 11th in soybean production in the country.

- Animal agriculture is the number one customer of soybeans, 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 April 25 and June 30, 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.

2024 ARKANSAS SOYBEAN PROMOTION BOARD RESEARCH ALLOCATIONS



Agronomy	$595,804
Breeding	$717,205
Economics	$75,154
Education	$77,846
Entomology	$138,219
Fertility	$228,722
Irrigation	$205,620
Plant Pathology	$415,913
Post Harvest	$226,630
Verification	$208,168
Weeds	$317,033
Research Total	$3,206,314

Meet the Board Members

JOHN FREEMAN, 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, VICE CHAIRMAN

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.

JOE THRASH, SECRETARY

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.

DONALD MORTON JR.

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.

BOARD MISSION

The Arkansas Soybean Promotion Board consists of soybean producers 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.

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.

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 he 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.

BRAD DOYLE

Brad Doyle's agricultural roots trace back to his great-grandfather, who cultivated soybeans on the family farm in Cross County. Although venturing on a different agricultural path in the 1990s scouting soybeans and cotton, Brad returned to his family origins after meeting his wife, Joyce, and joining her family's operation in 2001. He purchased his first farm in 2003. Today, he and Joyce, who received her Ph.D. in plant breeding from the University of Arkansas, grow row crops, including soybeans, for the family seed business while conducting crop and wildlife seed replicated small plot and strip trials.

SHANNON DAVIS

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

Shaping the Future of Agriculture: Innovations in Soybean Research

University of Arkansas scholars are making significant strides in soybean research to spur innovation in traditional farming practices. The Arkansas Soybean Promotion Board, in conjunction with the University of Arkansas System Division of Agriculture, provides fellowships to master's and doctoral students pursuing agricultural degrees.

Eligible candidates' educational focus must be anchored in soybean production, including animals, plants, soils, pest management, food and feed sciences, or engineering.

Each scholar utilizes their unique areas of expertise to advance soybean cultivation, address challenges, advance the future of farming, and foster a more sustainable and efficient agricultural industry.

Jared Smith

M.S. in Crop, Soil, and Environmental Sciences

Anticipated Graduation: 2025

Hometown: Milroy, Indiana

Project: *Evaluation of Relay Intercropping as a Cultural Weed Control Method*

Jared Smith explores an alternative approach to managing herbicide-resistant weeds, particularly Palmer amaranth, as soybean growers face increasing challenges from weed resistance. He evaluates the weed control benefits of relay intercropping winter wheat and soybean, using the wheat to suppress the emergence of weeds in the spring.

The soybeans will germinate beneath the wheat canopy, grow slowly until the wheat is harvested, and then rapidly canopy once the wheat is removed. This cultural control method helps reduce weed competition, minimizing the need for herbicides and lowering costs for producers.

Kirsten Midkiff

Ph.D. in Animal Science Candidate

Anticipated Graduation: 2024

Hometown: Fullerton, Louisiana

Project: *The Inclusion of Soybean Co-Products in Ruminant Supplements on Health and Reproductive Efficiency*

Kirsten Midkiff explores the health and reproductive impacts of including soybean co-products in ruminant supplements. By using supplements containing soybean co-products to activate an immune response in stocker cattle, she aims to improve performance, decrease the necessity of antibiotic treatments, and increase net returns on cattle sales.

By feeding developing heifers supplements containing soybean oil, Midkiff seeks to raise the cattle's reproductive efficiency and decrease the potential for revenue losses. Her research could result in a more dynamic use of soybean products in the livestock industry and open up the market for increased demand from Arkansas soybean producers.

Kona Blake Swift

Ph.D. in Cell & Molecular Biology Candidate

Anticipated Graduation: 2027

Hometown: Evans, Georgia

Project: *Creating Novel Tools to Manage Diseases and Pests of Soybean*

Kona Blake Swift researches the creation of novel biological tools to manage soybean diseases and pests. She designs transgenes that will create disease-resistance soybean cultivars via host-induced gene silencing. In this strategy, the soybean plant produces a signal that "tricks" the pathogen into turning off its own genes required for infection.

Additionally, Swift uses non-transgenic genome editing on a selection of naturally occurring fungal pathogens of pigweed (Palmer amaranth; Amaranthus palmeri) to create highly lethal biological control products that are host-specific to Palmer amaranth. These innovations have the potential to increase soybean yields, lower input costs, reduce risk from the unpredictability of disease occurrence, and lower environmental and social impacts from herbicide applications.

The fellowship program provided by the Arkansas Soybean Promotion Board and the University of Arkansas System Division of Agriculture is a catalyst for agricultural innovation and breakthroughs in soybean research. Each fellow reshapes the future of farming by harnessing their unique expertise. Their contributions advance soybean production and utilization and foster a sustainable and efficient agricultural industry. This program is a driving force behind a brighter and more prosperous future for the world of farming.

Learn more about the University of Arkansas System Division of Agriculture and the Arkansas Soybean Promotion Board's fellowship program by visiting **TheMiracleBean.com**.

Characterizing Top-to-Bottom Soybean Yield Variability in Furrow Irrigated Fields

LEAD INVESTIGATOR:
Aurelie Poncet

CO-INVESTIGATOR:
Jeremy Ross

OBJECTIVES

1. **Quantify Yield Variability:** Measure top-to-bottom soybean yield variability in two cropping systems in Arkansas.
2. **Identify Yield Drivers:** Determine the factors contributing to yield variability in selected fields.
3. **Monitor Plant Health:** Compare different plant health metrics for in-season monitoring of yield-limiting stress.

The goal is to enhance the profitability of irrigated soybean production through optimized crop management by characterizing yield response to in-field variability and developing data-driven recommendations and decision-support tools.

Seeding Rate Experiment

This experiment was conducted on-farm in Lincoln County, Arkansas, across three fields (A, B, and C) from 2021 to 2023.

Fields and Treatments: Fields A and C, 80 acres each, and Field B, 50 acres, received five seeding rate treatments (75, 100, 125, 150, and 175 thousand seeds per acre). Seeding was done using a 12-row planter with auto-guidance and variable-rate seeding capabilities. Furrow irrigation with poly pipe sets optimized using PipePlanner software was employed. Each strip, spanning the field's entirety, was created by two consecutive planter passes, with a total width of 60 feet.

Planting and Harvesting: Fields A and C, previously planted with rice, were planted with soybeans on June 6, 2021, and May 25, 2023, respectively. Field B, previously planted with soybeans, was planted on May 21, 2022. Harvesting occurred from October to November each year.

Soil Composition: Soil types varied across fields, with Perry, Portland, and Rilla series predominant in field A, Perry, Rilla, and Herbert in field B, and Perry and Portland in field C.

Yield Data: The yield data collected using a combine equipped with a yield monitor indicated that soybean yields were significantly higher at a seeding rate of 175,000 seeds per acre, with the median yields averaging 66 to 68 bushels per acre across all fields. This represented an increase of approximately 6% compared to the next highest yield, achieved at 150,000 seeds per acre.

Furthermore, the 175,000 seeds per acre treatment exhibited the least variability, with coefficient of variation (CV) values between 6.7% and 12.0% across the fields, demonstrating a more consistent yield output. The lowest yields, averaging 60 to 63 bushels per acre, were observed at the 75,000 seeds per acre seeding rate.

Remote Sensing and Yield Correlation

High-resolution satellite images were used to monitor crop health. Moderate to strong correlations between vegetation indices and yield were found, though these varied by field and seeding rate.

Field A: Strong correlations observed 50-115 days after planting, especially at 125,000 and 150,000 seeds per acre.

Field B: Moderate correlations observed throughout the season, stronger with Soil Adjusted Vegetation Index (SAVI) and Normalized Difference Vegetation Index (NDVI).

Field C: Strong correlations identified from 60 days after planting to harvest, particularly at 75,000 and 125,000 seeds per acre.

These results demonstrated that in-field soybean yield variability is structured enough to allow for in-season monitoring and prediction using remote sensing-based vegetation indices such as Green Normalized Difference Vegetation Index (NDVI), GNDVI, and SAVI.

However, the magnitude of the relationship between these indices and yield varied between fields, seeding rate treatments, and timing within a growing season.

Conclusions

In-field soybean yield variability is significant and can be effectively monitored using remote sensing. However, variability patterns and remote sensing correlations differ by field and treatment, suggesting a need for revised methods to account for multi-dimensional variability.

Future Research

Future studies will expand to other irrigation strategies and improve models by considering two-dimensional spatial effects and temporal changes in remote sensing indices. This approach aims to better capture the complexity of in-field variability and improve crop management recommendations.

The research scope will also be expanded to include the temporal changes in remote sensing-based vegetation indices, making yield correlation more dynamic.

Comprehensive Disease Screening of Soybean Varieties in Arkansas

LEAD INVESTIGATOR:
Travis Faske

CO-INVESTIGATOR(S):
Terry Spurlock, Amanda Greer, Michael Emerson, Amanda Tolbert, and John Barham

OBJECTIVES

1. **Frogeye Leaf Spot Screening:** Evaluate all entries in the University of Arkansas Official Variety Testing (OVT) program for Frogeye Leaf Spot.
2. **Southern Stem Canker Screening:** Assess all entries for Southern Stem Canker.
3. **Southern Root-Knot Nematode Screening:** Screen all entries for Southern Root-Knot Nematode in both greenhouse and field.

Progress and Accomplishments

Annual Evaluations: Each year, the UA OVT entries were tested for two diseases and southern root-knot nematode. Entries were classified as susceptible or resistant based on field and greenhouse reactions. The total number of entries per year were 165 in 2021, 154 in 2022, and 126 in 2023.

Frogeye Leaf Spot: The percentage of varieties susceptible to frogeye leaf spot was highest in 2022 but decreased in 2023, indicating a trend towards selecting resistant varieties by breeders and seed companies.

Southern Stem Canker: Most entries were resistant to southern stem canker, though a concerning 40% were susceptible in 2023. Susceptibility was determined by the presence of cankers or foliar symptoms.

Southern Root-Knot Nematode: Most varieties were susceptible to the southern root-knot nematode in both greenhouse and field screenings. There was a trend toward more resistant varieties, particularly among conventional MG V germplasm entries from the University of Arkansas and University of Missouri.

Value to Soybean Industry

Soybean growers primarily select varieties based on yield performance. However, disease resistance is crucial as yield potential can be significantly reduced by diseases. In Arkansas, soybeans are cultivated on approximately 3.0 million acres annually, valued at about $500 million. Disease-related yield and quality losses are estimated at $25 million per year statewide.

This screening program provides vital information on the disease resistance of new soybean varieties, reducing the risk of severe disease losses due to incorrect variety selection.

The data is published annually in the following formats:

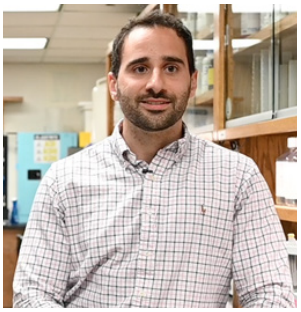
1. **UADA Variety Testing Programs website:** UADA Variety Testing Programs.
2. **UADA Soybean Update**
3. **UADA Soybean Performance Test:** Reports for 2021, 2022, and 2023, with the 2023 publication being the first to recognize the screeners' efforts.

The 2024 OVT screening will follow the same procedures as previous years with the same group of pathologists. Once received, seeds will be organized by entry and herbicide traits and distributed. This process, conducted at the Lonoke Extension Center, typically takes a week with five to six individuals working together. The project relies on generous support from Arkansas farmers, the Arkansas Soybean Promotion Board, and the UADA-CES. Future plans include posting results earlier on the Arkansas Row Crops Blog to meet farmers' demands for timely information.

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

LEAD INVESTIGATOR:
Caio Canella Vieira

CO-INVESTIGATOR:
Travis Faske



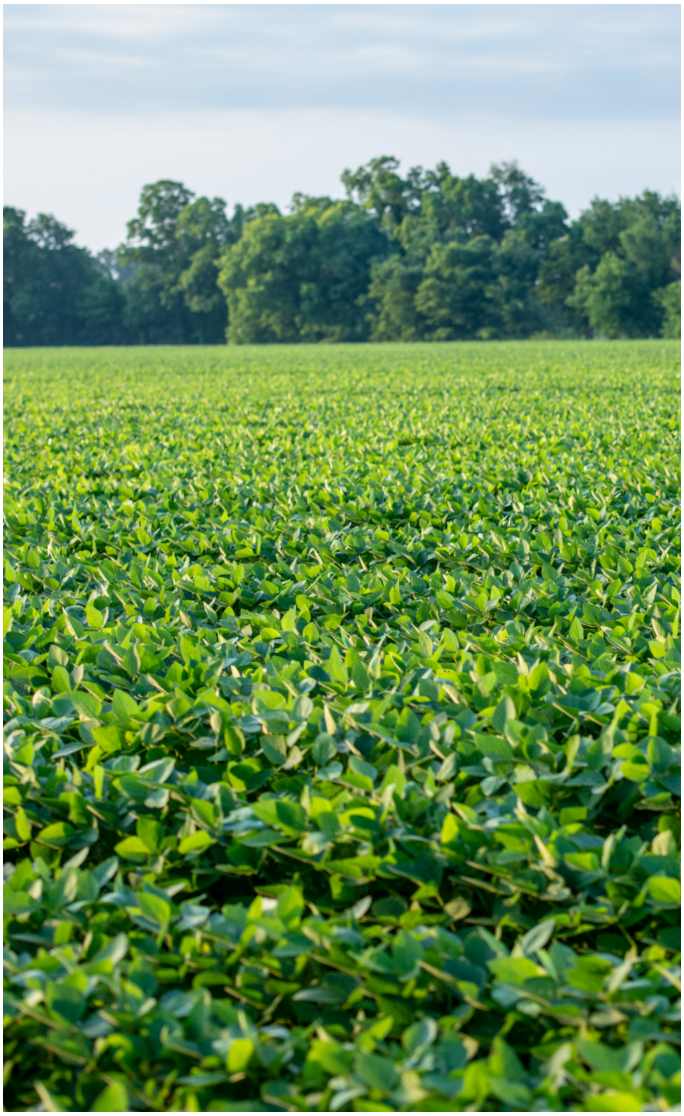
OBJECTIVES

1. Identify Southern Root-Knot Nematode (SRKN) Resistant Cultivars: Discover soybean cultivars with superior resistance to SRKN.
2. Characterize Advanced-Stage Cultivars: Evaluate advanced-stage pre-commercial cultivars for SRKN resistance using molecular markers, greenhouse inoculations, and field screenings.
3. Develop New Breeding Populations: Utilize identified cultivars to develop new breeding populations aimed at increasing SRKN resistance frequency in the Arkansas soybean breeding program.
4. Conduct Marker-Assisted Selection: Implement marker-assisted selection for SRKN in new populations and advance them via off-season nurseries for expedited development.

Progress and Accomplishments

Breeding Program Advancements: Significant efforts have been made to increase SRKN resistance in the breeding program and maintain this resistance throughout the breeding pipeline. Resistant lines were identified and advanced to final stages, serving as parental lines for new high-yielding breeding populations.

New strategies were introduced to address the need for SRKN resistance in early maturing soybeans. These include marker-assisted selection tools and a genomic prediction model. Materials in different breeding pipeline stages were genotyped with the Soy3KSNP platform and screened with a comprehensive molecular marker panel for 22 traits, including SRKN and other stressors.



Novel Resistance Sources: A panel of 10,225 plant introductions (PIs) was used to identify resistance sources. Twenty-six PIs with SRKN-resistant alleles and low galling scores were identified. Seeds from these lines were obtained for subsequent screening under field and greenhouse conditions to explore diverse resistance mechanisms, increasing genetic diversity.

2024 Regional Testing and Pre-Commercial Lines

Yield Trials Advancement: Two lines from 2023 preliminary yield trials containing the SRKN trait were advanced to 2024 Final Yield Trials. Additionally, 24 lines with SRKN-resistant pedigree will be evaluated in replicated 2024 preliminary yield trials across three Arkansas locations.

Progeny Rows and Early Generation Advancement

Progeny Rows: A batch of 26 populations comprising around 2,109 progenies has been packaged for planting in Kibler, AR. These will undergo comprehensive evaluation focusing on plant architecture, maturity, and pod load.

Early Generation: In the Puerto Rico winter nursery, 82 populations are undergoing generation advancement, with 68 involving one parent and 14 involving both parents possessing SRKN resistance.

Crossing Block Plans

2024 Crossing Block: Among the 72 parents intended for the 2024 crossing block, 18 possess the SRKN-resistant trait. Anticipated crossing combinations aim to produce F1 seeds, which will undergo generation advancement in the winter nursery until F4:5 stage.

Summary

The project aims to fast-track the development of MG4 and early MG5 soybean cultivars resistant to Southern Root-Knot Nematode (SRKN). Significant progress has been made in identifying and advancing resistant lines, implementing marker-assisted selection tools, and increasing genetic diversity within the breeding program. Continued efforts and upcoming trials will further solidify the advancements and impact of this project on the Arkansas soybean industry.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Understanding the Impact of Water Quality on Insecticide Applications in Soybean and Cotton Production

LEAD INVESTIGATOR:
Ben Thrash

CO-INVESTIGATORS:
Nick Bateman, Glenn Studebaker

OBJECTIVES:

Over the past three years, a comprehensive research effort has been underway to investigate the intricate relationship between water quality and insecticide efficacy in soybean and cotton production. The study aims to elucidate how variations in water quality parameters, such as hardness and pH levels, influence the performance of insecticides commonly used to manage key pests in these crops.

The primary objectives of the research endeavor are as follows:

1. **Biopesticides and Water Quality:** Investigate the effectiveness of Heliothis NPV in controlling bollworms in soybean, focusing on the influence of water quality, tank mixing, and water conditioners.
2. **Foliar Insecticide Applications:** Compare insect control using foliar insecticide applications with different water quality measures and water conditioning agents.

3. **Insecticide Stability:** Determine the impact of prolonged exposure (12, 24, or 48 hours) of insecticides in high pH water on their efficacy.

Summary of Findings

The research findings have provided valuable insights into the complex interplay between water quality and insecticide efficacy in soybean and cotton production systems. Some of the key findings include:

1. Increased water hardness and pH levels were found to reduce the effectiveness of chlorantraniliprole in controlling corn earworms in soybeans.
2. Residual control of chlorantraniliprole decreased in very hard water conditions after 21 days, highlighting the need for careful consideration of water quality in insecticide applications.
3. Field trials conducted across various water hardness levels showed no significant differences in efficacy among different insecticides used in soybean crops, underscoring the need for further research to understand the full extent of water quality's impact on pest management.
4. In cotton production, acephate's efficacy was observed to decrease with higher water hardness, while other insecticides remained unaffected, suggesting the need for tailored pest management strategies based on water quality parameters.

The research conducted has shed light on the significant role played by water quality in influencing insecticide efficacy in soybean and cotton production. The findings underscore the importance of considering water quality factors, such as hardness and pH levels, in pesticide applications to optimize pest management strategies and ensure sustainable agricultural practices.

Further research is warranted to deepen our understanding of these dynamics and develop targeted solutions for managing pests amidst varying water quality conditions, thereby enhancing crop yields and promoting the long-term viability of agricultural systems.


ALWAYS LEAVE IT BETTER THAN YOU FOUND IT.
Through the soy checkoff, U.S. soybean farmers are investing in new production practices to continuously improve their sustainability while protecting the air, water, and soil for generations to come.
unitedsoybean.org
@UnitedSoybeanBoard
@UnitedSoybean
OUR SOY CHECKOFF™
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On-Farm Variable Soybean Seeding Rate Study

LEAD INVESTIGATORS:
Jeremy Ross, Aurelie Poncet

Project Goal

The overarching goal of the project is to increase soybean profitability through optimized management practices.

The study focuses on assessing the benefits of variable-rate seeding for Arkansas soybean producers, identifying criteria for variable-rate seeding prescriptions, and creating a methodology for data-driven soybean seeding rate prescriptions.

OBJECTIVES:

1. Determine spatial variation in soybean yield response to seeding rate within commercial fields.
2. Assess the feasibility of variable-rate technology for enhancing soybean returns in Arkansas.
3. Develop criteria for variable-rate seeding prescriptions.

Progress / Accomplishments

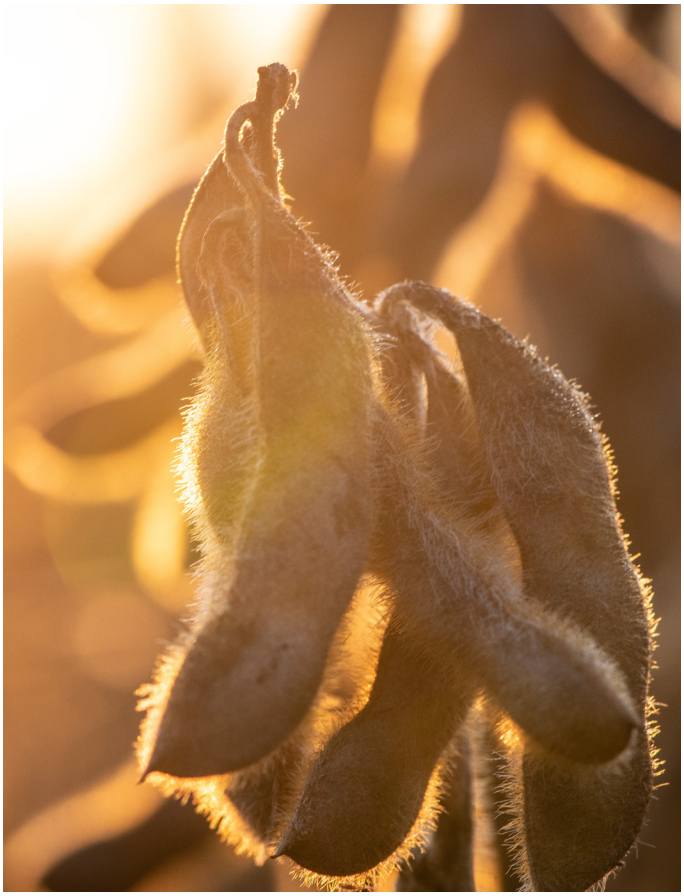
Seeding rate trials were conducted in three production soybean fields in Lincoln County, Arkansas, using a randomized complete block strip design. Data collected included planter performance metrics, stand counts, soil survey, field elevation, and soybean yield, along with assessments of planter performance.

Assessment of Planter Performance:

Statistical analysis was performed on seeding rate and plant population data, highlighting the need for planter calibration to ensure accurate seeding rate treatments.

Soybean Yield Response to Seeding Rate:

Analysis revealed no significant difference in yield between fields or seeding rate treatments. Factors influencing yield variability within fields, such as soil properties and elevation, were identified.



Agronomic Optimum Seeding Rate Prescriptions:

Statistical models were used to predict site-specific yield response to seeding rate, resulting in the development of agronomic optimum seeding rate prescriptions tailored to field conditions.

Value to Soybean Industry

The methodology enables data-driven variable seeding rate prescriptions, potentially integrated into user-friendly web tools, enhancing decision-making capabilities and promoting increased profitability and sustainability within the soybean industry.

Future Research

Future research will focus on conducting economic analyses for profit-maximizing seeding rate prescriptions, identifying fields where variable-rate seeding is most profitable, refining data analysis methods for faster processing and integration into web-based tools, and improving ground-truth assessments of planter performance while investigating environmental factors' impact on yield variability.

WE ARE U.S. SOYBEAN FARMERS

SUSTAINABILITY NEVER GOES OUT OF SEASON

CUSTOMERS PREFER U.S. SOY BECAUSE IT'S SUSTAINABLE.

But as demands for sustainability continue rising, meeting those demands remains a journey of continuous improvement. Which sustainable practices do you do now? Which ones could you adopt to improve your sustainable footprint?

COVER CROPS

☐

WATER MANAGEMENT

☐

REDUCED TILLAGE

☐

NUTRIENT MANAGEMENT

☐

DECISION FARMING

☐

PEST MANAGEMENT

☐

OUR SOY CHECKOFF™

Soybean Science Challenge

LEAD INVESTIGATOR:
Julie Robinson

CO-INVESTIGATOR:
Jeremy Ross

OBJECTIVES:

1. Develop and deliver original educational resources/curriculum to Arkansas junior high and high school students.
2. Increase awareness and knowledge of the value of soybeans to the Arkansas economy and potential careers supporting agricultural sustainability among Arkansas junior high and high school students.
3. Increase knowledge of the diversity of soy products and uses among Arkansas junior high and high school students.
4. Increase participation in applied research by Arkansas junior high and high school students supporting soybean production.
5. Development of state-wide educational partnerships to leverage the Arkansas Soybean Promotion Board's resources.
6. Actively engage students in the "co-creation" of knowledge and reward outstanding student researchers through the Soybean Science Challenge research awards.
7. Reach out to science teachers to consider using Soybean Science Challenge online education resources and curriculum in their classroom.
8. Share resources with teachers to bring Arkansas soybean research and education into classrooms nationally.

Progress/Accomplishments

- The online Soybean Science Challenge course has seen significant enrollment and completion rates, with 232 students and 22 teachers participating, achieving a 90% completion rate.
- Increased participation in science fairs with 13 entries for the State Science Fair in 2024, totaling up to 48 students entering various competitions.
- Development of 11 curriculum lessons, covering various science disciplines and aligned with Next Generation Science Standards (NGSS).
- Presentation of educational workshops to teachers and students, both in-person and virtually, enhancing understanding of soybean research and agricultural careers.
- Engagement in educational events and conferences, including the National Science Teachers Association Conference and Farm Bureau Meetings, to showcase resources and disseminate information.

Original Curriculum Development:

- 11 lessons written across multiple science disciplines, with 9 virtual mini-lessons and 12 NGSS-aligned VFT lesson manuals.
- Lessons and manuals upgraded for accessibility, covering topics such as soil pH, soybean nutrition, and growth.
- Soybean Science Challenge Educational Presentations.
- Conducted in-service and virtual workshops for teachers, reaching a total of 53 teachers in 2021-2022 and 30 teachers in 2022-2023.
- Engaged students through workshops on soybean nutrition, growth, and DIY chicken feed preparation.

Educational Events:

- Participation in conferences, field trips, and workshops, including events hosted by the National Science Teachers Association, Arkansas Science Teachers Association, and FFA AG Science Teacher In-Service Day.

SSC Awards:

- Recognition of student and teacher achievements through state and regional awards, promoting excellence in agricultural scholarship.

Community Gardens:

- Establishment of 236 community gardens, fostering hands-on learning opportunities and promoting agricultural sustainability.

Value to Soybean Industry

- The Soybean Science Challenge provides relevant and engaging education to junior high and high school students, fostering awareness of agricultural sustainability and career opportunities. The project fills a critical gap in curriculum and education, empowering students to contribute meaningfully to discussions on food, fuel, feed, and agricultural sustainability. By shaping the attitudes and understanding of youth, the Soybean Science Challenge plays a vital role in shaping the future of the soybean industry and agricultural practices.

BOARD MISSION

The Arkansas Soybean Promotion Board consists of soybean producers 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.

ARKANSAS SOYBEAN PROMOTION BOARD