



THE NEWSLETTER OF THE ISU SEED SCIENCE CENTER AND SEED LAB

## Seeds! Diversity of Wonder wins Two Prestigious Telly Awards

Marking its 40th anniversary as the world's largest honor for video and television content across all screens, the Telly Awards announced a film produced by the Iowa State University (ISU) Seed Science Center (SSC) as one of this year's winners. *Seeds! Diversity of Wonder*, a six-part documentary on the beauty of seeds, has won the Silver Telly Award, while one episode, "A Day Without Seeds," has won the Bronze Telly Award.

Founded in 1979, the Telly Awards honors video and television made for all screens and is judged by The Telly Award Judging Council; a group of leading video and television experts from some of the most prestigious companies in entertainment, publishing, advertising, and emerging technology. The Telly Awards receives over 12,000 entries from all 50 states and 5 continents.

"Seeds are not just the beginning, but the renewal of agriculture,

of all life and civilization. With this documentary, we wanted to communicate that value and beauty of seeds to the world," said Dr. Manjit Misra, Director of the ISU-SSC and film executive producer. "I think we've been able to capture that beauty."

The project started years ago when Misra and his family saw a film at a local science center about how floods can wipe out local vegetation. He knew then he wanted to reach a wide audience to tell his story about the beauty and wonder of seeds. The Seed Science Center produces a range of regular publications on the center's mission, which is to research and test seeds for scores of plant species. However, those publications most often address an audience of farmers, plant breeders, and seed scientists with a deep familiarity with seeds. Misra said seed technology affects so many issues of global importance, such as food, feed, nutrition and energy security, and safety that a well-



produced film on the topic of seeds could be of interest to a much wider audience.

"From eastern Iowa to East Africa, farmers must plant good quality seeds if we want to improve security and safety, especially in light of climate change," said Misra.

The award-winning documentary, produced by Pierce Mill Media, made its debut in March, 2019, at the Environmental Film Festival in Washington, D.C., to a sold-out

TO FEED THE FUTURE  
WE MUST FIRST SEED THE FUTURE

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*Left to right: Rahul Namboori, President Indian Students' Association; Dr. Rajeev Arora, Professor Horticulture; Dr. Manjit Misra, Seed Science Center Director; Sudhakar Dalela, Consul General to India; Dr. Susana Goggi, Professor Seed Physiology; Dr. Ratnesh Kumar, Professor Electrical and Computer Engineering.*

The Chicago Consul General to India, Mr. Sudhakar Dalela, made a visit to the Seed Science Center in August, 2019. He spoke with ISU leadership, faculty, staff, and students as well as local business leaders. Dalela is interested ways to connect with the University and the Ames community for mutual collaboration on science and technology.

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## Research Shows Groundcover Crops Hold Promise for Farmers and the Environment



Test plot planted in Spring 2019 with corn and Midnight Kentucky Bluegrass showed no difference in the rate of emergence in the perennial ground cover system, compared to a more conventional full tillage bare soil system.

A drive through Iowa in the Summer months reveals mile after mile of rolling fields filled with corn and soybeans. It is hard to imagine those fields were once covered with native grasslands. Roots which created some of the most fertile land in the world. But almost 75 percent of the native grasslands were converted to cropland by the middle of the 1800's.

The conversion from native vegetation to crop production has created numerous environmental problems. And as the population of the world has grown, and the production of crops increases, so has the negative impact on the environment. Part of the problem is having a crop that only grows part of the year, leaving the field open to erosion and runoff for the rest of the months. The solution could be as simple as planting grass or other perennial groundcover between rows.

This year, two Seed Science Center researchers have gone to the field looking answers. Dr. Susana Goggi, Professor of Agronomy, who recently co-authored *Regenerating Agricultural Landscapes with Perennial Groundcover for Intensive Crop*

Production published August 2019 by MDPI, and Agronomy Ph.D. student Chad Kimmelshue answer questions about why this research is so critical to farmers worldwide and the environment.

### ***How long have you been doing cover crop research?***

**Goggi:** We joined a team of researchers as the seed specialists in 2018. The team we joined from the ISU Department of Agronomy started the perennial ground cover research in 2008. They have been conducting multiple field experiments every year since starting the research.

### ***What cover crops are you using and what has been the results?***

**Kimmelshue:** We are using Midnight Kentucky Bluegrass. The midnight species was previously tested by the research team and showed compatibility with corn.

### ***How do you think this research will benefit farmers?***

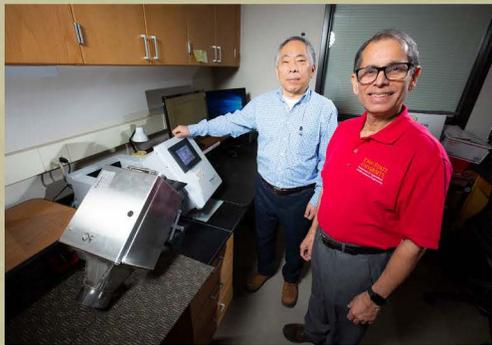
**Kimmelshue:** Perennial ground covers will benefit farmers in multiple ways. Soil erosion and loss of top-soil, and nitrogen leaching into the watershed are two major issues affecting agriculture today. Perennial ground covers can help mitigate these. When farmers leave their field fallow in the fall, winter and early spring, their soils are subject to erosion. Ground covers can protect the soil from wind and rain which directly cause erosion.

**Goggi:** Ground covers also help retain soil nutrients and reduce leaching of nitrogen into the water supply. Indirectly, cover crops allow farmers to use less fertilizer by improving soil structure and retaining nutrients from fertilizers applied in the field. These perennial ground covers also can improve water retention in the soil profile and suppress weed pressure. Better water retention allows for corn and soybeans to be grown in years with less than ideal rain fall. The suppression of weeds by perennial ground covers provide farmers with a new weed management strategy that reduces need for application of herbicides. Less use of herbicides also reduces the development of herbicide-resistant weeds.

**Kimmelshue:** The use of perennial ground covers allows farmers to save money and time by not having to seed and terminate their cover crop each year. Annual cover crops have to be seeded every year in the fall and terminated in the spring. Perennial ground covers only need to be seeded once and managed properly should survive for 5-10 years.

Continued on pg 4

## Seed Science Center Researchers Honored for One of Year's Best Ag Engineering Innovations



Dr. Yuh-Yuan Shyy pictured left, Dr. Manjit Misra pictured right

Two Iowa State University Seed Science researchers have received a national honor for an invention named one of 2019's best innovations in agricultural, food and

biological engineering and technology.

Manjit Misra and Yuh-Yuan Shyy of ISU's Seed Science Center received the award in March from the American Society of Agricultural and Biological Engineers at the organization's Agricultural Equipment Technology Conference in Louisville, Kentucky. Each year the organization honors the "AE50," which represent the best innovations in engineering and technology for agricultural, food and biological systems.

Misra and Shyy developed a technology that can measure the flow of bulk materials such as seeds, grains, fertilizers, food and pet food ingredients in real time as they move through an

inclined pipeline. The invention is called the Real Time In-Line Inclined Flowmeter, or RIIF.

"It is easier to measure flow when a product is falling vertically, but at an incline, the product slides, making it harder to measure," said Misra, director of the Seed Science Center and professor of agricultural and biosystems engineering.

Misra says it can assess in real time the amount of product being loaded straight into a truck. This can cut loading time by more than half and reduce the potential for fines for overweight trucks.

### Cover Crops continued from page 3

Finally, the use of perennial ground covers improves environmental conditions for workers and neighbors as less chemicals are applied, which reduces the chance for human exposure.

#### **How do you think this research will help the environment?**

**Goggi:** The answer to this question goes hand-in-hand with the previous answer. With perennial ground covers providing better soil retention and less nutrient run off, adoption of this farming system would decrease pollution of waterways. This helps ensure food security and water quality for future generations and provides cleaner water for wildlife. Less use of herbicides and fertilizers reduces chemicals in the environment. The perennial ground cover also provides a habitat for wildlife. Beneficial insects that live in the ground cover act as insect predators and parasitoids that can reduce insect damage on the cash crop. This, like the reduction of herbicides, also reduces that amount

of insecticides that would be put into the environment.

#### **How hard will it be to implement these practices?**

**Kimmelshue:** Implementing this new cropping system will take a completely new mindset for farmers. Adoption of new technologies is always hard for everyone, especially when farmers have been using the same farming practices for decades. However, farmers are aware and concerned about soil erosion and are willing to make a change. Farmers are worried how this erosion will affect future generations, and has prompted a slow and steady increase of new soil-conservation practices.

**Goggi:** One financial benefit of implementing a perennial ground cover system is no substantial equipment cost. Farmers that already practice minimum till and no till would be able to implement the system right away. Farmers that practice a more conventional "full tillage" practice will need to purchase a strip tillage machine. Farmers establishing a perennial ground cover will only need

to purchase and plant seed one time. This ground cover will co-exist with the cash crop for many years. This is a cost savings for farmers practicing annual cover cropping in which they have to purchase and plant seed every year.

#### **Is the use of cover crops becoming a more widely accepted practice?**

**Kimmelshue:** Numbers show the acres farmed using cover crops in the corn belt doubled from 2015-2017. Although the number of acres doubled, cover crops are only used on less than 10% of acres farmed. According to the Ag Census conducted in 2017, 15.4 million acres of cover crops were seeded in the corn belt. Most of these acres coming from larger farms.

Cover crops have their benefits and make sense for a lot of farmers. When commodity prices are low, as they are now, it can be difficult for some farmers to justify the additional expense of implementing this system. As some Federal and State cost-share financial incentive programs become available, more farmers will be willing to implement cover crops systems.



*Priyanka Jayashankar pictured in red*

## Fighting Hunger with Food Sharing Initiatives

A faculty member from Iowa State University (ISU) is working to fight hunger in India, where it is estimated nearly 196 million people go without food every day, including one in four children. She hopes her research will lead to the better use food that is currently going to waste and encourage corporate social responsibility (CSR) initiatives.

A case study, published in SAGE Business Cases Publications in January by Priyanka Jayashankar, Adjunct Assistant Professor for the ISU Seed Science Center and the Ivy College of Business, examined how such initiatives can positively effect food security, encourage food sharing, and instigate policies leading to more of the Indian population in need receiving a daily meal.

“Unlike the United States, the concept

of a food bank or food pantry is a foreign concept in India,” Jayashankar said. “In the U.S. there are different institutions that work to feed the hungry, there are more volunteers and there are more non-profits.”

One exception is the India Food Banking Network (IFBN), established in 2010 to support the food security mission. Jayashankar wanted to understand why, despite the adoption of the Indian Companies Act in 2013 which contained a CSR clause, there remains a reluctance towards charitable giving. What she discovered was a fear of retribution.

“The United States has the Good Samaritan Act which protects people and businesses,” Jayashankar said. “India doesn’t have anything like that for food donation. It makes people afraid to donate food because there are no laws in place to protect them, if someone gets

sick.”

Jayashankar is referring to the law passed by the U.S. Congress in 1996 which encourages food donation by limiting liability of businesses and nonprofits which donate and distribute food to those in need. According to the IFBN, there is plenty of food produced in India to feed the population; the problem is getting it to those who need it, especially women and children. This is not an issue unique to India, it is estimated 40 percent of fruits and vegetables and 30 percent of cereals produced worldwide are lost due to inefficient supply chain management.

Jayashankar says the goal is to capture food that is left to waste on retail shelves and in warehouses due to expiration dates and excess production. This is food that could be funneled to India’s fledgling food bank system to feed the hungry.

Recently recognized by Iowa State University for her local sustainability work, Jayashankar says sustainability is also the key to distributing viable products to the people in India who need it the most.

“Religious organizations have helped people share food for centuries, but it is not an organized effort,” Jayashankar said. “India lacks volunteerism; more structures are needed to bring the volunteers and the institutions together.”

For Jayashankar, this subject hits very close to home. She grew up in Europe and Southern India, where much of her family still lives. She is encouraged by the change she is seeing there.

“I used to work with social enterprises and non-profits in India as part of my research and volunteer work,” Jayashankar said. “I was amazed to see how like-minded individuals could work to create a better world.”



*Dr. Manjit Misra, Seed Science Center Director (left); Dr. Susana Goggi, Professor Plant Physiology (middle); Dr. Daniel Robison, College of Ag and Life Sciences Dean (right)*

## SSC Professor Honored for Seed Industry Dedication and Achievement

**A**n Iowa State University professor is the recipient of the 2019 Iowa Seed Association (ISA) Honorary Membership Award. Dr. Susana Goggi, Professor of Agronomy, has dedicated her life to addressing major seed quality issues confronting the seed industry in Iowa and globally.

“Dr. Goggi has demonstrated great dedication to the improvement and support of the Iowa seed industry,” said Jim Webster, ISA board president. “Her entire career has been focused on delivery of quality seeds and the education of people that conduct the research, produce the seed or sell the seeds that benefits the nations farmers.”

Webster emphasizes Goggi’s impact on future seed professionals through her teaching. Dr. Goggi has trained more than 25 Master’s degree and Ph.D. students, and has taught seed

physiology and science to hundreds of undergraduate and graduate students in class.

“The influence she has on our young people through her Seed Science and Technology class will ensure the seed industry is prepared to meet the challenges of feeding a growing population,” said Webster. “She has been a good partner to seed companies providing research and advice on seed quality issues.”

Goggi was recognized with the award, during the annual Seed Forum hosted by the Iowa Seed Association (ISA). The association annually partners with the Agribusiness Showcase and Conference in Des Moines to provide attending members a wider range of learning and networking opportunities. The recipient of this award has been chosen every year since 1949, by the

outgoing ISA board president.

“Over the years I have been impressed at the caliber of the recipients of this award,” Goggi said. “I am humbled, and at the same time ecstatic, to be recognized among these giants of the seed industry.”

Annually, Goggi leads an ISA committee with the selection process of scholarships which are awarded to Iowa State University students at the conference. This year ten ISU students interested in pursuing seed science studies received scholarships.

“She recognizes the importance of quality seed as the foundational component in agriculture and has served with purpose, both directly and indirectly to support the success of the seed industry and Americas farmers,” said Webster. “The Iowa Seed Association is honored recognize her service.”



**Congratulations Jianru “Jane” Chen on achieving Certified Seed Analyst in Germination for AOSA and SCST. Chen is a Seed Analyst II in the ISU Seed Lab at the Seed Science Center.**

## STB Grad Student Achieves Rigorous RGT Accreditation

An Iowa State University (ISU) Seed Science Center (SSC) staff member and graduate student has achieved what no other current employee has: accreditation as a Registered Genetic Technologist (RGT). Tyler Tuning, Graduate student in the Graduate Program in Seed Technology and Business (STB) and SSC Seed Lab Trait Testing Coordinator, completed the rigorous written test and practical exam standards this year and was recognized for this accomplishment at the Association of Official Seed Analysts/Society of Commercial Seed Technologists (AOSA/SCST) Annual Meeting in June 2019. Along with the RGT accreditation, he went from associate membership to full membership in SCST.

“It is an excellent opportunity

for me to advance my career and become more active in the seed testing community,” Tuning said. “Membership is important in these organizations because we facilitate the movement of seed based on the expertise and training we provide to the seed testing industry.”

According to Tuning, a large role of SCST and its’ sister organization, the AOSA, is to ensure laboratories maintain proficient staff and to standardize rules and other criteria for testing seed. Michael Stahr, ISU Seed Lab Manager and president of AOSA, said this is a great accomplishment for Tuning.

“He is intelligent, quick to learn, inquisitive, and very well organized,” Stahr said. “His educational background and work experience add to his credentials.”

Tuning earned his undergraduate

degree from Iowa State University and now is a student in the STB program. He says the education he is receiving helped him accumulate the requirements for the RGT accreditation.

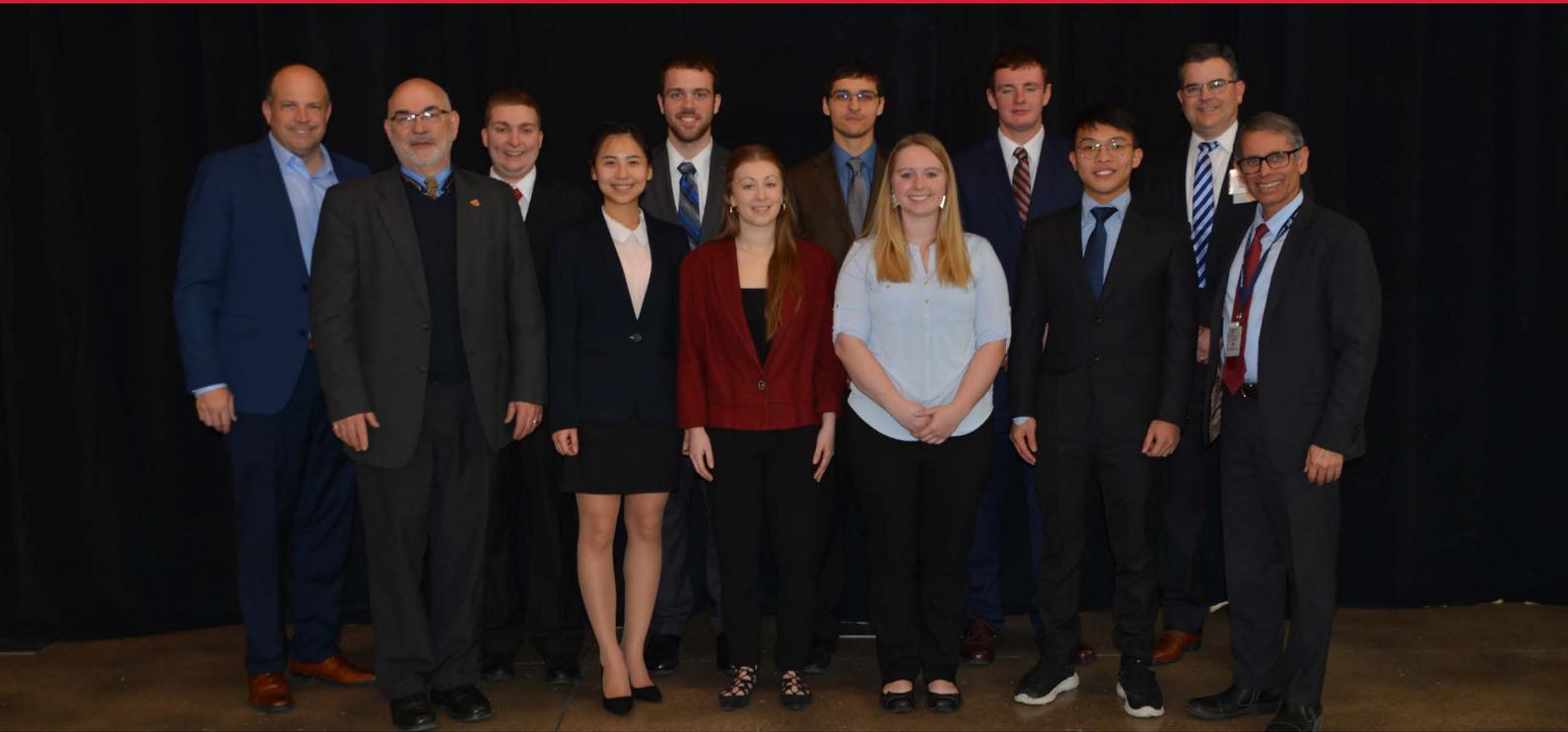
“The STB courses offer insight into aspects of the seed industry that are often overlooked by seed technologists,”

Continued on pg 14



*Tyler Tuning (left); Mike Stahr, SSC Lab Manager and AOSA President*

# Future Seed Leaders



Back row: Chris Latham, CFO Latham Seed Company; Daniel Korhonen; Michael Geissinger; Regan Pleggenkuhle; Eric Heick; John Latham, President Latham Seed Company.

Front Row: Dr. Tom Brumm, ISU Agriculture & Biosystems Engineering; Yee Shuan Lai; Caryn Dawson; Karli Buckmeier; Chee Gang Ngui; Dr. Manjit Misra, Director of ISU Seed Science Center \*Not Pictured: Rachel Nordhoff; Tucker Gabriel

## Ten CALS Students Recognized as Seed Leaders and Awarded Scholarships

Eleven scholarships were given to ten Iowa State University (ISU) College of Agriculture and Life Sciences (CALS) students at the 2019 Iowa Agribusiness Showcase and Conference on February 13, in Des Moines, Iowa. Eight Iowa Seed Association (ISA) Scholarships of \$1,000 each were awarded. One of ISA awarded students was selected as the Manjit Misra Outstanding Senior Scholar and received an additional \$500 scholarship. The \$1,000 Bill Latham Memorial Scholarship and the \$1,000 Lisa Shepherd Jenkins Memorial Scholarship were also awarded at the ISA ceremony.

This ISA scholarship competition is awarded based on

academic excellence, leadership skills, interpersonal skills, and interest in a career in the seed industry or seed science.

1. Karli Buckmeier is from Saint Michael, Minnesota and is a senior in Agricultural Systems Technology with an emphasis in Machine Systems. She is an undergraduate student assistant at the ISU Seed Testing Laboratory, where she receives samples from customers, processes and records them into the computer system, both before and after testing is completed.

2. Caryn Dawson is from Palmer, Iowa and is a junior with a double major in Global Resource Systems and Horticulture with a double minor in Animal Science and Spanish. She is an undergraduate

student assistant at the ISU Seed Laboratory working on seed germination projects.

3. Daniel Korhonen is from Radcliffe, Iowa and a senior with a double major in Agronomy and Seed Science. He has worked as a lab assistant in the ISU agronomy, soils and organic crops labs, as a crop scout at Central Ag Consulting in Valley City, North Dakota, and in warehouse worker for Champion Seeds of Iowa. Upon graduation, he would like to work alongside farmers as an agronomist for a seed company or as a crop consultant.

4. Chee Gang Ngui is a student from Puchong, Malaysia and a senior with a double major in Horticulture (food crop production and management) and Seed

Science and a minor in Food Science and Industry. He has worked as an undergraduate research assistant in fruit crops in Dr. Cochran's lab, and as a field inspector for Bayer, in Iowa.

5. Rachel Nordhoff is from Boone, Iowa and a junior with a double major in Agricultural Studies and Agronomy. After meeting ISU Seed Science Center employees at a farm expo, she decided to apply for an undergraduate assistant position at the lab. She says that job was a career-changing experience. She would like the opportunity to complete summer internships in the seed industry and find a job in seed and agronomy sales upon graduation.

6. Regan Pleggenkuhle is from Waucoma, Iowa and a sophomore with a double major in Agronomy and Seed Science. He grew up on his family farm where he was involved in all aspects of the row crop and hog farming operation. It was his childhood experience which forged his interest in agriculture as a career.

7. Tucker Gabriel is from Eudora, Kansas and a senior in Agricultural Engineering with a minor in Ag Business. He is an undergraduate student research assistant at FloMetrix where he tests seed flow sensors and the measurement repeatability for the company.

8. Michael Geissinger is from Marshfield, Wisconsin and a senior with a double major in Agronomy and Animal Science. His interests in seeds stems from widely diverse job opportunities in the seed industry, from sales to genetics, and from research to technology transfer. Geissinger is also the recipient of the 2019 Manjith Misra Outstanding Senior Scholar \$500 Scholarship.



*Chris Latham, CFO Latham Seed Company; Eric Heick, ISU Junior; John Latham, President Latham Seed Company*

## 2019 Bill Latham Memorial Scholarship Winner

Eric Heick was chosen as the 2019 recipient of the 4th annual Bill Latham Memorial Scholarship for \$1,000. Heick is from West Branch, Iowa and a junior pursuing a double major in Agronomy and Seed Science. He is interested in a career in the areas of seed genetics and seed conditioning. He is an undergraduate student assistant in Alan Gaul's seed conditioning program at the Seed Science Center. Latham was a former president of the Iowa Seed Association, the American Seed Trade Association (ASTA), and the Independent Professional Seed Association (IPSA). He was also the former president of his family company, Latham Seed. Bill passed away on July 31, 2015.



*Yee Shuan Lai, ISU Senior; Dr. Manjith Misra, SSC Director*

## 2019 Lisa Shepherd Jenkins Scholar

Yee Shuan Lai from Malaysia was chosen as the third annual Lisa Shepherd Jenkins Scholar. Yee is a senior in Ecology and currently works at the ISU Seed Testing laboratory as an undergraduate assistant in germination and seed health testing. She also works as research assistant in Arabidopsis haploid induction at Dr. Lübberstedt laboratory in Agronomy Hall. She plans to pursue a master's degree in seed science. The \$1,000 Lisa Shepherd Jenkins Memorial Scholarship is awarded by the ISU Seed Science Center to an undergraduate student engaged in seed science and seed technology. Shepherd Jenkins served as Seed Health Testing Coordinator for the Seed Science Center and as Director of the Administrative Unit of the National Seed Health System. She also headed one of the most active phytosanitary seed testing programs in the country and served as a chair on committees for both the American Seed Trade Association and the American Phytopathological Society. Lisa passed away on July 1, 2015.



## SSC Welcomes New Global Programs Leader with a Familiar Face

how can one pass up the opportunity to be part of the Seed Science Center? SSC's world-renowned expertise in seed testing, research and outreach, its collaborative dynamic, and its trademark global orientation are authentic draws."

Rodriguez, who grew up in Laguna, Philippines did undergrad training in development communication at the University of the Philippines at Los Baños before completing her master's in communication at Cornell University. After that, she pursued her doctorate in mass communication, with emphasis in agricultural journalism, at the University of Wisconsin-Madison.

Dr. Manjit Misra, SSC Director, is excited to have Rodriguez on board and says she is exceptionally qualified for the Global Programs Leader position.

"Dr. Rodriguez led the communication component of the ISU-SSC Agriculture Technology Transfer project in northern Ghana and has been involved in research and outreach projects in

South and Southeast Asia," Misra said. "She will bring a wealth of knowledge, experience, resources, and reputation to bear on our global programs."

In international assignments that took her to farmers' fields in the developing world, Rodriguez has observed the dire need for good quality seeds, which curbs agricultural production. Most of the growth in food demand, she says, will come from developing countries where the greatest production capacity lies. The SSC's role is crucial in making sure that farmers around the globe have access to quality seeds, whether they be for food, feed or fuel, she adds.

"I am excited to be part of Iowa State's, especially the College of Agriculture and Life Sciences' initiatives to engage the world," Rodriguez said. "I have come to know that those in this community are here not necessarily because they have a reputation to keep, but because they understand that they have a world to serve."

A familiar face has returned to the Iowa State University (ISU) campus. Dr. Lulu Rodriguez, who previously served as professor of journalism and mass communication with the Greenlee School for 20 years, is now the Global Programs Leader at the Seed Science Center (SSC). She returns to ISU after six years as director of the Agricultural Communications Program at the University of Illinois at Urbana-Champaign.

"I always enjoy the benefits of living in a community anchored by an internationally recognized research university," Rodriguez said. "Besides,

## ISU Graduate Joins ISU-SSC as Administrative Specialist

Bobbie Jo Gustafson joined the staff as an Administrative Specialist II on August 26, 2019. Gustafson, who earned her Bachelor of Arts degree in Art and Design at ISU in 1997, says she is excited to be back on campus and at the SSC.

"During the decades since I've studied at ISU, my organizational and communications skills have evolved as well," Gustafson said. "It's rewarding to me that the Seed Science Center values how I've invested in my career and has given me this opportunity to now be employed by Story County's best employer."

She started her new position on the same day ISU students came back to class for the Fall semester and said it was fun to walk campus witnessing the students and the impressive evolution of the campus since the 1990's, when she was a student.

Gustafson is a native of Odgen, Iowa and currently lives with her husband in Story City, where the couple raised their two daughters. Most recently, she had helped her husband with his business start-up, and was also a support professional at the Roland-Story School District for a few years while the business was being planned and built.

Bobbie Jo admits a design degree isn't typical in an administrative support professionals resume. She is certain the degree has enhanced her career.



"My design degree has always differentiated me as a support professional," Gustafson said "I was educated to trust process, and because of that I'm an action-focused employee who is comfortable in the minutiae of small details. I'm patient and persistent."

Gustafson will provide administrative support to the faculty and staff of the Seed Science Center, the Seed Lab, and the National Seed Health System.



## Commentary: Year End

by Iowa State Seed Laboratory Manager Mike Stahr

### From the Lab: December 2019

The holiday season coincides with a busy time for staff, temp and student workers at the ISU Seed Lab as it also coincides with a busy time for many of our customers. I have had the pleasure of working at the Seed Lab for ~40 years, if my two years as a student worker are included. Years ago we had two slower times of the year: late spring into the summer and the month of September. That changed a few years later when our summers included many samples of flower and vegetable seeds. Even though we are based in corn and soybean country, we test over 300 species of seeds, including grasses, small-seeded legumes, flower, vegetables and even cotton & peanuts!

August & September 2018 and 2019 were different as we tested many samples of rye seeds and oat seeds for use by farmers as cover crops. That testing is either for a farmer to meet NRCS requirements (purity, germination, from which Pure Live Seed can be calculated) or for farmers and seed companies wishing to sell to farmers (purity, noxious, germination). Testing has to be done in a timely manner because many farmers seed from the air and they have seedling dates locked in. Fortunately, the rye samples (for the most part) didn't have a problem with Fusarium, but unfortunately, some of the oat samples were pretty dirty (a lot of inert matter). The dirtier the

sample with weed seeds and inert matter, the longer it takes to process and the more expensive it is for the customer.

As of October 28, we switched all testing to our new seed testing database CySeed (Go Cyclones!). Health testing switched in late June. There have been some bumps and for that I apologize to our customers who we affected. CySeed offers many advantages for both our staff and our customers. We have greatly improved search capabilities, increased options to receive information about samples and also the ability to connect Excel spreadsheets, images and instrument-generated reports with samples. We continue to offer secure web locker accounts, accessible 24 hours a day, in which reports can be printed, results checked and testing progress tracked. To have an account set up please contact me at [mgstahr@iastate.edu](mailto:mgstahr@iastate.edu) and provide your account number and a password of your choosing. Another option which is available for qualifying accounts is e-transfer. E-Transfer uploads customer and sample information directly into CySeed. This is especially helpful when variety, lot or information consists of long strings of letters and numbers. Please contact Cherie or myself ([seedlab@iastate.edu](mailto:seedlab@iastate.edu), 515-294-6826) anytime you have a question or a comment.

This will be an even busier year than normal for workshops. In late January we will conduct Purity Week of the Seed Analyst Short Course. In the past it has been held the week before or after Germination week. Purity week has received rave reviews the past two years as RST Jessica Blake has done a great job organizing and teaching a course that focuses on participants not only getting lots of hands-on time, but also getting much "how to" information from Jessica, other instructors and other students. The first week of February we will host the SCST Genetic Testing Super Workshop. Germination week will be the last week of April with the AOSA SCST Germination exam April 30 and the Purity exam May 4. From there we go to a summer of seed conditioning workshops organized by our colleague Alan Gaul. Please check the Training page for more information.

#### ***Whom do I contact at the ISU Seed Lab?***

The cheery voice you hear when calling 515-294-6821 is likely to be Cherie Hill, but it could be Connie or Morgan. To contact ISU Seed Lab Customer Care by e-mail: [seedlab@iastate.edu](mailto:seedlab@iastate.edu).

**ISU Seed Lab website:  
[www.seedlab.iastate.edu](http://www.seedlab.iastate.edu)**



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Rancagua, Chile



Sarah Ebert  
Parma, ID

## Online, Off Campus – Four ISU Students Earn STB-MS From Afar

Four Seed Technology and Business (STB) graduate students received their master's degrees from Iowa State University (ISU) on Thursday, May 9, but these keyboard warriors spent very little time on campus. Between working full-time jobs and taking care of families these seed leaders earned their degrees entirely online, with the only degree program of its kind.

"The flexibility of this program allows professionals the freedom to study when and where their schedule permits," said Lori Youngberg, STB Coordinator. "Students can literally earn this degree from anywhere."

In fact, none of the four graduates even live in Iowa. Jim Fitzpatrick resides in Watertown, Connecticut with his wife and children. He currently is a Crop Insurance Agent for Arthur Carroll Insurance Agency. Sarah Ebert is a Quality Assurance Lab Technician at BASF in Parma, Idaho. Brian Kirk lives in St. Louis, Missouri with his partner and 1-year-old daughter where he is in row crop operations for Bayer.

Jaime Saavedra, a Site Enablement Leader at Bayer Crop Science, completed his degree from Rancagua, Chile. Jaime wanted a program that was not only oriented to the sciences but also focused on learning about the global seed industry. He said the two determining factors in his decision to enroll in the Iowa State program were it was online and from one of the most prestigious agriculture schools in the world.

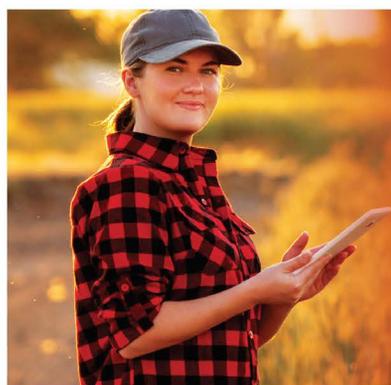
"A professor who wrote a recommendation letter for me to get into the program said 'Iowa State has a stamp of quality. It is like the Coca-Cola of agriculture schools,'" Jaime said. "The program really helped me gain confidence in my decisions, improved my way of thinking in a more holistic way and improved my business acumen."

Sarah Ebert agrees and adds the STB program has helped her move forward in her career.

"I am qualified for more jobs within my company and I have had several job interviews," said Sarah. "It has shown me what areas of the seed industry interest me more and helped narrow my focus for where I want my career to take me."

Faculty and staff from the Graduate Program in Seed Technology and Business would like to wish these #seedleaders the best of luck in the future! We can't wait to see what our newest group of alumni do with their very bright professional careers.

The STB program, delivered entirely online, is focused on preparing students for seed-related management roles. For more information about the STB online graduate program or online learning in the College of Agriculture and Life Sciences at Iowa State University, please contact Lori Youngberg at 515-294-9137 or email [seedgrad@iastate.edu](mailto:seedgrad@iastate.edu).



IOWA STATE UNIVERSITY  
**Seed Technology and Business**  
Graduate Program & Short Courses



Jim Fitzpatrick  
Watertown, CT



Brian Kirk  
St. Louis, MO



Jaime Saavedra  
Rancagua, Chile



Sarah Ebert  
Parma, ID

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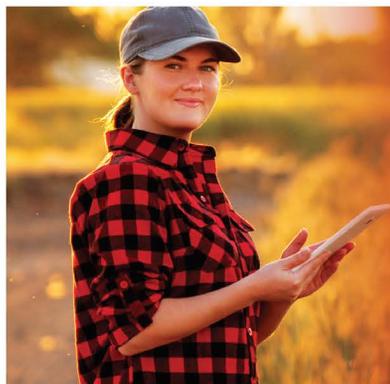
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IOWA STATE UNIVERSITY  
**Seed Technology and Business**  
Graduate Program & Short Courses



Left to right: Dr. Wendy Wintersteen, ISU President; Dr. Gary Munkvold, Professor Plant Pathology and Microbiology; Dr. John Wickert, ISU Senior Vice President and Provost

## Graduate Program in Seed Technology and Business Director Honored with Regents Award

Plant Pathology and Microbiology Professor Gary Munkvold was honored Monday, September 23 with the Regents Award for Faculty Excellence. The annual recognition, presented by the Iowa Board of Regents, recognizes tenured faculty members who are outstanding university citizens and who have rendered significant service to Iowa State University (ISU) or the state of Iowa.

“Dr. Munkvold is recognized internationally in seed health and fungal pathogens,” ISU

President Wendy Wintersteen said during the award presentation. “As co-director of the USDA National Seed Health System, he has made significant impacts in global seed trade at the state and federal levels.”

Munkvold also oversees two graduate programs: Plant Pathology and Seed Technology and Business. A nominator wrote “Gary’s intellect, dedication, and energy have made him valuable to innumerable stakeholders at the university, the state, and world.”

Dr. Munkvold, who has been at ISU for 22 years, teaches two courses related to Seed Pathology, which is unique to Iowa State University. “My specialization in seed pathology involves continuous collaboration with the global seed industry, which is very dynamic and always presents new challenges.” Munkvold said. “There are no other courses on this subject in the U.S, and I enjoy the opportunity to delve deeply into this specialized topic.”

Professor Munkvold was among 50 faculty and staff recognized at the annual awards ceremony.

“Iowa State University’s greatest asset is its people,” said Wintersteen. “The faculty and staff who work hard every day and care deeply about providing an exceptional experience for our students and advancing excellence in our academic, research, and extension programs.”

### *Telly Awards continued from page 1*

auditorium. The film takes viewers from the ISU campus and Iowa farms to locales as far away as India and Africa. Comprised of six segments of roughly 10 minutes each, the film can be viewed separately or as a single, hourlong presentation. The segments cover a range of seed-related topics, including the role seeds play in everyday life, how seed technology can lead to more nutritious food, and how the genetic material contained in seeds is stored in a global network of seed banks. The episode “A Day Without Seeds” features the work of award-winning author and biologist, Thor Hanson.

Other winners of this year’s Telly awards include animated, environmentally-conscious standouts like Passion Pictures & CNN’s *There’s a Rang-Tan in my Bedroom*, live streaming favorite DC Entertainment’s “DC Daily Live with Kevin Smith,” Netflix’s drag show music video of Dolly Parton’s legendary “Jolene” and CBS Interactive’s viral juggernaut for “The Late Late Show with James Corden: The Biggest Baby Shark Ever” starring a crooning Josh Groban and Sophie Turner. A resurgence of documentary filmmaking also prompted top honors for a diverse range of companies: ESPN, AETN, AJ+, HBO Latin America, and PBS.

## Arias promoted to Adjunct Assistant Professor



A Seed Science Center postdoctoral researcher has accepted a new position as Adjunct Assistant Professor in the Department of Plant Pathology and Microbiology. Dr. Silvina Arias has worked at the Iowa State SSC for three years with Dr. Charles Block and Dr. Gary Munkvold on the role of seeds in the epidemiology of bacterial leaf streak of maize, caused by *Xanthomonas vasicola* pv. *vasculorum* (Xvv). Her new role will be divided between

research and teaching. She will continue to work in the SSC.

"I will focus on laboratory research to contribute to solving plant pathology problems through collaborative research projects," Arias said. "I am enthusiastic to pursue research on corn and soybean diseases, particularly those caused by *Fusarium*, but also plant diseases caused by bacteria."

Arias, who is a native of Argentina, earned her undergraduate and graduate degrees in Biochemistry at the University of Cordoba. After working for several years as food analytical microbiological biochemist in the Center of Excellence on Products and Processes, she returned to the University of Cordoba to pursue a PhD. Her PhD research provided specific biochemical evidence for the phytotoxic effects of fumonisin B1 in tissues of maize seedlings, and the role of this mycotoxin in the ability of *F. verticillioides* to cause seedling disease.

Her research interests include interactions among plant pathogens, environmental conditions, and host defense responses, plant-microbe associations, detection of seedborne and seed-transmitted pathogens of crop plants, and analysis of mycotoxins and other secondary metabolites.

She is teaching Responsible Conduct in Research (GR ST 565) for graduate students during the Fall Semester, 2019 but is interested in teaching courses such as Introduction to Microbiology, Microbiology Laboratory or Food Microbiology.

"I am excited and grateful to face new challenges in this prestigious center with so many incredible colleagues, mentors, and friends," Arias said. "I welcome the opportunity to pursue external funding for new research programs; to contribute to the university mission by teaching and advising students and conduct service activities to benefit the institution."

## STB Grad Student Achieves Rigorous RGT Accreditation continued from page 7

Tunning said. "When you take into consideration the different topics addressed in the coursework, understanding your role as a member in SCST and working at an AOSA Lab, and the overall seed industry, becomes much clearer."

The STB program, delivered entirely online, is focused on preparing students for seed-related management roles. It is divided into sections on seed science, seed technology, and business. Business courses highlight seed-related issues, while the science and technology courses focus on practical applications. Courses emphasize interactivity with fellow students and faculty where students are encouraged to share their work experiences with other members

of the group. The online courses typically consist of a combination of pre-recorded lectures, homework, threaded discussions, short papers, and examinations. The STB program also offers two optional short courses held at the Seed Science Center each year, one on seed technology and one on seed business management. The Seed Science and Technology short course meets Nov 4-8, 2019 and the Seed Business Management short course is scheduled for April 6-10, 2020.

One of Tunning's STB professors, Dr. Gary Munkvold, isn't surprised by his accomplishments and says it reflects on his intellect and dedication to the profession.

"Tyler is thoughtful and curious, and he has a thorough understanding of his

work and its relationship to agriculture as a whole," Munkvold said.

As for Tunning, he would like to see more young people become active in AOSA and SCST and encourages those who are interested to reach out to current members at various private, public, and commercial seed testing labs.

"By communicating the importance of AOSA and SCST membership to seed company executives, public organizations, and government legislators we can bolster our standing in the seed industry," Tunning said. "This ensures quality job opportunities for young people and competitive salaries for employees in seed testing."

Tunning joins several SSC Seed Lab personnel with prestigious accreditations including Registered Seed Technologists Jessica Blake and Usha Arora.



Scenes from the 2019 Seed Science Center Seed Workshops.

## Save-the-Date for 2020 Seed Quality Workshops

Seed Conditioning Specialist Alan Gaul and Seed Lab Manager Mike Stahr facilitate Seed Science Center shortcourses and workshops for seed industry professionals around the world each year from April through August. This year a total of 15 workshops and shortcourses covered topics from seed testing and cleaning, to gravity separation, color sorting, and seed treatment.

According to Gaul, one highlight of this the workshops series is the Seed Treatment Workshop in mid-July. “We had an opportunity to hold the workshop in the Hansen Agriculture Student Learning Center for the first

time,” said Gaul. “Because there was basically no limitation on the amount or size of the machinery that we used for demonstrations, that workshop was an extremely effective and enjoyable one. We hope to be able to use that venue again in the future.”

The Seed Science Center at Iowa State has provided training for seed industry professionals for more than 42 years. Seed Industry professionals have traveled all over the U.S. and the world, including Canada, China, Germany, Mexico, Turkey, the U.S., and Zambia to attend seed conditioning and quality workshops at Iowa State.

## Don't Miss the 2020 Seed Analyst Short Courses

In 2020, the Seed Science Center will once again offer three Seed Analyst Short Courses. (Dates listed in righthand column)

Attendees of Germination Week have the opportunity to evaluate seedlings from 16 species of seeds, and conduct tetrazolium testing on four species.

Purity Week focuses on methods to distinguish the many seed species that analysts may potentially encounter when conducting mechanical purity tests or noxious weed exams. Hands-on work was also offered.

On Friday of both weeks, a respective Association of Official Seed Analysts (AOSA) and Society of Commercial Seed Technologists (SCST) consolidated exam was given to participants. Written and practical components of the exams reflect the knowledge and abilities of each analyst, and eventually lead to certification as an RST (Registered Seed Technologist) or a CSA (Certified Seed Analyst).

For more information about these Seed Science Center training opportunities and to register: <http://register.extension.iastate.edu/seedscience>

## 2020 Seed Quality Workshops

- Commercial Popcorn Conditioning**  
May 19-21
- Color Sorting - Satake (SM, EVO)**  
June 2-4
- Color Sorting Buhler Sortex**  
June 10-11
- Specialty Seed Conditioning**  
June 16-18
- Seed Corn Conditioning**  
June 22-25
- Soybean and Small Grain Seed**  
July 6-9
- Seed Treatment**  
July 15-16
- Soybean & Small Grain Seed**  
July 20-23
- Gravity Separation**  
July 29-30
- Seed Corn Conditioning**  
August 3-6

## 2020 Seed Analyst Short Courses

- Purity Testing Short Course**  
Jan 27-30
- Genetic Testing Super Workshop**  
February 3-6
- Germination Testing**  
April 27-30
- Native Species Workshop**  
August 18-20

## 2020 Seed Technology & Business Short Courses

- Seed Science & Technology**  
November 2-6
- Seed Business Management**  
April 6-10

# Everson Global Seed Symposium



## Symposium attracts brightest minds in the seed industry to Ames

Nearly 200 people, from all over the nation and around the world, attended the 2019 Everson Global Seed Symposium at Iowa State University, October 14-15, 2019. The symposium, held in conjunction with the World Food Prize in Des Moines, featured some of the brightest minds in seed business, technology, science and art. This symposium was designed to engage and inspire seed professionals, policy makers, educators and students on the beauty and value of seeds to society.

ISU President, Wendy Wintersteen, opened the symposium looking to the future saying our most urgent and complex societal challenge is ensuring food security for more than nine billion people by the year 2050. She called the Everson Global Seed Symposium a key part of the University's commitment of addressing this global challenge.

"This is an opportunity to bring together the best minds from across our campus, country, and around the world," Wintersteen said. "We're not only creating and applying knowledge to address global food security, but we're sharing this knowledge broadly to impact our world for the better."

This year's theme was a deep dive into the subjects covered by the award-winning six-part documentary film, *Seeds! Diversity of Wonder*. The film is now available for free download at [seeds.iastate.edu](http://seeds.iastate.edu), along with reflection sheets teachers can use in the classroom.

The film takes viewers to locales in India and Africa as well as the ISU campus, the World Food Prize in Des Moines, local Iowa farms, and Colorado. It covered a range of seed-related topics, including the role seeds play in everyday life, how seed technology can lead to more nutritious food, and how the genetic material contained in seeds is stored in a global network of seed banks.

The film was commissioned by ISU Seed Science Center Director, Dr. Manjit Misra and produced by film producer, Walker Lambert.

"Many people think that food comes from the grocery store," said Misra. "It does not. It comes from farms, hard-working farmers, and they have to plant good quality seed to get a good crop."

Many of the Symposium's diverse set of speakers, were either featured in the film or closely related to the topics. Those speakers included Julie Borlaug, granddaughter of seed pioneer Dr. Norman Borlaug; Maaïke Groot, daughter of 2019 World Food Prize laureate Simon Groot; Sarada Krishnan, niece of seed pioneer Dr. M.S. Swaminathan; award-winning photographer, Robert Llewellyn; award-winning author and biologist Thor Hanson; 2016 World Food Prize laureate, Howdy Bouis; former U.S. undersecretary of agriculture, Catherine Woteki; former lead agriculturalist for World Bank, Dr. Jitendra Srivastava; principal scientist from the Indian Agricultural Research Institute, Dr. Alka Singh; CEO of Futurity, Jack Bobo; executive director of the Access to Seeds Index, Ido Verhagen; research leader at the USDA Plant Introduction Station, Dr. Candice Gardner; Global Crop Diversity Trust executive director, Marie Haga; and Seed Savers Exchange historian, Sara Straate.

Keynote speaker, Thor Hanson, talked about what life would be like without seeds and the importance of seeds to society. Hanson is featured in one episode of the film, "A Day Without Seeds."

"The biology of seeds challenges the very notion of life itself," Hanson said. "Without seeds you would wake up on a bare mattress, you wouldn't have pajamas on, you would not have any sheets. All of those are made from cotton, which is a seed."

The Everson Global Seed Symposium was made possible by a generous contribution from the family of Leroy Everson, former director of the Seed Laboratory at the Iowa State Seed Science Center.



*Author and biologist Thor Hanson talks about what life would be like without seeds and the importance of seeds to society.*



Julie Borlaug, Dr. Sarada Krishnan, Dr. Lulu Rodriguez, Maaïke Groot Borlaug, Krishnan and Groot participated in the “Seed Pioneers: The Next Generation” panel discussion moderated by Rodriguez.



Dr. Candice Gardener, Sara Straate, Marie Haga, Dr. David Acker Gardener, Straate, and Haga participated in “The Seed Bank” panel discussion moderated by Acker.



Howdy Bouis, featured in “Let Seed Be Thy Medicine” discusses biofortification as a way to fight hunger and malnutrition.



Dr. Alka Singh participated in the “Seed Innovations” panel discussion during her two week visit to the Seed Science Center in October.

## ISU-SSC Hosts Visiting Seed Researcher from India

Dr. Alka Singh, Professor and Principal Scientist from the ICAR-Indian Agricultural Research Institute, New Delhi, India, spent two weeks in October 2019 as a guest researcher at the Iowa State University (ISU) Seed Science Center (SSC).

The Center provided Dr. Singh on-site office support, facilitated her interactions with faculty at the university, and assisted her work on seed policy, seed systems, trade, regulatory as well as biosafety and policy issues related to genetically modified agricultural products.

Dr. Singh chose the ISU-SSC because she said she wanted to examine a global perspective regarding socioeconomic, biosafety, policy and regulatory framework of new agri-biotechnologies in the food sector.

“I wanted to have a cross-cultural perspective which would enable me to provide science-based analysis on the risks and benefits of biotech products, as well as guidance and recommendations to policy and regulatory groups in India,” Singh said. “ISU and the Seed Science Center have the experience I was seeking and are well equipped with scientists concerning these issues.”

Continued on page 18

# Woteki and Lambert honored for Lifetime Achievement



*Dr. Manjit Misra, Seed Science Center Director; Walker Lambert, Film Producer; Dr. Catherine Woteki, Charles Valentine Riley Memorial Foundation President; Dr. Daniel Robison, ISU College of Ag and Life Sciences Dean*

A science educator and a film producer were honored at the 2019 Everson Global Seed Symposium. The Iowa State University (ISU) Seed Science Center (SSC) gave the Lifetime Achievement and Service Award in Seed Science Technology and Systems to two very deserving individuals.

“Every year the Seed Science Center recognizes exemplary leadership and commitment to excellence as a tireless advocate for Iowa State and for the global seed industry,” said Dr. Dan Robison, Dean of the College of Agriculture and Life Sciences at ISU. “This year we have

two. One who has made her impact in the world of education and science and the other who has made his impact through communication.”

The recipient of the Lifetime Achievement award was Dr. Catherine Woteki. Dr. Woteki has served as Chief Scientist and Under Secretary for USDA’s Research, Education, and Economics from 2010 to 2016. She is a staunch advocate for domestic and international food and agricultural research. She is currently the president of the Charles Valentine Riley Memorial Foundation, a professor of food science and human nutrition at Iowa State, and she chaired the

planning committee for this symposium.

“Dr. Woteki is recognized for her strong support of the USDA National Seed Health System, which is administered by our Seed Science Center,” said Dr. Manjit Misra, Director of ISU-SSC. “With her outstanding leadership, the National Seed Health System flourished and today it is responsible for ensuring the integrity of over a billion dollars-worth of seeds exported annually from the United States.”

The recipient of the Service Award in Seed Science and Technology Systems was Walker Lambert. Lambert is a producer, writer and film-maker with Pierce Mill Media. He most recently produced a documentary commissioned by the Seed Science Center, called “Seeds! Diversity of Wonder.”

“Walker has a passion for both storytelling and for seed science,” Dr. Misra said. “It is a trait he inherited from his father, the late Dr. David Lambert.”

Walker has 15 years of experience producing, writing and directing video and live productions with a specialty in educational and social impact media. He enjoys the challenge of uncovering stories to communicate complex messages and ideas in simple, persuasive and captivating ways.

## *ISU-SSC Hosts Visiting Seed Researcher from India continued from page 17*

While she was in Iowa, Singh visited local seed companies, attended the World Food Prize in Des Moines, and participated in the Everson Global Seed Symposium as a panel member.

“The Everson Global Seed Symposium taught me about holistic seed system development across the stakeholders and enlightened me about the U.S. system of seed health, certification and trade,” Singh said. “While in Iowa, I met many stalwarts in the field of agricultural sciences, policy analysts, input industry persons, and several international organizations working to strengthen food and nutrition sector across the globe.”

Though her visit was short, Dr. Singh says she sees many opportunities for future collaborations with the ISU-SSC.

“I wish to act as future resource person related to Indian policies with Iowa State University, particularly concerning development of seed systems,” Singh said. “I would also to encourage my students and young faculty to participate in global programs of Iowa State University.”



*John and Elaine Everson, 1993*



*Dr. Leroy and Barbara Everson, 1943*



*John Everson attending the 2019 Leroy and Barbara Everson Global Seed Symposium*

## Dr. Leroy Everson Legacy Lives on at ISU-SSC

Dr. Leroy Everson spent more than 30 years at Iowa State University (ISU) as a seed scientist and served as Director of the Seed Science Center (SSC), until his retirement in 1980. And while the father of four and former Navy lieutenant commander passed away in 2005, his legacy at ISU lives on through the generosity of his children.

For the past seven years John Everson, along with his sisters, Karin Everett, Grace Turley, and Mary Everson, continued fund funding the seed science scholarships established by thier father and the annual seed symposium named in their parents' honor.

Dr. Everson, who married his wife Barbara in 1941, was a recognized leader in standardizing and improving seed testing methodologies all around the world. Dr. Manjit Misra, current director of the Seed Science Center, said he had the good fortune to work with him and be inspired by his commitment to collaboration. The Leroy and Barbara Everson Global Seed Symposium and the seed scholarships help the SSC honor the work of Dr. Everson by advancing seed science.

“The scholarship funds are instrumental in attracting quality graduate students for conducting seed research,” Misra said. “While the symposium has allowed the center to provide a forum to discuss and address global seed issues.”

John Everson envisioned that the symposium would provide a medium to discuss and address critical issues and current topics of interest within the seed industry, agriculture in general, and the public. He wanted to see seed experts from around the globe gather at the university his father loved to review and discuss cutting-edge research and offer perspectives on agriculture and seed science and technology, socio-economic, regulatory, and related issues.

“The Symposium’s general purpose is to promote and advance seed science and technology and secondarily to celebrate and honor the work and legacy of my father, Dr. LeRoy Everson,” Everson said. “It is my intent that this fund and the symposium enhance global cooperation, communications, and co-existence to provide sustainable global solutions.”

Everson adds, the ISU-SSC is a critical national and international resource, a center of excellence, and provides timely research and analysis and thoughtful input to address a myriad of global as well as domestic issues.

John received his Bachelor of Science degree from ISU in 1968 where he met his wife, Elaine. John later pursued studies in fruit science and agriculture engineering at California State Polytechnic University, Pomona. In 2000, John and Elaine purchased a 75-acre farm in the Blue Ridge Mountains and built a home. They planted a vineyard in 2005 and sold their grapes to two local wineries in Fauquier Country. After his wife’s death, John also established the Elaine R. Everson Teaching Fellowship Fund with the ISU Ivy School of Business.

Dr. Misra says John Everson and his sisters have kept up with the passion of Dr. Everson who always promoted excellence in education.

“When I have a conversation with the Eversons, they usually bring up how education is the key to solving many societal issues,” Misra said.

IOWA STATE UNIVERSITY

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Tyler Tuning  
Seed Science Center Scientist  
Seed Technology & Business Master's Student



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