NCSRP
NORTH CENTRAL SOYBEAN RESEARCH PROGRAM

2025 ANNUAL REPORT
OCTOBER 1, 2024-SEPTEMBER 30, 2025

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FROM THE BOARD PRESIDENT

This year's cropping season in the North Central region, weather patterns have affected us all — from high amounts of rainfall, to drought relief, to dry conditions — across all of the 13 states. This fall, harvest brought unrest with new tariffs in place for soybeans and other crops. In short, it was another roller coaster year for agriculture.

In the midst of it all, agricultural scientists and researchers remained steadfast in their quest for a better bean. In fiscal year 2025, NCSRP funded six research projects or programs and supported eight multi-regional projects that will advance the soybean industry in various ways. Research areas include soybean disease and weed management, improved genetics and genetic techniques, as well as artificial intelligence and machine-learning. Researchers across the country are acting on ingenious ideas to improve our productivity and profitability.

The farmer-led NCSRP board is a great group who are inherently curious about farming better. We continually endeavor to support research that improves ROI, that reduces redundancy and encourages collaboration across state boundaries and professional disciplines. Cognizant of current market pressures, we have strived to be very frugal with your Checkoff dollars. While maintaining our previous project commitments, we have been very selective and decisive about taking on new projects we are fearful of maintaining properly in subsequent years.

Also in December 2025, Ed Anderson retired from his tenure as NCSRP Executive Director. He has served this board passionately over the last 12 years and the organization is viewed as a leader in the soybean research realm because of his efforts. We wish Ed the best as he closes this chapter. We also extend a welcome to Joe McClure who is taking up the leadership reins.

To learn more about NCSRP-funded projects as well as many other research projects across the country, visit the Soybean Research & Information Network (SRIN) at www.SoybeanResearchInfo.com.

Thank you for the opportunity to serve as your NCSRP board president.

David Clark
FY2025 NCSRP President

FROM THE EXECUTIVE DIRECTOR

For this, my final North Central Soybean Research Program annual report letter, I have the opportunity to highlight 2025 and to sincerely thank the many farmer board members, state staff, public and private researchers, and so many good and committed people across the soybean industry whom I've had the pleasure of working with on behalf of the almost 350,000 soybean farmers in the North Central region.

As you read this annual report, you will see that your farmer board members continued to prioritize and support the funding, execution, and communication of multi-state, multi-disciplinary, short- and long-term research, teaching, and Extension programs that focus on helping soybean farmers to continuously improve soybean production, soybean quality, profitability and sustainability.

The programs supported by NCSRP, and highlighted in this report, can be explored in greater detail on the Soybean Research & Information Network (SRIN), by talking with an NCSRP farmer board member, state staff, highly qualified researchers, Extension experts, and students. Research program areas include soybean breeding, genetics, and biotechnology; agronomics and cropping systems; soybean diseases; insect pests; weeds and abiotic stressors; and soybean cyst nematode. Research areas also include the exploration and application of new and emerging technologies like remote sensing, AI, predictive modeling, and decision tools for improved soybean production management.

In addition, NCSRP continues to build on a long and strong tradition of collaboration and coordination within and across the Soy Checkoff. NCSRP also partners with the United Soybean Board and other regions (Atlantic, South, and Mid-South) for multi-regional and national research, as well as many state soybean and plant science centers, to join expertise in addressing some of the biggest challenges and opportunities for soybean farmers today and tomorrow.

As NCSRP leadership transitions to Joe McClure and an evolving board and staff, I am confident that NCSRP and the region's soybean farmers are in very good hands. I am grateful and sincerely thank you for giving me nearly 13 years to work with this incredible organization. I wish you all the very best.

Ed Anderson, Ph.D.

NCSRP Executive Director Ed Anderson Retires

After 12 years at the helm of the North Central Soybean Research Program, Ed Anderson retired from the executive director position on December 31, 2025. His storied career ends on a high note, as NCSRP is considered a national leader in support of research that serves to improve the soybean industry through basic and applied research. His impact has helped soybean farmers across the country improve their productivity and profitability.

Anderson attributes his successful career to good fortune. "I had a strong desire to drive collaboration and partnerships because I've always liked working with others," he says. "I believe that through collaboration, it brought value and big benefits to those partners as well as the work we were doing."

At the beginning of his career in the mid-1980s, Anderson was a research assistant at Washington University in St. Louis where he was part of early collaborative work with Monsanto on genetically engineered crops. The team explored the biotechnology and dealt with the politics that have surrounded the topic.

Anderson then held positions as research assistant, postdoctoral research associate, and assistant professor at three universities before transitioning to management positions at Pioneer Hi-Bred, where he was for 16 years prior to his hire at Iowa Soybean Association.

"My work at Pioneer shifted from doing biochemistry, biotechnology and engineering to leading an integrated group," he explains. "We had engineers, scientists, software developers and automation experts on the team. We worked together with several labs to help Pioneer automate processes in evaluating new germplasm, breeding lines and potential crops."

Anderson is trained as a molecular virologist — someone who studies how plants and viruses interact to cause or resist disease. This area of science is important and Anderson was successful in the positions he held. But his resume is peppered throughout with key words such as "leadership" and "collaboration." When it came time to take on the Executive Director role for NCSRP, it was a natural fit.

As NCSRP Executive Director, he has been the catalyst between farmer board members and university researchers, helping them to develop close, highly functional partnerships.

"I think we improved and developed more trust, rapport and partnership between researchers, farmers, and soybean associations," he says. "My greatest feeling of accomplishment is bringing people together and building programs that brought coordination of research to drive the return on investments, and attract other funds for research that farmers need in the short term and the long term."

In addition to bringing farmers and researchers to the table, the researcher-to-researcher relationships have grown as well.

"Researchers have told me several times that if it wasn't for NCSRP pushing the collaborations and working together, they might have never met their colleagues, let alone work with them," he says.

Because of these inter-state, and multi-disciplinary university relationships, soybean research has become more streamlined and redundancy has decreased. Scientists are sharing findings with one another, which accelerates advancements.

"I've been impressed and grateful for the farmers on the NCSRP board who have acknowledged important research programs," he comments. "It's rare for farmer boards to support long-term projects. But the NCSRP farmers have looked at results, listened to the rationale, and have seen continuous improvement in evolving programs and they've sustained the investments."

Ed didn't let state lines stop him from doing what's best for the soybean industry. He brings people and ideas together to make things happen, and he's built our programs into the most respected in the country. He taught us to put farmers first and not be afraid to shake things up when something isn't delivering results. Farmers may not know how many battles he fought for them — but we do. We're all better because of his leadership, courage, and unwavering commitment to this industry."

— Katherine Drake Stowe
Sr. Director | Collaboration & Partnerships Director, U.S. Soybean Research Collaborative
United Soybean Board

Photo: United Soybean Board

In 2024, United Soybean Board Chair Steve Reinhard presents Anderson with the Tom Oswald Legacy Award. The national USB award honors those who have contributed significantly to the soybean industry and is a tribute to the Iowa farmer who passed away suddenly in 2022. Oswald served on county, state and national soybean boards and had a creative mind, challenging Anderson and other soybean staff to think differently.

In addition to building the leadership and reputation with NCSRP, Anderson has been the impetus for the eight soybean research centers across the country to meet and collaborate. He's also been the driver behind the multi-regional soybean associations working

As is often the case with leaders who are responsible for major changes and significant advancements, I don't think Ed gets the credit he deserves. His passion and focus on improving the quality of soybean research funded by soybean farmers has resulted in great progress, and more importantly, the impact of his contributions will help ensure even greater results in the years to come. What a great legacy to leave as he enters into retirement.

— Kirk Leeds
Iowa Soybean Association CEO

Ed can facilitate and nurture discussions about research on virtually any soybean-related topic like no one else I've met. He knows what most soybean researchers in the U.S. are doing, which is invaluable as he always urged university researchers to coordinate and collaborate, not duplicate. The NCSRP is one of the most highly regarded checkoff organizations in the nation and that reputation is due in no small part to Ed's talents, commitment and drive.

— Greg Tylka
Iowa Soybean Research Center Director

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together. Along with the North Central region, the Atlantic, Mid-South, and Southern regions as well as the United Soybean Board, are funding projects together to provide answers on issues that all soybean farmers face (see list on page 7).

As Anderson turns his attention to the next life chapter, which includes lots of family and grandkid time, he wants those he's worked for and worked with to know how thankful he is.

"Thanks for putting your trust and confidence in me, giving me the freedom so I could try to

Ed and his wife, Brenda, volunteer at the Iowa Soybean Association's exhibit at the Iowa State Fair. Brenda has been a steadfast supporter of Ed and his work as well as a great co-pilot as they traveled to NCSRP meetings. Photo: Iowa Soybean Association

Ed has been an exceptional leader of the North Central Soybean Research Program. He has helped NCSRP to focus on non-redundant research projects that bring value to farmers across the entire region while utilizing the skills of many researchers in an economically efficient manner.

— Tom Fontana
Director, Research and Education
Ohio Soybean Council

As the director of the NCSRP insect pest management project for 12 years, I worked closely with Ed during that time. He was an excellent interpreter to help researchers better understand the needs of farmers and to translate the science we had to offer into real-world understanding for farmers. It was a privilege to work with Ed towards our common goal to support the soybean farmers in the North Central Region.

— Kelley Tilmon
Professor of Entomology
Ohio State University

build these collaborations and partnerships," he remarks. "Thank you for the opportunity to work on your behalf and hopefully make some progress and contributions to the soybean industry."

The farmers and researchers whom Anderson has affected owe thanks to him as well, as he has certainly made an immeasurable positive impact on soybean research throughout his career. His impact will be noted at state, regional and national levels.

Fontana Retires from Ohio Soybean Council

After more than two decades at the Ohio Soybean Council, Tom Fontana retired in December as Director of Research and Education. Throughout his career, he has been behind OSC's research and education programs, overseeing projects that advanced soybean production and improved sustainability. Fontana has supported NCSRP through his connections with Ohio farmers and university researchers. He was a regular attendee at NCSRP board meetings, providing a familiar face and hospitality, making everyone feel welcome.

New NCSRP Executive Director
Welcome Joe McClure

Joe McClure was introduced as the new Executive Director for NCSRP at the group's winter meeting on December 8. He takes the helm from Ed Anderson who retired December 31.

He is also the Chief Officer for the Research Center for Farming Innovation (RCFI) at Iowa Soybean Association, serving in this position since June 2022. He will continue in this role along with the NCSRP duties.

McClure has 25 years of experience in the agriculture industry, including in field research, inventory, logistics, and seed production for Bayer|Monsanto. Most recently, he was a regional lead for corn and soybean seed production at two Illinois locations and one in Michigan. He was based in Hawaii for the company for seven years, serving as operational and organizational leads.

McClure holds a master's degree in crop production and physiology from Iowa State University and earned a Bachelor of Science in computer science from Mount Mercy College, Cedar Rapids, Iowa. He is an Iowa native, married to Diana, and they have three children.

NCSRP LEADS MULTI-REGION, MULTI-STATE PROJECTS AND PROGRAMS

For more than 30 years, the NCSRP farmer board members have set the precedent in supporting soybean research that spans across state boundaries and institutional disciplines. These projects have been highly successful for farmer productivity and profitability. Some of them have morphed into long-term programs as soybean diseases and pests continue to evolve and prey upon the crop across the country. As an outcome of NCSRP's success, the United Soybean Board is supporting projects that encompass all regional soybean groups, with NCSRP overseeing their management.

Below are the multi-regional projects, which include the North Central, Atlantic, Mid-South, and Southern regions. On the following pages are the FY2025 projects and programs funded by NCSRP.

An Integrated Approach Towards the Detection, Diagnosis, and Response to Emerging Herbicide-Resistant Weeds in Soybean – year 1
Principal Investigator: Eric Patterson
Michigan State University

Characterizing and Utilizing Metribuzin Tolerance in Soybeans to Improve Weed Management Strategies in Early Planted Soybeans – year 1
Principal Investigator: Samuel Revolinski
University of Kentucky

Evaluating Wheat-Soybean Relay Intercropping for Improved Weed Management Outcome and System Yield – year 1
Principal Investigator: Jason Norsworthy
University of Arkansas

Evaluate Spray Drones in Soybean Production – year 1
Principal Investigator: Steven Li, Auburn University

Developing and Releasing High-Yielding Soybean Varieties/Germplasm with Climate-Resilience and Genetic Diversity Across Maturity Groups 00 to 7 – year 2
Principal Investigator: Bo Zhang, Virginia Tech

Quantifying Nitrogen Credits From Soybean – year 2
Principal Investigator: Michael Mulvaney

Development and Expansion of Disease Management Decision-Making Tools Across Multiple Soybean Regions – year 3
Principal Investigator: Carl Bradley
University of Kentucky

Field Phenotyping Using Machine Learning Tools Integrated with Genetic Mapping to Address Heat and Drought Induced Flower Abortion in Soybean – year 3
Principal Investigator: Krishna Jagadish
Texas Tech University

Advancing Soybean Health: Field Trials to Decision Support Tools to Maximize Disease Management

Funding: $375,000

Principal Investigator:

Richard Webster, North Dakota State University

Co-Principal Investigators:

Daren Mueller, Iowa State University

Martin Chilvers, Michigan State University

Darcy Telenko, Purdue University

Horacio Lopez-Nicora, Ohio State University

Dylan Mangel, University of Nebraska

Damon Smith, University of Wisconsin

Scan the QR code to read about the project on the National Soybean Checkoff Research Database

Overview of Project Objectives

Objectives for this project include conducting three-year, multi-state field trials that compare high- and low-intensity strategies such as fungicide applications, biological fungicides, biological seed treatments, and varying maturity groups. The team will conduct a farmer survey to further understand how they use soybean disease management products. Results could steer future extension content for new publications and outreach materials. Lastly, the team will build interactive calculators for key soybean diseases to help farmers learn their likely ROI. The team will evaluate new and existing fungicide products efficacy and economics. Results will determine what will optimize ROI for environment-specific disease management across locations and identify where intensive fungicide use is financially advantageous.

Key Results

Field trials across seven states were established, examining levels of soybean disease management with seed treatments and foliar fungicides. Field trials for biological control of sudden death syndrome with seed treatments, and multiple foliar fungicide programs have also been established. Management for white mold by biological control agents is being investigated in field trials. Four biological seed treatment products for the control of oomycete pathogens is being evaluated. These trials will be inoculated with Pythium or Phytophthora for disease reduction or will be planted into fields with a history of soybean seedling diseases.

The farmer survey was created and distributed in the third quarter of 2025.

The team is updating publications Fungicide Efficacy for Control of Soybean Foliar Diseases, Fungicide Efficacy for Control of Soybean Seedling Diseases, and Soybean Disease Loss Estimates from the United States and Canada. New publications are under development including Scouting for Soybean Stem Diseases and Monitoring for Resistance to the SDHI Fungicide Seed Treatments ILEVO and Saltro for SDS Management. The Crop Protection Network released a video, White Mold: Insights and Updates for 2025.

Benefits for Farmers

This project delivers decision-making support for farmers to refine their disease management practices. Growers will discover which combinations of fungicides, seed treatments, and cultural techniques are most likely to offer a profitable return under their environmental conditions. The developed decision-support tools, such as the ROI calculator, put real-time economic data at farmers' fingertips to avoid unnecessary expenses and to better target investments in fungicides or biological products.

The uniform trials on white mold, seedling diseases, and sudden death syndrome will provide practical, unbiased data, giving farmers a clear sense of how well biologicals stack up against conventional controls.

The survey of farmer practices ensures the research remains grounded in real-world challenges. By capturing insights into why farmers make certain decisions and what knowledge gaps persist, the team can craft targeted extension resources, update efficacy tables, fact sheets, and webinars that address farmer needs.

The multi-state collaboration allows for the pathologists to be prepared for rapid responses to evolving threats. As new diseases emerge and changes in production systems occur, these specialists can share data, solutions and strategies across state lines, building a supportive infrastructure to keep farmers well-prepared, profitable, and competitive.

Additional Resources

White Mold ROI Calculator: https://cropprotectionnetwork.org/white-mold-roi-calculator

SRIN article: White Mold ROI Calculator Available for North Central Farmers

Boots on the Ground 2: AI-driven Tools for Maximizing Soybean Yield and Profitability

Funding: $500,000

Principal Investigator:

Shawn Conley, University of Wisconsin

Co-Principal Investigators:

Joe McClure, Iowa Soybean Association

Maninder Singh, Michigan State University

Lindsay Malone, North Dakota State University

Paul Esker, Pennsylvania State University

Christian Krupke, Purdue University

Laura Lindsey, Ohio State University

Nick Seiter, University of Illinois

Nicolas Cafaro La Menza, University of Nebraska

Scan the QR code to read about the project on the National Soybean Checkoff Research Database

Overview of Project Objectives

The first objective of this project is to test the Agroptimizer across the North Central region. The Agroptimizer is a new machine learning, cloud-based decision support tool that was developed to identify optimum corn and soybean cropping systems for maximum yield and profitability from among thousands of possible cropping systems a farmer can choose from in a single field. The second objective is to test a script for integration into the OCM that allows for real-time monitoring of fields with satellite images to detect potentially problematic areas within each field.

The third objective is to add a defoliation assessment to the Open Crop Manager (OCM), a management support tool created as a result from a previous NCSRP project. The digital defoliation tool can rapidly assess the level of herbivory and estimate whether the sampled leaves are at threshold levels for action. The integration of this defoliation estimator will provide a quick, easy, and repeatable way to confirm whether intervention for defoliating insects is necessary, adding a new dimension to the platform's ability to assist in scouting and decision making.

Key Results

By the end of 3-year project the team will have validated the efficacy of two decision-making tools: the Agroptimizer, a machine learning cloud-based tool to identify management practices that can increase yield and profit across the North Central region; and the Open Crop Manager, a satellite-assisted scouting tool and a defoliation assessment tool to detect yield-limiting factors during the growing season. We expect the combined use of these tools can substantially increase farm profitability. Upon successful validation, these tools can have an immediate impact in farming operations since they are already developed.

The team is also strengthening state-to-state research collaboration through the managed coordination of the on-farm network as well as leveraging existing NCSRP funding to secure national funding opportunities.

To this point OCM has logged the following data: total scouting reports: 10,039; total images: 10,069; total production surveys: 900; total users: 102. Data is from 12 north central states, plus New York (just counting scouting reports and images). Overall, the potential impact of the outcomes derived from this study are significant and attainable for the entire NCSRP growing region.

Benefits for Farmers

The combined use of these tools have the potential to help North Central farmers protect and increase yield, profit, and sustainability in their fields. They could substantially increase farm profitability by identifying field-specific best management practices and applying pesticides when and where needed through precision scouting.

Additional Resources

www.agroptimizer.com

Open Crop Manager: https://open-crop.vmhost.psu.edu

SRIN article: New Decision Tool Helps Farmers with ROI at the Field Level

Management Tactics and Tools for Insect Pests in the North Central Region

Scan the QR code to read about the project on the National Soybean Checkoff Research Database

Funding: $363,711

Principal Investigator:
Justin McMechan, University of Nebraska

Co-Principal Investigators:
Erin Hodgson, Iowa State University
Brian McCornack, Kansas State University
Janet Knodel, North Dakota State University
Deirdre Prischmann-Voldseth, North Dakota State University
Adam Varenhorst, South Dakota State University
Andy Michel, Ohio State University
Kelley Tilmon, Ohio State University
Doris Lagos-Kutz, University of Illinois
Nick Seiter, University of Illinois

Raul Villanueva, University of Kentucky
Robert Koch, University of Minnesota
Ivair Valmorbida, University of Missouri
George Graef, University of Nebraska
Ian Keesey, University of Nebraska
Louis Hesler, USDA-ARS - National Center Agricultural Utilization Research

Overview of Project Objectives

The project consists of seven program areas including work on management of the soybean gall midge, soybean tentiform leafminer, soybean aphid, Dectes stem borer, and soybean thrips. In addition to advancing knowledge on these soybean pests, is updating and creating outreach materials for farmers such as a new regional field flip book on soybean gall midge biology, a fact sheet about the soybean tentiform leafminer and expanding 3D printing for products that farmers can use.

Key Results

The soybean gall midge (SGM) knowledge increases annually. Stem burial studies were established this crop season and the SGM Alert Network has expanded across eight states and two Canadian provinces. Pheromone selection protocols were established, as data supports improved adult detection potential. Several states are collecting data on possible SGM resistant soybean lines, with 45 lines being tested, and crossbreeding has begun to start the process of identifying resistant genes. Insecticide treatments are also being evaluated in three states. A Soybean Gall Midge Field Guide is being developed, and the annual webinar on this pest was held in Feb. 2025 with 178 live attendees.

Field survey work has been developed for the soybean tentiform leafminer and Koch led a scouting and ID session. Work continues on soybean aphid management with growing of varieties for possible resistance. Evaluation strategies were developed for management of the Dectes stem borer, which focus on an innovative, scalable tool for risk assessment. Supplies were distributed to participants and suction traps were established to analyze soybean aphid and thrips.

Benefits for Farmers

This project is designed to help farmers protect their soybeans from emerging insect pests, ensuring higher yields and greater profitability. Farmers will gain access to better pest management strategies, improved risk assessments, and practical recommendations based on real-world data

Soybean gall midge has the potential to cause 31% yield losses on a whole field basis in affected areas. This research will provide farmers with better detection tools, optimized insecticide application methods, and insights into resistant soybean varieties. Similarly, efforts to track and manage soybean tentiform leafminer will help farmers stay ahead of potential threats and reduce crop damage.

This project will test new Rag soybean varieties to determine their effectiveness against soybean aphids and provide farmers with recommendations for maximizing protection. Farmers will have clarified economic impact of the Dectes stem borer as well as possible effective management strategies to prevent lodging and yield loss. Farmers will also benefit from an expanded pest-monitoring network that tracks threats like soybean thrips, which spread Soybean Vein Necrosis Virus, affecting seed quality. By developing predictive tools, farmers could have early warnings and proactive management options.

Additional Resources

Soybean Gall Midge Alert Network: https://soybeangallmidge.org
SRIN article: Soybean Gall Midge Fight Continues

SOYGEN3: Building Capacity to Increase Soybean Genetic Gain for Yield Through Combining Genomics-Assisted Breeding with Characterization of Future Environments

Scan the QR code to read about the project on the National Soybean Checkoff Research Database

Funding: $715,000

Principal Investigator:
Aaron Lorenz, University of Minnesota

Co-Principal Investigators:
Asheesh Singh, Iowa State University
William Schapaugh, Kansas State University
Dechun Wang, Michigan State University
Carrie Miranda, North Dakota State University
Katy Rainey, Purdue University
Leah McHale, Ohio State University
Matthew Hudson, University of Illinois
Nicolas Frederico Martin, University of Illinois
Andrew Scaboo, University of Missouri

George Graef, University of Nebraska
David Hyten, University of Nebraska
Rex Nelson, USDA-ARS, Iowa State University

Overview of Project Objectives

Project objectives include: continue to develop and enhance genomics-assisted breeding resources and tools to facilitate routine application in public breeding programs; develop and test methods for predicting cultivar performance in target environments through genomics-assisted breeding models, phenomics, and environment characterization; and discover structural variants and test whether modeling structural variants improves genomic predictions for yield and seed composition.

Key Results

The team continues work so that public breeders have standardized, validated tools and technologies for executing genomic prediction. They have developed an application tool to helps breeders with easier implementation of genomic selection. The team is also developing a non-destructive method to evaluate crop biomass under different environmental stressors using drone imagery to provide measurements at canopy. From this, the team implemented two modeling strategies for reliable biomass predictions across growth stages.

A second project looks at how unbalanced DNA structural changes affect the overall size of the genome. Early tests show that genome size differences seem to be linked with traits like yield, seed protein and oil levels, and fiber content.

Although the two projects started separately, they have similar points: different large-scale DNA processes each describe part of how populations are structured. Ignoring any one of these signals could lead to wrong estimates of genetic relationships and errors in later analyses. This work has already improved the estimation of relationships and the heritability estimates of important traits.

The team has funding support from the Department of Energy Joint Genome Institute for the sequencing of a soybean pan-genome from samples the team is supplying. Nothing like this pan-genome has been created before, in industry or academia, and the results will have a large impact on the ability to improve soybean varieties and the speed with which it can be done.

Benefits for Farmers

Soybean breeding has a large impact on agriculture efficiency and profitability through the development of new high-yielding varieties with critical defensive traits and enhanced seed composition. Ensuring that private and public breeding programs are using state-of-the-art technologies to drive genetic gain in the face of changing environments and narrowing genetic diversity contributes to continual development and release of better soybean varieties. These efforts also help educate future scientists and soybean breeders to enter the seed industry and develop impactful products for farmers.

SoyRenSeq: A Novel Approach for Disease Resistance Gene Discovery and Application for Soybean Improvement

Funding: $588,175

Principal Investigator:

Jianxin Ma, Purdue University

Co-Principal Investigators:

Madan Bhattacharyya, Iowa State University

Dechun Wang, Michigan State University

Carrie Miranda, North Dakota State University

Aaron Lorenz, University of Minnesota

Feng Lin, University of Missouri

Guohong Cai, USDA/ARS

Scan the QR code to read about the project on the National Soybean Checkoff Research Database

Overview of Project Objectives

The goals of this collaborative, multi-state, and multi-disciplinary project are to develop, optimize, and apply the RenSeq (resistance gene enriched sequencing) technology, which can specifically capture, enrich, and sequence resistance genes. This project is expected to provide novel resources of disease resistances and expedite the development of disease-resistant soybean cultivars through resistance (R) gene-based precision selection.

Specific objectives include: developing a high-quality RenSeq platform; sequencing and assembling gene clusters (nucleotide-binding site-leucine-rich repeats, or NBS-LRR) in major soybean lines to carry resistance to soybean pathogens; analyzing resistance gene expression and responses to various soybean pathogens; evaluating resistance to various pathogens and mapping major resistance genes and genetic regions (quantitative trait loci, or QTLs); and developing candidate R-gene-based molecular markers for precision breeding.

Key Results

Two objectives were fully achieved in previous years; three objectives will be fully completed by the end of the project. The team has analyzed gene expression in varieties conferring resistance to Phytophthora and frogeye leaf spot, and are conducting similar analysis for Fusarium and wild mold. The QTLs in these varieties have been anchored to R gene clusters on specific chromosomal regions, and this information combined with R gene expression analysis have pinpointed several genes as candidates for disease resistance to Phytophthora.

All PIs have been making efforts on evaluation of novel resistances to specific pathogens, construction of new populations for genetics analysis, and/or mapping of major R genes or QTLs.

Regarding the objective Development of Candidate R-Gene-Based Molecular Markers for Precision Breeding, progeny lines were advanced that carry the novel Rps genes but show early maturity so they can be used by the breeders in this project. Markers for other disease resistance will be designed once candidate genes for a particular resistance are further validated.

Benefits for Farmers

This project explores, applies and optimizes the game-changing new gene identification and sequencing technique for rapid discovery of resistance (R) genes to Midwest soybean pathogens. These enabling technologies and tools will facilitate adding disease resistance genes into soybean cultivars more quickly, precisely and accurately, to improve soybean protection from disease and increase profitability for soybean growers.

The SCN Coalition: A Checkoff-led, University-driven, Industry-supported Partnership Battling Soybean's Biggest Underground Threat

Funding: $240,000

Principal Investigator:

Dylan Mangel, University of Nebraska

Co-Principal Investigators:

Gregory Tylka, Iowa State University

Rodrigo Onofre, Kansas State University

Tim Todd, Kansas State University

George Bird, Michigan State University

Marisol Quintanilla, Michigan State University

Angela Tenney, Michigan State University

Samuel Markell, North Dakota State University

Febina Mathew, North Dakota State University

Richard Webster, North Dakota State University

Guiping Yan, North Dakota State University

Alyssa Collins, Pennsylvania State University

Paul Esker, Pennsylvania State University

Adriana Murillo Williams, Pennsylvania State University

Darcy Telenko, Purdue University

Lei Zhang, Purdue University

Scan the QR code to read about the project on the National Soybean Checkoff Research Database

Madalyn Shires, South Dakota State University

Jason Bond, Southern Illinois University at Carbondale

Horacio Lopez-Nicora, Ohio State University

Nathan Schroeder, University of Illinois

Seth Naeve, University of Minnesota

Jefferson Barizon, University of Missouri

Mandy Bish, University of Missouri

Shawn Conley, University of Wisconsin

Ann MacGuidwin, University of Wisconsin

Damon Smith, University of Wisconsin

Overview of Project Objectives

The SCN Coalition was formed to help growers reduce their risk to the yield threat caused by soybean cyst nematode. The focus for this year is on research advancements and economics regarding SCN. Specific objectives include recruiting partners and increasing partner relations; updating training presentations and other educational materials as research progresses; and continue the ongoing, robust communications efforts through various media.

Key Results

The reach of NCSRP funding has helped The SCN Coalition leverage additional sponsorship from corporate partners, which expands the impact of the Coalition. Promotions including National Nematode Day and the SCN Profit Checker were able to continue and expand.

Additionally, the Coalition was able to engage with agricultural media and social media to reach more farmers about the importance of knowing how to manage SCN.

National market research was conducted in December 2024 and found that 27% of farmers were soil sampling, which is up from 18% a decade ago; 56% were rotating genetic sources of SCN resistance, up from 39% in 2015; 42% are using a nematode-protectant seed treatment, up from 22%. Media activities continued to increase during this time period. Four news releases were released in FY25, bringing the total since the launch of The SCN Coalition to 1,281 online articles.

Benefits for Farmers

Despite great advancements in understanding and management, there remains a large number of farmers who can still improve yields by implementing SCN management tools. Some farmers have tested their soil and know they have SCN, but they may be unaware of its increasing pressure due to adaptation to SCN-resistant varieties. Additionally, scientists are making advancements in research and farmers need to know of these strides. The SCN Coalition aims to build in the project's success for increased awareness and understanding of this deadly soybean disease.

Additional Resources

The SCN Coalition website: https://www.thescncoalition.com

The SCN Profit Checker: https://www.thescncoalition.com/profitchecker/

The North Central Soybean Research Program is recognized as a leader in multi-state collaborative research and outreach efforts to support soybean farmers and drive the soybean industry forward.

The focus of NCSRP is soybean production research and extension outreach. NCSRP's emphasis on enhancing and protecting soybean yield through genetics, basic biology, physiology, molecular biology, agri-technologies, and agronomic practices contributes to farmer success today and tomorrow.

NCSRP
NORTH CENTRAL SOYBEAN RESEARCH PROGRAM

MISSION:

NCSRP will serve as a bridge between state and national soybean organizations and will be the recognized leader in funding and communicating basic and applied soybean research programs that are highly collaborative and uniquely appropriate in addressing soybean production, profitability and environmental sustainability for growers across the North Central region.

GUIDING STATEMENTS:

1. NCSRP Executive Board will review overall program impact and success and establish specific research priorities of regional importance on a five year cycle (e.g. key diseases, insects, production practices, etc.).

2. NCSRP funded programs and projects will not be redundant with current state (QSSB) or nationally (USB) funded programs but may complement and extend state or nationally funded projects when addressing the common interests and needs of North Central region soybean growers.

- NCSRP will maintain communication and collaborative connectivity with QSSBs and the USB to maintain awareness of state and national soybean research priorities and funding.
- Regional researchers submitting proposals for NCSRP funding must provide clear statements of research being funded by a QSSB or the USB.

3. Multi-year research project or program proposals will be accepted for funding consideration, but annual renewal will be predicated on successful generation and communication of meaningful annual results.

4. NCSRP emphasizes the collection, compilation and dissemination of research results through appropriate peer reviewed scientific abstracts and journals, extension publications, farmer-focused bulletins, appropriate websites (Soybean Research & Information Network) and databases (National Soybean Checkoff Research Database).

COLLABORATIVE SOYBEAN RESEARCH OBJECTIVES AND PRIORITIES:

1. Soybean yield and quality enhancement through genetic improvement and biotic and abiotic stress mitigation for soybean maturity groups 0-IV.

- Classical and molecular soybean breeding efforts that will enhance yield potential and yield stability clearly focused to the North Central region.
- Research that addresses the control of insects and diseases (defensive traits) with consistent or potentially significant economic impacts across the North Central region.
- Research that addresses weed resistance to herbicides for species of common occurrence and threat across the North Central region.
- Research that addresses soybean response to water, nutrients, soil and environmental conditions unique to the North Central region.

2. Soybean production practices that will increase yield, profitability and environmental stewardship specific to the North Central region.

- Soybean–corn rotations
- Plant populations, row spacing and input management
- Water quality and watershed planning
- Cover crops and other conservation agronomy
- Soybean production sustainability and life cycle assessment
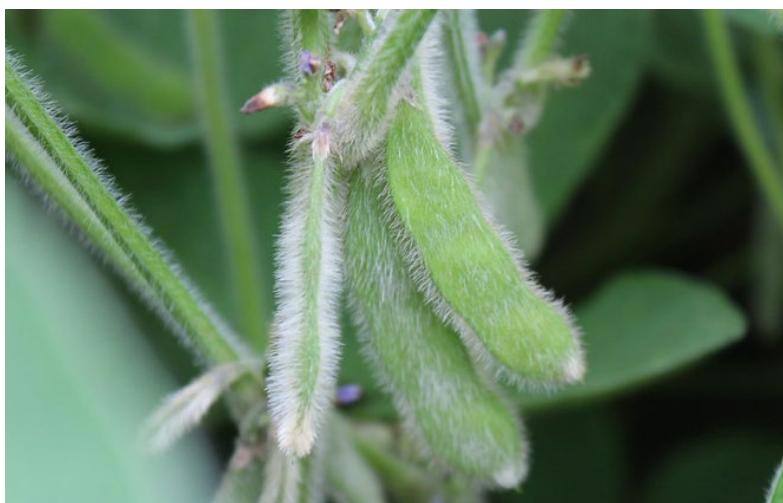
FY2025 BUDGET

Checkoff amount invested in production and applied research = $3,328,086

State contributions = $3,200,000
USB partial support for operations and SRIN = $272,000
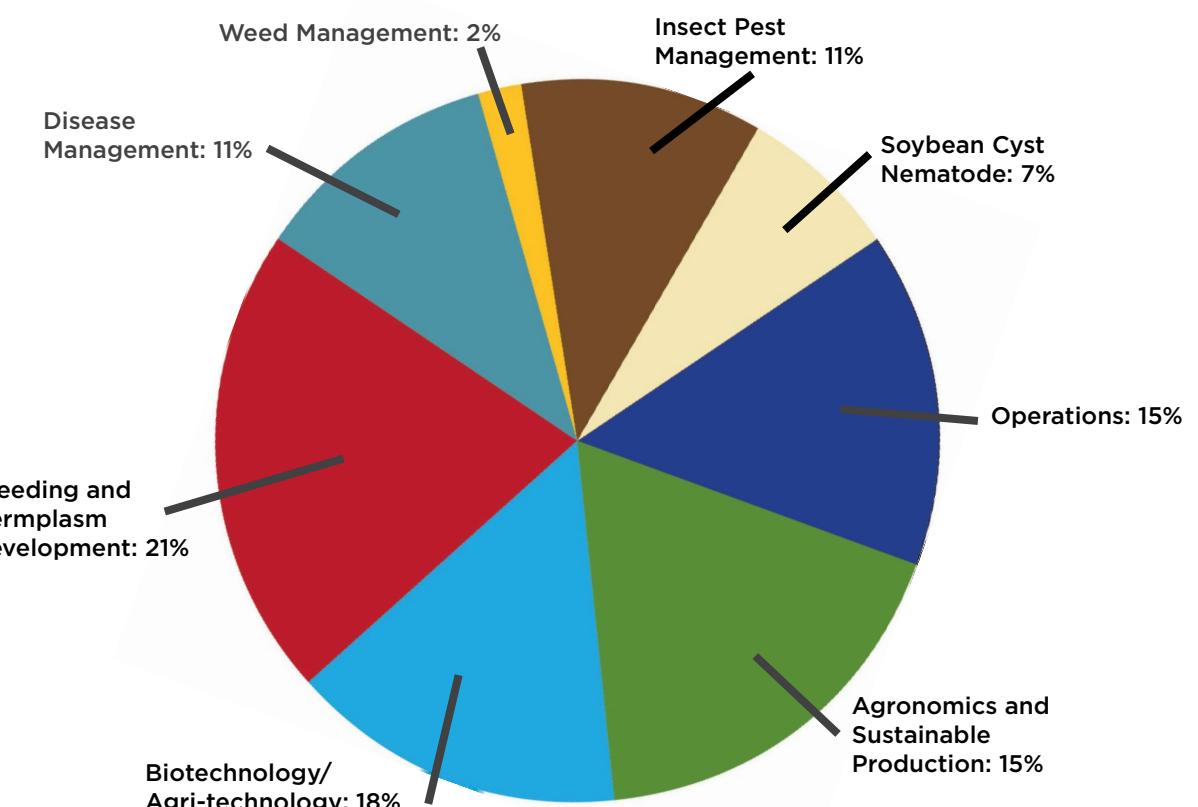
Weed Management: 2%
Insect Pest Management: 11%
Disease Management: 11%
Soybean Cyst Nematode: 7%
Operations: 15%
Breeding and Germplasm Development: 21%
Agronomics and Sustainable Production: 15%
Biotechnology/Agri-technology: 18%

SOYBEAN RESEARCH & INFORMATION NETWORK

www.SoybeanResearchInfo.com

Your go-to resource for NCSRP and other Soy Checkoff-funded research results. The Soybean Research & Information Network (SRIN) is a comprehensive communication hub based on scientific research results and includes up-to-date articles, guides, and decision-making tools for farmers.

ILLINOIS SOYBEAN ASSOCIATION

INDIANA SOYBEAN ALLIANCE®

IOWA SOYBEAN Association

KANSAS SOYBEAN COMMISSION

MICHIGAN SOYBEAN COMMITTEE

MINNESOTA SOYBEAN GROWERS ASSOCIATION

MISSOURI SOYBEANS

NEBRASKA SOYBEAN BOARD

ND SOYBEAN COUNCIL

OHIO SOYBEAN COUNCIL

PSB Pennsylvania Soybean Board

SOUTH DAKOTA SOYBEAN CHECKOFF

WISCONSIN SOYBEAN MARKETING BOARD

UNITED SOYBEAN BOARD™