IOWA STATE UNIVERSITY
Iowa Soybean Research Center

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ISRC Funds Three Soybean Researchers in 2020

The Iowa Soybean Research Center's (ISRC) Industry Advisory Council met in September to discuss 22 research project ideas and offer their recommendations. Following that meeting, the ISRC awarded $256,000 in funding to three soybean research projects at Iowa State University.

Thomas Baum, plant pathology and microbiology, will receive funding for a two-year project on "Mechanisms of defense suppression by cyst nematode effectors." Baum's research will focus on determining how a small group of molecules called effectors that are produced by cyst nematodes suppress or inactivate plant immunity. Understanding how the effectors interfere with plant defenses may reveal strategies to strengthen natural plant defense mechanisms.

Leonor Leandro, plant pathology and microbiology, will receive funding for a two-year project titled "Time of disease onset as an early indicator of soybean resistance to SDS." Recent results in the Leandro lab with a single soybean variety suggest management practices that delay the onset of soybean sudden death syndrome (SDS) disease symptoms could be most effective at protecting soybean yield. With funding from the ISRC, new research will determine if time of SDS symptom onset can be a useful measure for early screening of soybean genotypes for SDS resistance.

Lie Tang, agricultural and biosystems engineering, will receive funding for a two-year project on "In-field soybean seed pod analysis on harvest stocks using 3D imaging and machine learning." Through advancement of 3D-sensing technologies, Tang's Agricultural Robotics lab at Iowa State University has made breakthroughs

in field-based plant trait identification, or phenotyping, for maize and sorghum. With funding from the ISRC, they will work to extend those technologies and innovations into field-based soybean plant phenotyping.

“We are extremely grateful to our Industry Advisory Council for helping with the decision-making process and we would like to thank the researchers who submitted ideas for 22 deserving projects,” said ISRC Director Greg Tylka. “We are also thankful for our industry partners who help make this research possible through their funding of the center.

“In a time of decreased check-off revenues, leveraging those funds with public-private partnerships, such as with the ISRC, has become even more important in ensuring our ability to continue funding soybean research,” said Ed Anderson, senior director of research for the Iowa Soybean Association and chair of the ISRC advisory council. “It’s exciting to see the caliber and innovation of soybean research at Iowa State University, the commitment and engagement of industry partners, and how all of this will eventually benefit Iowa’s soybean farmers.”

Physically distanced and via video conferencing, the ISRC's Industry Advisory Council met in September. In forefront: Randy Miller, soybean farmer and ISA director. In back, from left: Will Cornelius of Cornelius Seed, Ed Anderson of ISA and Greg Tylka of ISRC.

ISRC Hits $1 Million Milestone in 2019

The ISRC is excited to share that in its first five years of supporting soybean research, it hit the million-dollar mark! Eleven Iowa State University faculty received funding for the projects listed in the table to the right.

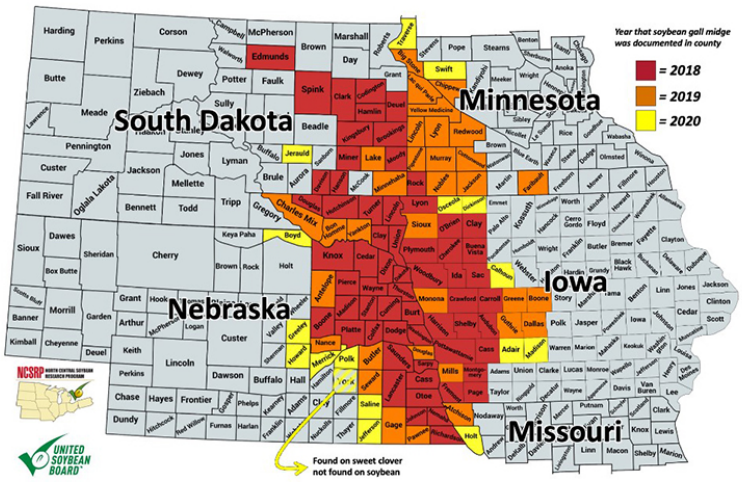
Funding for research from the ISRC was made possible due to financial support provided by the Iowa Soybean Association and the center's industry partners: AMVAC, BASF, Bayer, Cornelius Seed, Corteva, FMC, GDM, Merschman Seeds and Syngenta.

ISRC Funded Research 2015-2019

Award Year	Researcher	Project
2019	Steve Whitham	Virus-mediated Gene Editing in Soybean
2019	Prashant Jha	Hyperspectral Imaging for Early Detection of Herbicide-Resistant Weeds in Soybean
2018	Fernando Miguez Peter Kyveryga	ISOFAST – Mastering Agronomic Decisions Through Interactive On-line Summaries of On-farm Replicated Strip Trials
2018	Arti Singh	Machine Learning Framework to Identify and Quantify Multiple Biotic and Abiotic Stresses in Soybean
2016	Gwyn Beattie Danny Singh	Root and Microbiome Traits to Tailor the Next-Gen Soybean Cultivars
2015	Steve Bradbury	Iowa Pest Resistance Management Plan
2015	Sotirios Archontoulis	Cropping Systems Modeling Tools to Improve Soybean Management and Yield in Iowa
2015	Matt Darr	Integrated Research and Education Program for Use of Remote Sensing and UAVs for Enhanced Soybean Production
2015	Thomas Baum	RNA-based Approaches for Resistance to Nematode and Fungal Pathogens of Soybean

Soybean Gall Midge Found in 19 New Counties

According to researchers with the Soybean Gall Midge Alert Network, the insect was identified in 19 new counties in 2020. In Iowa, new counties included Adair, Calhoun, Dickinson, Madison and Osceola. In total, infested fields have been found in 112 counties in five states.



Above is a map of counties in which fields infested with soybean gall midge have been found. Image courtesy of the Soybean Gall Midge Alert Network.

As researchers continue to study this new crop pest, their advice to farmers seeing significant damage is to harvest field borders of heavily damaged fields first to avoid additional losses from early maturing plants and lodging.

Erin Hodgson, professor of entomology at Iowa State, gave an update on the pest during the ISRC's Industry Advisory Council meeting in September. She says researchers have been studying its life cycle and trying to figure out how it overwinters in soybean. Some advice and findings so far include scouting field edges and areas next to dense vegetation, early planted soybeans tend to see more of the pest than late planted soybeans, gall midge infests at the V3 stage or older, and adults are non-feeding. In addition to soybean, Hodgson says the midges also like alfalfa and sweetclover. And while spread of this pest has been relatively slow, it will be interesting to see what effect, if any, the Derecho had on things.

Several chemical, cultural and host plant resistance studies were conducted this year with some visual differences between treatments occurring during the season. An online event is being developed to provide an update on research results from the season.

The Soybean Gall Midge Alert Network is made up of collaborating researchers from Iowa State University, the University of Nebraska, University of Minnesota, South Dakota State University, Pioneer Seeds and Ruskamp Seeds. The group receives funding from the United Soybean Board, North Central Soybean Research Program, University of Nebraska Extension, Nebraska Soybean Checkoff, and the North Central Integrated Pest Management Center.

AMVAC Partners with ISRC

AMVAC Chemical Corporation has joined the ISRC as an industry partner. In this role, AMVAC provides financial support to the center and will have a representative serving on the ISRC's Industry Advisory Council, which provides guidance on research funding priorities for the center.

"We are excited to expand our research investment in Iowa by joining the team at the Iowa Soybean Research Center at Iowa State University. AMVAC has enjoyed a successful history partnering with ISU research teams for a wide range of crop and non-crop solutions from precision planting to innovative crop solutions," said Peter Porpiglia, vice president, Global Product Development and Technical Support.

“I am delighted to have AMVAC join the group of industry partners of the center. Having worked on research with AMVAC for numerous years, I know first-hand that they will provide valuable perspective and guidance to the center’s Industry Advisory Council,” said Greg Tylka, director of the ISRC and a professor of plant pathology and microbiology at Iowa State.

Iowa Soybean Assoc. Funds Iowa State Research

The Iowa Soybean Association (ISA) announced financial support for eight research projects at Iowa State University. Funding for the projects was decided during the ISA's Supply Committee and full Board meeting in June.

"The Iowa Soybean Association is happy to provide funding support for these exciting research topics," said Ed Anderson, senior director of research for the ISA. "We look forward to learning the findings of these projects and how the information can be used to benefit our Iowa soybean farmers."

Following is the list of projects that will receive ISA funding for 2020-2021.

- **Madan Bhattacharyya**, agronomy: "Stacking Four Plant Genes to Provide Durable and Enhanced SCN and SDS Resistance in Soybean"
- **Erin Hodgson**, entomology: "Aphids and Midges - Something Old and Something New in Iowa Soybean"
- **Prashant Jha**, agronomy: "Chaff Lining: A Harvest Weed Seed Control Technology for Mitigating Herbicide Resistance and Grain Contamination in Iowa Soybean"
- **Mark Licht**, agronomy: "Iowa Contributions to Amplifying Extension Impact: Agronomists Collaboratively Delivering Soybean Best Management Practices"
- **Danny Singh**, agronomy: "Breeding High Yielding Soybean Cultivars for Iowa Farmers"
- **Michelle Soupir**, agricultural and biosystems engineering: "Integrated Agricultural Systems to Promote Soil Health and Environmental Resilience"
- **Greg Tylka**, plant pathology and microbiology: "Evaluating Resistant Soybean Varieties and Seed Treatments to Help Iowa Farmers Maintain High Yields in SCN-infested Fields"
- **Steven Whitham**, plant pathology and microbiology: "Improving CRISPR Gene Editing in Soybean"

Each project will be entered into the National Soybean Checkoff Research Database where readers can find information about project researchers, budget, objectives, experimental plan, semiannual progress report, and final results including how farmers will benefit from the work.

ISRC Affiliates Awarded Federal Funding for Soybean Research

From left: cyst nematode juveniles, soybean aphids and soybean cyst nematode females on soybean root.

Several Iowa State University soybean researchers and ISRC affiliates (listed in bold) have recently been awarded federal grants for soybean research.

Thomas Baum, plant pathology and microbiology and Roger Innes, Indiana University, were awarded federal funding for 2020-2024 for their project titled “Use of the PBS1 Decoy System to Engineer Resistance to Plant-Parasitic Nematodes.” The project is funded by the Plant Biotic Interactions Program, which is a coordinated grants program of the National Science Foundation and the U.S. Department of Agriculture’s National Institute of Food and Agriculture (NIFA). The goal of the project is to develop genetic-based resistance to plant-parasitic nematodes using soybean and the soybean cyst nematode as model pathosystem.

Matt O’Neal, **Erin Hodgson** and Brad Coates, entomology, were awarded funding for their project titled “Detecting Insecticide-Resistant Aphids before Field Failures Cost Farmers” from USDA-NIFA for 2020-2023. The goal of the project is to develop genetic markers to reveal if individual soybean aphids are resistant to pyrethroid insecticides.

Santosh Pandey, electrical and computer engineering, and **Greg Tylka**, plant pathology and microbiology, were awarded funding for their project titled “Automated Instrument to Extract and Quantify Nematode Cysts From Roots of Agricultural Crops.” USDA-NIFA will fund the project for 2020-2024. The goal of the project is to develop an instrument to automate recovery of adult SCN females from soybean roots coupled with high-throughput imaging software to identify and count the cyst nematode females.

Let's Talk Todes!

From left: farmer Matt Biermann, University of Missouri extension plant pathologist Kaitlynn Bissonnette, Iowa State nematologist Greg Tylka and North Dakota State University extension plant pathologist Sam Markell.

In August, Iowa State University was to host the SCN Coalition’s Tode Tour, a gathering of key farmers and agricultural media from across the country, but due to the COVID-19 pandemic those plans had to be changed. With the help of communications firm MorganMyers, the coalition instead is offering a “Let’s Talk Todes” video collection which can be viewed via the SCN Coalition’s website. Growers, scientists and soybean checkoff leaders share best management practices and highlight how partnerships and a checkoff investment in SCN-related research are bringing new tools to combat SCN.

The videos feature coalition members Greg Tylka, Iowa State University; Kaitlyn Bissonnette, University of Missouri; and Sam Markell, North Dakota State University as well as Matt Bierman, a soybean farmer from Mills County, Iowa and Ed Anderson, Iowa Soybean Association. The videos were shot at Iowa State’s Field Extension Education Laboratory (FEEL) near Ames, IA on July 21 and August 31.

Researcher Spotlight: Leonor Leandro

Leonor Leandro

ISRC affiliate Leonor Leandro is a professor of plant pathology and microbiology at Iowa State University. Her research program aims to increase understanding of the biology, epidemiology and management of fungal pathogens of soybeans, with a focus on soybean sudden death syndrome (SDS) and the Fusarium root rot complex. These soil-borne diseases cause millions of dollars in crop loss nationally and are hard to manage due to the long-term survival of fungal structures in soil and a lack of curative treatments.

In addition to running a research lab, she teaches an undergraduate course in mycology and graduate courses in responsible conduct in research and professional speaking skills.

Her current research focuses on the effect of sustainable disease management practices, including diversification of the corn-soybean cropping system using extended crop rotations and cover crops, on soilborne pathogens. These practices have a broad impact beyond disease management since they play major roles in environmental protection by reducing nutrient loss into waterways, reducing soil erosion, and improving soil health. Her research program also includes projects to increase basic understanding of the impact of environmental factors, such as soil moisture, temperature and pH, on disease development.

Leandro is a graduate of the Instituto Superior de Agronomia, University of Lisbon, Portugal and holds an MS from the University of Nottingham, UK. She earned her PhD at Iowa State University where she has been a faculty member since 2006.

Get to Know ISRC Farmer Rep: Jeff Frank

Jeff Frank works on his farm near Auburn, IA. *Photo by Joseph L. Murphy, Iowa Soybean Association.*

Jeff Frank is one of three Iowa soybean farmer representatives on the ISRC's Industry Advisory Council. The council serves to identify research needs in the areas of soybean production and protection for the center. Farmer representatives serve three-year terms on the council and provide input on what research topics are of importance from the soybean farmer perspective.

Frank farms on a century farm near Auburn, IA and is a fourth-generation farmer. He was recently re-elected to serve a second term on the Iowa Soybean Association (ISA) Board of Directors. In this role, he will continue overseeing soybean checkoff and non-checkoff resources and advocating for the interests of soybean farmers in his 16-county district in western Iowa. He is also active in his ISA District Advisory Council, serves on the ISA Demand and Policy Committees, and serves as president of the ISA Research Advisory Committee.

"It is a privilege to serve on the Iowa Soybean Association Board and the Industry Advisory Council of the Iowa Soybean Research Center," said Frank. "To be a part of providing input and having a first-hand look of what advances are taking place and being developed both by the ISA Research Center for Farming Innovation and

Iowa State's ISRC is exciting. The advancements, knowledge and persistence that these two organizations produce is what we as farmers need to solidify our existence in an ever-changing environment of demand and sustainability. Both of these committees value the input and participation that individual farmers and industry supply to them. The collaboration between the two, I feel, is unmatched, both working towards the same goal of making Iowa soybean farmers the most respected producers around the world."

In addition to his involvement with the ISA and ISRC, Frank has served as a Sac County Farm Bureau board member, a member of the U.S. Meat Export Federation, and on the board of the newly created Iowa Smart Agriculture Group. He received the 2014 Environmental Ag Leader Award and was recognized as a Century Farm at the Iowa State Fair and as a 2015 Ag Leaders Program participant.

As a fun side note, in 2017, he and wife Ellen became coffee roasters and started their business, Little Green Truck Coffee Co., which has been highlighted in several Iowa-based publications.

Soybean Protein Proposal Receives Funding

As mentioned in the ISRC's July newsletter, Katy Rainey, associate professor of agronomy at Purdue University and director of the Purdue Soybean Center, submitted two proposals to the United Soybean Board for funding. The proposals were for projects based on ideas that came from a brain-storming session with the Soybean Centers Coordination Group. Rainey recently announced that her proposal on soybean protein had been selected for funding.

The project will include information-gathering sessions with stakeholders conducted by Purdue University, Iowa State University and the University of Missouri to explore future opportunities for the soybean industry in regards to plant-based protein. Session participants will be asked to identify high priority research areas, to understand the issues important to customers, scientists and partners and to develop and/or strengthen relationships between and among the stakeholder groups.

SCN Coalition Wins Best of Show NAMA Award

The SCN Coalition received national honors, winning one of only five National Best of Show National Agri-Marketing Association (NAMA) Awards in Public Relations for its media relations campaign to increase the number of growers who are actively managing the soybean cyst nematode (SCN). Since its launch in 2018, the Coalition's media outreach efforts have generated 19.1 million potential impressions among North America's soybean growers and agronomists.

Iowa State University's, Greg Tylka, director of the Iowa Soybean Research Center and a professor of plant pathology and microbiology, was the founder and leader of the original SCN Coalition in the late 1990s and is co-leader of the current effort. Today, the SCN Coalition includes university scientists from 28 states and Ontario, grower checkoff organizations such as the North Central Soybean Research Program (NCSRP), United Soybean Board (USB) and state soybean promotion boards, as well as partners in the private sector, including BASF, Bayer, Growmark, Nufarm, Pioneer (Corteva), Syngenta, Valent and Winfield United. The full media release is available on the ISRC website.

Upcoming Events

- Wednesdays at noon - Weekly Iowa Learning Farms Webinars
- November 2-6, free registration - ISU Seed Science & Technology Webinar Series
- December 1-February 4, $45 registration - CropsTV – ISU Extension

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