



# 2020 Stakeholder Report

IOWA  
SOYBEAN  
RESEARCH CENTER



In collaboration with the Iowa Soybean Association



# IOWA STATE UNIVERSITY

# About the ISRC

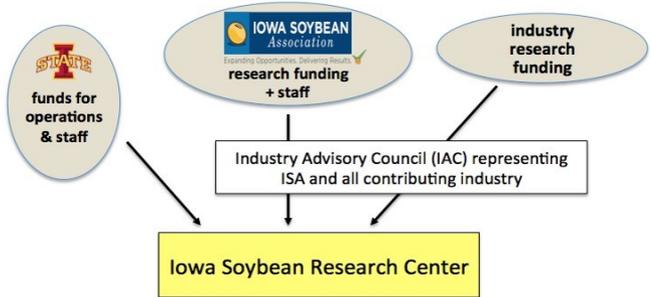
The Iowa Soybean Research Center (ISRC) works in partnership with the Iowa Soybean Association, industry leaders, farmers and researchers at Iowa State University. The goal of this collaborative effort is to identify and fund research in the areas of soybean production and protection. The center involves and helps coordinate research, teaching and extension activities of faculty and staff who work in the areas of soybean biology, breeding, economics, precision agriculture, production and pest management at Iowa State and scientists at the Iowa Soybean Association’s Research Center for Farming Innovation.

## Research Focus

The ISRC-funded research includes traditional and multidisciplinary problem-solving approaches, and sometimes includes machine learning and artificial intelligence tools to accelerate and enhance research efforts. Specific research areas for the ISRC are identified by the center’s Industry Advisory Council.

## Funding

Financial support for the ISRC comes from Iowa State University’s College of Agriculture and Life Sciences, the Iowa Soybean Association and industry partners. Our goal is to seek widespread input and support from individuals representing key segments of the soybean production and protection system. Partners from select non-governmental organizations with expertise on policy, social and environmental issues also are desired.



## ISRC Staff

Greg Tylka, director

Jill Cornelis, program coordinator

Clarke McGrath, on-farm research & extension coordinator

Steve May, industry partner recruiter

Kara Berg, communications specialist

## Industry Advisory Council

Iowa soybean farmers, industry partners and the Iowa Soybean Association have representation on the center's Industry Advisory Council. The council provides input on research needs, which includes identifying new areas of research, gaps in research and opportunities to expand and build upon existing research.

Industry partners currently represented on the council include AMVAC, BASF, Bayer, Cornelius Seed, Corteva Agriscience, FMC, GDM, Merschman Seeds and Syngenta. AMVAC and Merschman Seeds are the newest industry partners, joining in 2020.



Attendees of the 2019 ISRC Industry Advisory Council meeting.

## ISRC Management Team

Funding decisions are made by the center's management team based on guidance from the Industry Advisory Council.

The management team consists of:

- Iowa State University's College of Agriculture and Life Sciences Dean Daniel Robison and Department Chairs Gwyn Beattie, Kendall Lamkey and Steve Mickelson
- Iowa Soybean Association Senior Director of Research Ed Anderson
- ISRC Director Greg Tylka

# Progress on Current ISRC Research Projects 2020-2021

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

*Prashant Jha, associate professor of agronomy and extension weed specialist, Iowa State University*

This project is a collaborative effort between Iowa State Weed Science and Montana State University Optics and Electrical Engineering programs.

Specific Objectives:

- Develop baseline spectral signatures of herbicide-resistant and susceptible weed biotypes of waterhemp, giant ragweed, and horseweed (marestalk)
- Use this information to detect herbicide-resistant weed biotypes in soybean fields using UAV-based hyperspectral imaging and machine learning algorithms
- Develop herbicide-resistant weed maps in soybean fields in-season and at-harvest



Herbicide-resistant and susceptible populations of weed species were collected in the fall of 2019 and grown in the greenhouse. The plan is to conduct hyperspectral imaging of weed biotypes in the greenhouse during fall of 2020.



Prashant Jha's research at Iowa State is focused on improved understanding of weed biology and ecology to develop effective, integrated weed management strategies in corn and soybean production systems, optimization and stewardship of herbicide application technology and herbicide use and understanding the evolution of herbicide resistance.

# Progress on Current ISRC Research Projects (*cont.*)

## Virus-Mediated Gene Editing in Soybean

*Steve Whitham, professor of plant pathology and microbiology, Iowa State University*

This project builds on previous experiments using plant viruses to perform gene editing in soybean, work that was initially funded by Iowa State's Plant Sciences Institute. Expanding this research could eventually lead to enhancement of soybean varieties by way of improving agronomic traits, disease resistance and seed quality.



While this project is still in its early stages, Whitham's team has been focused on building the resources that will be used in future experiments.

These tools include:

- modifying the genome of a soybean virus to carry CRISPR guide RNAs,
- implementing a strategy that enables simple and rapid cloning of CRISPR guide RNAs in a soybean virus genome, and
- growing transgenic plants that contain the Cas9 protein (a protein that uses CRISPR guide RNAs to induce site-specific edits in genomes).



Steve Whitham's research at Iowa State is centered on an interest in the molecular mechanisms that underlie viral and fungal pathogenicity as well as plant defense against these organisms. He studies soybean and corn, and utilizes model host plants. He uses functional genomics approaches to study molecular changes that occur in susceptible and resistant genotypes of crop and model plant species. The plant and pathogen genes identified in these studies provide insight into ways in which successful pathogens interact with and manipulate their hosts and by which plants deploy defense mechanisms.

# ISRC Research Projects Overview

Year	Project	PI	Funding
2020-Present	Virus-mediated Gene Editing in Soybean	Steve Whitham	\$100,000
2020-Present	Hyperspectral Imaging for Early Detection of Herbicide-Resistant Weeds in Soybean	Prashant Jha	\$120,000
2019-2020	ISOFAST – Mastering Agronomic Decisions Through Interactive On-line Summaries of On-farm Replicated Strip Trials	Fernando Miguez Peter Kyveryga	\$46,000
2018-2020	Machine Learning Framework to Identify and Quantify Multiple Biotic and Abiotic Stresses in Soybean	Arti Singh	\$80,000
2017-2020	Root and Microbiome Traits to Tailor the Next-Gen Soybean Cultivars	Gwyn Beattie Danny Singh	\$400,000
2015-2018	Iowa Pest Resistance Management Plan	Steve Bradbury	\$60,000
2015-2017	Cropping Systems Modeling Tools to Improve Soybean Management and Yield in Iowa	Sotirios Archontoulis	\$80,000
2015-2016	Integrated Research and Education Program for Use of Remote Sensing and UAVs for Enhanced Soybean Production	Matt Darr	\$37,000
2015-2016	RNA-based Approaches for Resistance to the Soybean Cyst Nematode	Thomas Baum	\$64,000
<b>Total research funded by the ISRC since 2015</b>			<b>\$987,000</b>

*More information on each project available at [iowasoybeancenter.org/research.html](http://iowasoybeancenter.org/research.html)*

## Federal Funding

Two Iowa State University researchers were awarded USDA National Institute of Food and Agriculture (NIFA) competitive grants for projects related to research funded by the ISRC for 2019-2022.

Gwyn Beattie—Mechanistic Drivers Shaping Root Microbiomes and Microbiome Drivers of Fitness Benefits in Drought-stressed Plants \$750,000

Arti Singh— Scalable Cyber Ecosystem for Acquisition, Curation, and Analysis of Multispectral UAV Image Data \$500,000

# ISRC Education and Outreach Activities

## Farm and Industry Tours

The ISRC engages students, staff and faculty by organizing farm and industry tours. In 2019, the ISRC helped coordinate tours to the Ewoldt Farm near Davenport, IA; the Bayer Learning Center in Huxley, IA; and the Syngenta Seedcare Institute in Stanton, MN.



## Hosted Events

ISRC staff hosted visits to campus including an ISA Experience group and two visiting farmer delegations. ISRC also assisted industry partners in coordinating training sessions for their staff at Iowa State.



## Newsletter

The ISRC publishes a quarterly newsletter that gives updates on ISRC activities, research, collaborations and more. To subscribe, email: [isrc@iastate.edu](mailto:isrc@iastate.edu) or visit [www.iowasoybeancenter.org/newsletters.html](http://www.iowasoybeancenter.org/newsletters.html).

### ISRC Quarterly Newsletter

View our latest newsletter and subscribe!

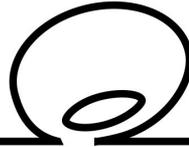


## SoyFest

The ISRC will host SoyFest on August 25, 2021. This fun and educational event celebrating all things soy will be held on Iowa State's central campus to coincide with "Soybean Month" and the start of fall semester. For more information, visit [iowasoybeancenter.org/soyfest.html](http://iowasoybeancenter.org/soyfest.html).

**SoyFest**  
A celebration of soy!

# IOWA SOYBEAN RESEARCH CENTER



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## Thank you to our industry partners!

