IOWA STATE UNIVERSITY

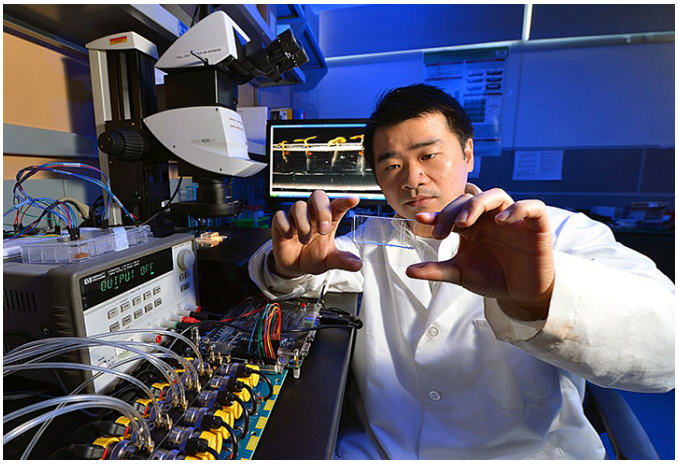
Iowa Soybean Research Center

April 2021 Newsletter

Vol. 9

Visit our website at www.iowasoybeancenter.org

ISRC Affiliates Receive Research Funding



Lisa Schulte Moore, *photo by Christopher Gannon, Iowa State University* and Liang Dong, *photo by Bob Elbert, Iowa State University*.

Iowa State researchers and ISRC affiliates Lisa Schulte Moore, natural resource ecology and management, and Liang Dong, electrical and computer engineering, recently received notable research grants.

Schulte Moore will expand her research into “Science-based Trials of Row-crops Integrated with Prairie Strips” (STRIPS) after receiving a $1.1 million, three-year grant from the Bia-Echo Foundation of Palo Alto, California. The project will look at ways to reintegrate prairie to help regenerate soil quality, research she has been involved with over the past 15 years. By interlacing prairie strips into farm fields, she has noted benefits to soil and water quality, habitats and reductions in greenhouse gas emissions. The STRIPS trials will take place in 12 states including Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Mississippi, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin. More information can be found in an article from the Iowa State Daily.

Dong was awarded a research seed grant from Iowa State, through the Office of the Vice President for Research (OVPR), for his project, “Conformal Electrical Property Tomography for Nondestructive, In-Field Measurement of Stalk Integrity.” His work will focus on developing a non-destructive, highly accurate, high-throughput measurement system to assess corn stalk integrity. In addition to using sensor technology he developed, Corteva Agriscience will serve in an industry partner support role. According to an announcement from the OVPR, “the uniqueness of this research provides an opportunity to develop a first-of-its-kind in-field, low-cost stalk integrity measurement device that can help seed companies evaluate and accelerate the commercialization of new varieties, while providing growers with valuable early – and accurate – detection of disease or insect infestations.” Seed grants are made possible through funding allocated by the Iowa Legislature and provide up to $50,000 in funding.

ISA & NCSRP Requests Proposals, Due May 24

The Iowa Soybean Association and the North Central Soybean Research Program (NCSRP) both recently released their requests for proposals. Following are links to each call for proposals and their required application forms. Please note, the due date of submission of proposals to both organizations is 5 p.m. CDT, May 24.

ISA: https://iastate.box.com/s/498q0ksjdu7a5s6k7w6hscb03z7iexpf

NCSRP: https://iastate.box.com/s/qckwcavp64jp9skqfldktx0vw35fvc71

Welcome New Department Chair Steven Harris

The ISRC would like to welcome Steven Harris, new chair of plant pathology and microbiology and of entomology at Iowa State. He started on April 1. Harris had been serving as professor and head of biological sciences at the University of Manitoba before coming to Iowa State and had also been a professor in plant pathology at the University of Nebraska.

Steven Harris

With over 30 years of experience working on the genetics, cell biology and genomics of yeasts and filamentous fungi, Harris has made significant contributions to understanding the morphogenesis of fungal cells. His research has been funded by the National Science Foundation, NASA, the American Cancer Society and the Natural Sciences and Engineering Research Council. He holds a B.S. and M.S. in biology from the University of Windsor, Ontario and a Ph.D. in genetics from the University of Michigan.

Harris will serve on the ISRC Management Team, which makes funding decisions for the center based on feedback from the Industry Advisory Council.

Gwyn Beattie served as interim department chair and Greg Tylka as interim associate department chair for plant pathology and microbiology during the search after Thomas Baum stepped down in January 2020. Baum had served as department chair for nearly 15 years.

Iowa Soybean Association Researchers Present Webinars

The ISA is offering Innovation to Go! webinars throughout the year. Links to the first three can be found on ISA's YouTube Channel via the links below.

Theo Gunther, ISA Senior Research Program Development Coordinator, presents during a recent ISA webinar.

"Using research to improve your farming operation" introduces the ISA's Research Center for Farming Innovation and explains how to get involved with ISA research opportunities. Topics include regional research priorities, current results and ways to connect with the ISA.

"Science-based solutions for your farming operation" provides key takeaways from recent studies of enhanced nutrient and cover crop management and how a cropping systems approach leads to increased productivity and profitability.

"Utilizing the Cover Crop Simulator for Economic Success" offers an overview of a new web-based tool developed by the ISA called the Cover Crop Economic Simulator. The simulator was designed to help users measure

environmental and economic outcomes of cover crops.

ISRC Funding Highlight

Each year, the ISRC funds soybean-related projects to address research priorities of importance to the ISRC Industry Advisory Council. The council is made up of representatives from the ISA, Iowa soybean farmers, and the center's industry partners. Following is an update on a project that received funding from the center from 2019-2021.

Hyperspectral Imaging for Early Detection of Herbicide-Resistant Weeds in Soybean

Prashant Jha, *photo courtesy of Iowa Learning Farms.*

Prashant Jha, agronomy, Iowa State, and Joseph Shaw, electrical and computer engineering, Montana State, are collaborating on a project that was funded by the ISRC in late 2019. The goal of their project, “Hyperspectral Imaging for Early Detection of Herbicide-Resistant Weeds in Soybean,” is to accurately map (drone-based) the location of herbicide-resistant weed biotypes in production fields using advanced optics and computer algorithms.

Greenhouse and laboratory experiments were carried out in 2020 to identify the spectral reflectance of different biotypes of waterhemp plants resistant to ALS inhibitors, atrazine, and/or glyphosate. Hyperspectral imaging and other measurements were taken using artificial light. More plants are being grown from two different species of pigweed (waterhemp vs. Palmer amaranth).

This summer (2021), Jha plans to mount a hyperspectral camera on a drone to collect data in soybean fields with confirmed herbicide-resistant waterhemp populations. This includes imaging herbicide-susceptible and herbicide-resistant weed biotypes at different growth stages to characterize classification accuracies as plants grow. Images will be analyzed to differentiate waterhemp from other weed species in a soybean field and to identify susceptible vs. resistant waterhemp biotypes. A neural network machine learning algorithm will be used to develop classification images for field-scale maps. Using neural networks instead of previously used support vector machine algorithms will improve classification accuracies from 80% to 99%.

Science for Success

Soybean extension specialists from across the U.S., including ISRC affiliate Mark Licht, agronomy, Iowa State, have been working together on the Science for Success initiative. The initiative, which receives checkoff funding, focuses on leveraging local expertise to provide national soybean “best management practices.” For videos, downloadable PDF fact sheets and a recorded webinar on planting considerations, visit the Soybean Research and Information Network website.

Get to Know IAC Rep: Kelly Gillespie, Bayer Crop Science

Kelly Gillespie

Kelly Gillespie is the Global Research and Development (R&D) Crop Efficiency Portfolio Manager for Bayer Crop Science and serves as Bayer's representative on the ISRC's Industry Advisory Council. Bayer is one of the IRSC's original industry partners.

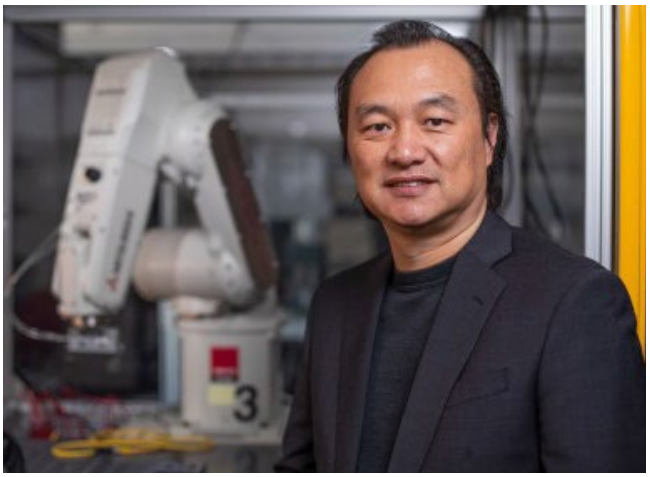
Gillespie sets the vision and R&D plan for sustainable corn and soybean yield improvements by understanding the intersection of technology innovation, grower needs and business strategy. A crop physiologist by training, her areas of expertise include abiotic interactions, applied plant biology, ecophysiology, environmental plant biology, phenomics and physiology. "Bayer Crop Science R&D has an open innovation research model, where we're committed to exploring new ideas and new technologies together with those who are advancing the science," said Gillespie. "Innovation ecosystems like the Iowa Soybean Research Center are critical to this model's success in that you're bringing together academia, industry and farmers to fund next-gen ideas for customer-focused solutions."

A graduate of Knox College in Galesburg, IL, with her B.S. degree, Gillespie earned her Ph.D. at the University of Illinois Urbana-Champaign (UIUC). While at UIUC, she was involved with the SoyFACE agricultural climate change facility, a highly collaborative environment that crossed different disciplines, all under the umbrella of understanding the agro-ecosystem response to climate change. She moved to St. Louis, MO, for a post-doctoral position at the Danforth Center and then joined Monsanto as a crop physiologist.

"I loved the scale and speed of the science directed at real world challenges that I saw happening at Monsanto and I wanted to be a part of it," said Gillespie. Over her ten years at Monsanto, now Bayer, she has held various leadership roles across biotechnology and breeding before taking on her current R&D portfolio strategy role. She has focused on projects and teams that work to intrinsically improve crop performance and sustainability, including such innovations as short stature corn and a 7-acre, automated Marana, AZ production greenhouse. She says, "It's been my experience that diversity of expertise, backgrounds and thinking is where true breakthroughs occur."

Researcher Spotlight: Lie Tang

ISRC affiliate Lie Tang is a professor of agricultural and biosystems engineering at Iowa State. His research interest areas are in automation and robotic systems for agricultural and biological applications, which include high-throughput robotic phenotyping, robotic weed control, and machine vision algorithms for plant and animal monitoring and traits characterization.



Lie Tang in his robotics lab at Iowa State. *Photo by Christopher Gannon, Iowa State University*

Tang has many years of international research experience. He developed an advanced real-time machine vision system for automated behavior monitoring for group-housed pigs in Belgium. During his PhD studies, he developed a machine-vision-based smart sprayer for precision weed control. While on faculty in both Denmark

and the Netherlands, he worked on agricultural robotics and intelligent systems.

At Iowa State, he has established an agricultural automation and robotics lab and has continued research in developing advanced sensing, optimization and robotic technologies for agricultural production systems and high-throughput plant phenotyping systems. He has led the development of the robotic system of the Enviratron, RoAD and PhenoBots, which are for either indoor or infield plant phenotyping. He has been collaborating with ISRC affiliated researchers including Steve Whitham, plant pathology and microbiology, and Liang Dong, electrical and computer engineering. He is also an entrepreneur. After a decade of research and development, he invented the world's most accurate real-time corn plant stand counting system called the Plant Stand Analyzer (PSA) and commercialized it through his startup company FieldRobo LLC. PSA has been adopted by the seed industry for large-scale maize breeding programs.

Last fall, the ISRC awarded Tang funding for a two-year project on "In-field soybean seed pod analysis on harvest stocks using 3D imaging and machine learning," where he will set out to develop an automated technology for soybean seedpod analysis in 3D space. In addition to research, he teaches an automation systems course and is actively engaged in offering students learning and research opportunities in advanced agricultural machinery engineering.

Tang has a B.S. in electrical engineering in industrial automation from the Jiangsu University of Science and Technology, China, and an M.S. in agricultural engineering from Zhejiang University, China. He earned his Ph.D. in agricultural engineering from the University of Illinois at Urbana-Champaign. As a leading agricultural state in the nation, he believes that Iowa offers unique opportunities in agricultural robotics research.

ISRC Affiliate Faculty Receive CALS Awards

From left: Marshall McDaniel, Michelle Soupir, Lie Tang, Greg Tylka and Wendong Zhang.

The ISRC would like to recognize the following research affiliates, including ISRC Director Greg Tylka, who recently received awards from the College of Agriculture and Life Sciences at Iowa State. Congratulations!

Marshall McDaniel, Early Achievement in Teaching

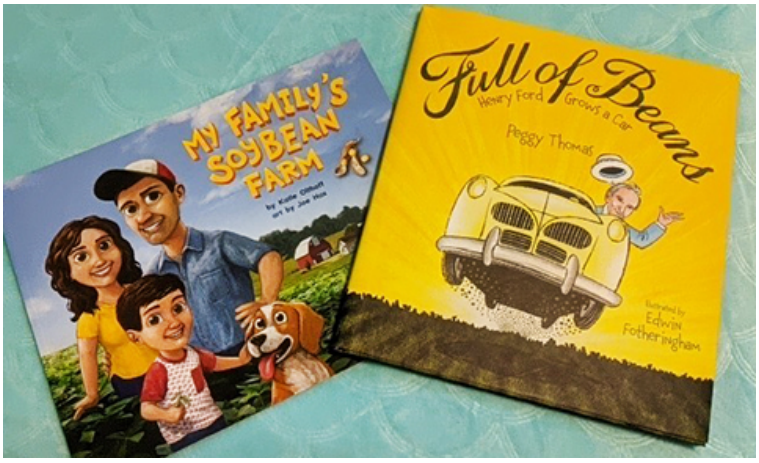
Michelle Soupir, Mid-Career Achievement in Research

Lie Tang, Outstanding Achievement in Research

Greg Tylka, Dean Lee R. Kolmer Award for Excellence in Applied Research

Wendong Zhang, Early Achievement in Extension and Outreach

Good Reads About Beans



In conjunction with National Reading Month and Read Across Iowa in March, ISRC staff were excited to see two new children's books being promoted that feature our favorite topic - soybeans! "My Family's Soybean Farm," written by Iowa author Katie Olthoff, is about a boy who lives on his family's soybean farm. He explains how soybeans grow, are harvested and are used. Another book, "Full of Beans: Henry Ford Grows a Car," written by Peggy Thomas, is about how famous car-maker and businessman Henry Ford made a car from soybeans. The two books were among other agriculture-related books sent to educators across Iowa as part of reading kits to share with their students. Iowa State Extension and Outreach was one of several groups involved in sponsoring the month-long reading celebration.

Save the Date! SoyFest Planned for August 25th

SoyFest

A celebration of soy!

Save the date: Wednesday, August 25, 2021, 10 a.m. to 2 p.m.

As the saying goes, "If at first you don't succeed, try, try again!" Last year, the ISRC's SoyFest celebration had to be postponed due to the pandemic. However, we are excited to announce that the event is back on for 2021! Please plan to join us on Wednesday, August 25, 2021, from 10 a.m. to 2 p.m. on ISU's central campus near Parks Library.

August is Soybean Month in Iowa, and SoyFest is ISRC's campus celebration of all things soy. While intended to be a fun event for students to learn all about soy, the public is welcome to attend this free event and we would love to see some of the ISRC's partners and research affiliates there. Join us for food, fun and giveaways!

In conjunction with SoyFest, ISRC staff plan to host a Meals from the Heartland event on Tuesday, August 24. Meals from the Heartland works to tackle the issues of global hunger and food insecurity by working with volunteers to package meals for delivery to people here in Iowa, the U.S. and around the world. Look for more updates on these activities in our July newsletter and on the ISRC's website.

Upcoming Events

- Wed. at noon - Weekly Iowa Learning Farms Webinars
- Wed., August 25, 2021, Ames, IA - SoyFest

Special thanks to Dr. Keith and Virginia Smith
for providing funding to make this newsletter possible.

Have a newsletter idea or wish to subscribe? Email us at ISRC@iastate.edu