In May ISU signed an agreement to partner with the Indian state of Andhra Pradesh to create a seed research center. The agreement marked the beginning of an inception phase to establish an Andhra Pradesh Seed Research and Technology Business Center and Mega Seed Park in the Kurnool district of Andhra Pradesh. As part of the project, ISU is working with the Andhra Pradesh state government, Acharya N. G. Ranga Agricultural University, and other state agencies to achieve and ensure continued seed security through science-led innovations, policies, and public-private partnerships.

“The inception launch was an exciting culmination to many months of collaboration,” said Manjit Misra, director of Iowa State’s Seed Science Center. “By signing this agreement, we agree to work together to enhance the production of, and access to, quality seeds to benefit smallholders across the state of Andhra Pradesh.”

Jonathan Wickert, ISU senior vice president and provost, and Wendy Wintersteen, endowed dean of the College of Agriculture and Life Sciences welcomed Nara Chandrababu Naidu, the chief minister of Andhra Pradesh, and an 11-member delegation May 7. Consul General Neeta Bhushan and Consul D.B. Bhati from the Indian Consulate in Chicago, also attended.

“The vision of this project is to address the seed security of Andhra Pradesh and provide access to quality seed to its farming community,” said Dileepkumar Guntuku, Seed Science Center global program leader. “This Mega Seed Park, the first of its kind in Asia, will serve as a reference center to develop the seed leaders of tomorrow. It will promote public-private partnerships to improve and strengthen the formal seed sector, provide facilities and services, and promote seed entrepreneurship and seed trade through the use of science-based seed policies and regulations.”

Guntuku Meets with Project Stakeholders Following the inception launch, Guntuku (Continued on page 3)
Outstanding Achievement Award Honors Owen Newlin for Seed Industry Contributions

The Seed Science Center honored one of the seed industry’s greatest champions, Owen J. Newlin, with a Distinguished Lifetime Achievement and Service Award for Seed Science, Technology, and Systems April 12 during the annual Leroy and Barbara Everson Seed and Biosafety Symposium in Ames. The award recognized Newlin for his exemplary leadership and commitment to excellence as a tireless advocate for Iowa State University (ISU) and the seed industry around the world.

“It is our great privilege to recognize Dr. Newlin for the outstanding achievements that he has accomplished during the more than 60 years that he has devoted to the seed industry,” said Manjit Misra, director of the Seed Science Center. “It is difficult to put into words the tremendous impact that he has had, both on the seed industry and on Iowa State University. He is truly an industry legend and we are fortunate to have been the beneficiaries of his leadership, unwavering dedication, integrity, and forward-thinking over the years.”

Newlin is a retired senior vice president and director of Pioneer Hi-Bred International. He received a bachelor’s degree in agronomy and a master’s degree in crop production from Iowa State. After earning a PhD in plant breeding and genetics at the University of Minnesota, Newlin began his career at Pioneer Hi-Bred as a research assistant in 1955. Later he went on to graduate from Harvard University’s Advanced Management Program.

Newlin has distinguished himself through his service to Iowa State University, Iowa, and the seed industry in countless ways over the years. He is a past president and past board member of the ISU Achievement Foundation, past national chair of the university’s Partnership for Prominence Campaign, and is currently a member of the Iowa State University Foundation Board of Governors. Newlin was also a member of the Iowa Board of Regents for 12 years, serving as board president for eight years.

He is a past president of the American Seed Trade Association, past president and board member of the American Seed Research Foundation, past president of the Iowa Seed Association, and delegate and past chair of the U.S. Grains Council.

Newlin has earned many recognitions and awards. In 2016, the American Seed Trade Association presented him with its highest honor, the inaugural Lifetime Industry Achievement Award. Iowa State University has honored him with ISU’s first True and Valiant Award, the Order of the Knoll Campanile Award, the Alumni Merit Award, the Achievement Award. Iowa State University has honored him with ISU’s first True and Valiant Award, the Order of the Knoll Campanile Award, the Alumni Merit Award, the Achievement Award. Iowa State University has honored him with ISU’s first True and Valiant Award, the Order of the Knoll Campanile Award, the Alumni Merit Award, the Achievement Award. Newlin is a Fellow of both the American Society of Agronomy and Crop Science Society of America, and a Fellow of the American Association for the Advancement of Science as a result of his accomplishments in the seed industry and agriculture.

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Seed Science Center Director Manjit Misra was honored by the Indian Council of Food and Agriculture. Misra, who also is a professor of agricultural and biosystems engineering, was presented the Global Agriculture Academic Leadership Award September 5th during the 10th Annual Global Agriculture Leadership Summit in New Delhi, India. The Global Leadership Awards recognize individuals and institutions for leadership in advanced agriculture and are based on nominations from experts in the fields of policy, academic research, industry, environment, innovation, livelihood, entrepreneurship, corporate social responsibility, development, and international leadership.

“This recognition means a great deal to me,” said Misra. “But it reflects not my accomplishments, but those of the Seed Science Center faculty and staff at Iowa State University. Through their hard work, our center has become a premier center of seed science and technology around the world. And I am extremely proud to be a part of that.”

Established in 2008 under the chairmanship of M.S. Swaminathan, pioneer of India’s Green Revolution, the awards recognize leadership roles played by individuals and institutions that positively impact the lives of millions of rural smallholders around the world.

During the summit, an annual forum that focuses on issues of importance to India’s food and agriculture sector, Misra spoke on the importance of providing quality seed to smallholders around the world as a way to mitigate food and nutrition insecurity.

World Food Prize Foundation President Kenneth Quinn was also honored at the event. Quinn received the International Leadership Award for his contributions to the global agriculture community.

While in New Delhi, Misra, Quinn, and other awardees were part of a 10-member delegation that visited India’s Vice President Shri M. Venkaiah Naidu. The group discussed global food security, farmer empowerment, and other issues of importance to India’s agricultural sector.

Misra Receives Global Academic Leadership Award

The Seed Science Center will host an 18-member delegation led by Andhra Pradesh Chief Minister Nara Chandrababu Naidu in Iowa in October.

“Currently, our plans for the delegation are twofold,” said Seed Science Center Global Program Leader Dileepkumar Guntuku. “We plan to highlight the Mega Seed Park project as part of a side-event hosted by the Cultivation Corridor the evening of October 18 at the Marriott Hotel. This will provide an excellent opportunity for the delegation to interact with Iowa leaders.”

In addition, the Seed Science Center will also host the delegation in Ames on the afternoon of October 18. “This will give us a chance to further consolidate our action plans for the Andhra Pradesh seed research center, and offer an opportunity for project stakeholders to discuss activities and strategies as we move forward,” said Guntuku.

Mega Seed Park

(Continued from page 1) traveled to India in late May to meet with Chief Minister Naidu; Andhra Pradesh’s Minister of Finance; and the Special Chief Secretary of Agriculture. Together, the group established a time line for the implementation of various Mega Seed Park activities.

While in Andhra Pradesh, Guntuku also took part in a task force committee meeting. The stakeholders discussed the preliminary planning phases of the research center. In attendance were University Officers from Acharya N. G. Ranga Agricultural University, the Special Chief Secretary of Agriculture, the Secretary of Finance, and the Commissioner of Agriculture.

Right: Manjit Misra and Kenneth Quinn were part of a delegation that discussed global food security with India’s Vice President Shri M. Venkaiah Naidu in New Delhi.

Photos courtesy of the Indian Council of Food and Agriculture
In early 2017, Seed Science Center Director Manjit Misra commissioned educational video production company Pierce-Mill Entertainment and Education, LLC, to shoot a documentary on the topic of seed.

“This film has been on my mind for a number of years,” said Misra. “I have always wanted to make a movie that highlights the importance of seed to society and civilization. One that examines the wonder and the beauty of seeds, and shows how individuals have captured the power of seeds to feed billions of people.”

Film Director Walker Lambert, Producer Karolina Jasinska, and Director of Photography John Napolitano began production on the film in April of 2017. The documentary, titled *Diversity of Wonder: The Journey into the World of Seeds* tells the story of seed development, the diversity of seed use, and how seeds support a diverse number of industries around the world.

To date, Lambert and Napolitano have traveled to India, Zambia, Iowa, and various locations around the U.S. to shoot footage for the film. Still on the agenda is a trip to Ghana before wrapping up shooting in the fall. The documentary is scheduled to be completed in the spring of 2018.

Lambert says that he and his production team have already learned a great deal from shooting the film. “Seeds are at the crossroads of an amazing collaboration between nature and mankind’s innovation,” said Lambert. “As Manjit says, ‘Seeds are a miracle of nature and the product of science.’”

“It’s amazing how seeds have this amazing potential to solve some of the world’s greatest challenges—around food, nutrition, energy, and industry,” says Lambert. “They are simply exquisite, and the plants that miraculously emerge from these small inert pods are astonishing and wonderful, and so often they’re just taken for granted.”

Lambert and Jasinska hope that the documentary will help the public understand the many ways that seeds impact them. “We want to show people how much our lives are intertwined with seeds, and the immense role they play in our everyday lives, whether you are a farmer or have never once thought about agriculture,” says Lambert. “Day in and day out, even if people completely take them for granted…we hope that people will appreciate the same sense of wonder that we now experience when we encounter seeds.”
The Iowa State University Graduate Program in Seed Technology and Business has created a short course that addresses the rapidly changing advancements in agriculture from both a seed technology and business perspective. Participants in the short course this fall will have the opportunity to take part in “hands-on” demonstrations led by faculty experts from Iowa State’s Seed Technology and Business Graduate Program (STB), Seed Science Center, College of Agriculture and Life Sciences, and College of Business. Guest speakers, discussion sessions, and tours of Iowa State labs and a local seed industry facility will be part of this educational experience.

“I talk with industry leaders regularly who express the desire for their employees to have more knowledge of all aspects of their companies,” said Gary Munkvold, short course director and professor of plant pathology and microbiology at Iowa State. “Our STB Short Course is designed specifically to meet that need….Attendees will gain knowledge and tools they can immediately apply in their own operations. They will also acquire an appreciation of how their role and the roles of others contribute to the overall success of their organization.”

Seed industry professionals, Greg Lamka and Dave Langer, of DuPont Pioneer, will be sharing first-hand knowledge and experience in research management, industry regulation, policy, and trade. Guest speakers include Mike Gumina, CEO of RiceTec Inc., and Jim Schweigert, president of Gro Alliance, who will contribute their perspectives concerning the challenges and opportunities facing today’s seed industry.

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Quinn says roads were needed to create pathways for trade, a benefit that has remained in more recent times. The connection roads provided has helped farmers bring products to market, further solidifying the need for seeds.

Advances in Technology

The seed industry has developed with advances in technology, Gumina said. Yet, as recently as the 1980s, he said it was a very local, low regulated business. “Over the years, it has become a highly regulated business,” Gumina said. “The whole mix can be too much for some companies to stay in and they exit the business.”

High levels of productivity allowed companies to make big gains in the 1990s. By the early 2000s, innovations in genomics/bioinformatics allowed a deeper look into the plant and an understanding of its genome. As a result of the greater understanding of the plant structure, advancements in breeding were made, Gumina said.

Roads Lead Toward Growth: Symposium Speakers

See Seed Continuing to Steer Direction of Economic Innovation

by Chris Lusvardi, Editor (Reprinted from Seed Today Third Quarter 2017)

Michael Gumina sees the continuing changes to the seed production industry challenging those leading it to think about why they stay involved in the business.

Economic stress has been one of the factors leading to consolidation within the industry, forcing decisions that might not otherwise be made, says Gumina, CEO, RiceTec Ag, Houston, TX. With product development cycles in the seed industry taking 7-10 years, Gumina said in a lot of ways when you’re in the seed industry, you have to have faith.

“The money you’re putting in today isn’t going to show up for a decade, which is something that requires patience,” Gumina said.

Gumina was one of the speakers in April during the 2017 Leroy & Barbara Everson Symposium on Next Generation Agriculture hosted by the Seed Science Center at Iowa State University, Ames, discussing how the seed industry has evolved and what it might look like in the future.

Roads to Development

Seeds have long been at the forefront of technological innovation dating back to the creation of the first marketplaces as something needed to be done with a surplus of products, said Kenneth Quinn, The World Food Prize Foundation president, Des Moines, IA, and former United States ambassador to Cambodia.

Weights and numbers were developed to calculate the surpluses and notes about wheat and barley were written on clay tablets, Quinn said.

“That’s what seed and agriculture did,” Quinn said. “Seed is the story of civilization. It’s the thread of history through everything that has happened.”

Symposium Hosts Second Poster Competition

Three individuals earned cash prizes in the 2017 Leroy & Barbara Everson Seed and Biosafety Symposium Poster Competition. First place went to: Chukiat Chotikasatian, Iowa State University (ISU)-Agricultural and Biosystems Engineering (ABE) visiting scholar from Kasetsart University, Thailand; 2nd place Sharon Tusiime, ISU-Horticulture; and 3rd place Robert Valek, ISU-Natural Resource Ecology and Management.

This is the second time that the competition has been held. Agronomy Professor Susana Goggi, ABE, Associate Professor Tom Brumm, and Seed Science Center Program Coordinator Cassie Welch facilitated the event.
“At least two dozen new seed companies are selling corn that didn’t sell corn in 2005, with several selling more than 50,000 bags,” Schweigert said.

Now, the question is becoming what the impact of mega mergers will be once those deals are completed. New traits and licenses can be developed with a reshuffling of the industry with different partnerships forming, Schweigert said.

One area of possible focus that larger multinational companies are unlikely to pursue is the organic market, which Schweigert says is still relatively small at about 100,000 acres of organic seed corn. “It’s not a huge market, but with high margins, it can grow rapidly,” said Schweigert. “There will be market share opportunity for independent companies that I think they’ll more quickly pick up.”

Challenges and Opportunities
Population growth continues to push demand for crops to be grown, Gumina said. Research will be as important as ever with about $3 billion per year invested, he said.

The cost structure of being able to maintain a return on investment will be difficult to maintain. Monsanto spent $9.6 billion on research in 6 years, according to reports from 2011-2016, Gumina said.

The potential challenges facing the seed industry with mega mergers looming are less innovation, less access to technology, increased market power for the new combinations, higher prices, and unique systems that are not easily replicated, such as chemistry and biology combinations.

However, Gumina cautions prices can’t be raised more than farmers can afford to pay.

Opportunities that can be created as a result of the possible mega deals are talent will become available, start-ups will emerge, spin-offs will occur as a result of Department of Justice processes, licensing, partnering, and distribution will be required for the new companies to grow and outsourcing of assets and services will be used. Relationships will still matter, Gumina said.

In order to take advantage of the opportunities, Quinn says innovation will be needed. “It will not happen without innovation,” says Quinn. “Innovation is what it’s all about.”

Impact of Consolidation
Leaders of seed production companies questioned what the future might hold with the rapid rate of consolidation. Gro Alliance, Cuba City, WI, had just decided to exit the retail seed business in 2003-2004 as a trend of multinational businesses purchasing independent seed companies started about a year later, says Gro Allience President Jim Schweigert.

“When you exit the retail to focus on contract production for the independent market, and about a year later, all independent companies start getting bought up, we kind of question the decision,” Schweigert said.”But what we didn't know was how independent companies would be able to respond in the face of consolidation.”

The period of consolidation lasted 5-6 years, Schweigert said. Through it, he says companies that weren’t acquired did incredibly well. That meant predictions of independent companies losing market share didn’t fully materialize as they worked hard to take advantage of new opportunities, said Schweigert.

“This helped us to be more efficient to drive basic genetic gain,” Gumina said. “This was a big opportunity and a lot of companies capitalized on it.”

It wasn’t long after that consolidation started happening within the industry. In 2000, Gumina says independent companies made up 38% of the market share for corn. Today, that figure has dropped to 17%, he said.

In 1900, Gumina said 300 retail companies sold corn and soybeans. Today, he said it’s down to 85 companies. “It’s a big change in the overall dynamics of the industry,” Gumina said. “Independents are getting smaller and less influential. There’s just no doubt about that.”

2017 Everson Symposium Focuses on Next Generation Agriculture
More than 180 individuals attended the Seed Science Center 2017 symposium titled “Next Generation Agriculture: Emerging Innovations and Opportunities.” April 12 and 13 at the Gateway Hotel and Conference Center in Ames. The event offered two sessions that explored the topics of “Seed Industry Outlook: Challenges and Opportunities” and “Next Generation Innovations and Technologies in Agriculture.”

For the first time, a special, half-day, extended session was held April 13, at the Seed Science Center. Speakers provided an in-depth focus on CRISPR-Cas9 editing for crop improvement, and highlighted methodology, public and private activity, regulation status, and societal questions.

Symposium Speakers Included:
Ambassador Kenneth Quinn, World Food Prize Foundation; Catherine Woteki, Former Chief Scientist and Under Secretary, USDA; Mike Crum, Iowa State University; Michael Gumina, RiceTec Ag., Inc.; Jim Schweigert, Gro Alliance; Samson Konlan, USAID; Dileepkumar Guntuku, Iowa State University; Steve Sonka, University of Illinois, University of Maryland; Bruce Battles, Syngenta; B.M. Prasanna, CIMMYT, CGIAR; Jeffry Sander, DuPont Pioneer; Kan Wang, Iowa State University; Clark Wolf, Iowa State University; and Jeff Wolt, Iowa State University.

To view videos of speaker presentations visit: https://vimeo.com/channels/1233000.
SARI Core of Excellence Launch Meeting Held in Ghana

A Core of Excellence Launch Meeting was held July 13 at the Savanna Agricultural Research Institute (SARI) in Nyankpala, Ghana.

During the event, ISU signed an agreement with the SARI to improve the research and infrastructure facilities at the Institute as a means to improve productivity and profitability of smallholder agriculture in the Northern Ghana region. The USAID provided $5.5 million funding for the project.

ISU College of Agriculture and Life Sciences has been working on the USAID Ghana Feed-the-Future Agriculture Technology Transfer (ATT) Project since 2013. The goal of the program is to increase competitiveness of Ghana’s rice, maize, and soy value chains, promote broad-based and sustained economic growth in the region.

In February 2017, Dileepkumar Guntuku conducted a needs assessment for the SARI. A Core of Excellence (COE) team was then established made up of experts in maize, soy, and rice value chains, business, and communications.

In March of 2017, the COE team traveled to ISU for training and to visit Midwest companies and institutions.

ISU and the COE team are enhancing the livelihoods of Ghana smallholders by providing training and exposure to innovative science and institutional strategies to improve SARI’s educational and communications capabilities.

Establishing an Enabling Regulatory Environment for Ghana’s Ag Sector

ISU’s Sergio Lence and Seed Science Center faculty members are partnering with Chemonics, as part of USAID’s Ghana Agriculture Policy Support Project. The team is working to improve agricultural policy making, policy analysis, and policy implementation to benefit subsistence farmers in Ghana.

The group is building private sector capacity and encouraging smallholder participation in the policy making process by establishing a legal seed framework that provides the agricultural community with quality seed. They are also strengthening the seed sector by training local seed enterprises to develop and implement quality management manuals.

In 2017, former ISU Seed Scientist Joe Cortes (pictured above) facilitated a Strategic Planning Workshop for the Ghana National Seed Trade Association Board of Directors and Staff in Kumasi. He also held Quality Management Workshops for Seed Enterprises in Accra. The quality management workshops were designed to provide private seed producers in Ghana with the process management skills needed to develop seed enterprise quality manuals to improve their administrative and operation systems.

Sergio Lence and North Carolina State Professor John Beghin met with four staff members from Ghana’s Ministry of Food and Agriculture’s (MoFA) Policy Unit in July 2017. They designed a training program that can be executed by the University of Ghana’s Institute of Statistical, Social, and Economic Research (ISSER), provided training for the staff members, and helped the group write a policy brief on the potential economic impact of an armyworm infestation on Ghana’s maize crop.

Left: Global Program Leader Dileepkumar Guntuku and Seed Science Center Business Manager Lisa Shen traveled to Ghana in August to help project stakeholders develop their 2018 work plan.

Catherine Leafstedt was named the 2017 Manjit Misra Outstanding Senior Scholar at the Iowa Seed Association (ISA) Scholarship Recognition Luncheon held during the Agribusiness Showcase and Conference in Des Moines February 15.

Leafstedt, who received $500 in addition to a $1,000 ISA scholarship, is an Iowa State Senior double-majoring in Agronomy and Global Resource Systems.

Ten Iowa State University Scholarship recipients were awarded ISA scholarships at the event. They include Sarah Striegel who was awarded the $1,000 American Seed Trade Association Scholarship and Leah Ellensohn recipient of the $1,000 Bill Latham Scholarship.

For the first time this year, the ISU Seed Science Center awarded the Lisa Shepherd Jenkins Memorial Scholarship during the ceremony. Anthony Moellers received the award that is open to students engaged in seed science and technology at Iowa State. The $1,000 scholarship honors former Seed Science Center Seed Health Testing Coordinator and Director of the Administrative Unit of the National Seed Health System, Shepherd Jenkins, who was an internationally respected seed pathology expert.

Other scholarship recipients included: Skyler Brazel, Haleigh Summers, Ashley Dean, Taylor Davis, Kelsey Baumhover, Savannah Jones, and Laura Schwarck.

This is the 11th year that the Misra Scholarship has been awarded. Bruce and Kathy Mauder provide funding for the scholarship that is awarded on the basis of academic excellence and leadership, along with a demonstrated interest in a career in seed science or the seed industry.

Awards, Recognitions, Activities

**Munkvold Named APS Fellow**
The American Phytopathological Society (APS) named Plant Pathology and Microbiology Professor Gary Munkvold a Fellow at their 2017 Annual Meeting in San Antonio in August. The award recognizes individuals for distinguished contributions to plant pathology or to the APS. The award is based on significant contributions in one or more of the following areas: original research, teaching, administration, professional and public service, and/or extension and outreach.

**Smith Earns ASTA Lifetime Honorary Member Award**
Center Visiting Scientist Stephen Smith earned one of the American Seed Trade Association's (ASTA) most prestigious awards during their summer meeting June 23. Smith was named recipient of the Association’s Lifetime Honorary Member Award. The award recognized Smith for this untiring service to ASTA and to the seed industry. Smith has served on intellectual property committees for both the ASTA and the Biotechnology Industry Organization (BIO). He also chairs the International Seed Federation’s Intellectual Property Committee and is a Fellow of the Crop Science Society of America.

**Goggi Promoted to Professor**
Agronomy Professor Susana Goggi was promoted to Professor in July 2017. Goggi has served the Agronomy Department and the Seed Science Center for 17 years.

**Misra Highlighted in SeedWorld**
Seed Science Center Director Manjit Misra was highlighted in the December issue of *Seed World* Magazine. To access the article visit: seedworld.com/finding-common-ground.

**Jones-Peterson, Heideman Retire From Seed Lab**
Two valued employees of the ISU Seed Lab retired in the past year. Ronna Jones-Peterson, who worked first as a clerk in Customer Care, and then as a seed analyst in the Germination Lab, retired in December. Nancy Heideman, also a seed analyst in the Germination Lab, retired in January 2017.

“It’s never easy to say goodbye to anyone who leaves the center, but in the case of these two individuals who have been a part of the Seed Lab family for so long, it’s especially hard,” said Seed Lab Manager Mike Stahr. “Their years of service and their expertise leave big shoes to fill. Although they earned this opportunity to take it easy in retirement, I know I speak for everyone here when I say they will be greatly missed.”

**Maunder Recognized in Summer 2017 Issue of Sorghum Grower**
Bruce Maunder, retired senior vice president of sorghum research at DEKALB Genetics and Seed Science Center External Advisory Council Chair, was featured in the National Sorghum Producer’s Summer 2017 issue of *Sorghum Grower*.

The article, written by Editor Jennifer Blackburn, highlights Maunder’s 40-year sorghum career and his contributions to the seed industry.

“Bruce has an accomplished career,” said Blackburn in the article. “His breeding achievements include some 150 commercial sorghum grain and forage hybrids grown on as much as 9.8 million acres in more than 20 countries….It is easy to say Bruce has had one of the greatest impacts on our industry, not only in the United States, but world-wide, and we are forever grateful.”

To access the full article, visit: sorghumgrowers.com/wp-content/uploads/2017/08/2017_SorghumGrower_Summer_FullFinal_web.pdf.

Photos courtesy of Kathy Maunder.
Online Graduate Program Celebrates 10 years

The center’s online Graduate Program in Seed Technology and Business (STB) is celebrating 10 years of delivering online education to seed industry professionals this year. To commemorate this milestone, the program will be rolling out several initiatives in the coming years, including a football tailgate party October 14 to be held before the Iowa State Cyclones vs. Kansas Jayhawks football game.

The Seed Technology and Business program enrolled their first graduate students in the fall semester of 2007 and has grown exponentially from that time. The program also will celebrate its 50th graduate this fall. There are currently more than 60 students working towards completing their master’s degree or certificate in Seed Science and Technology or Seed Business Management.

“We take a lot of pride in each of our students and understand that it is quite an accomplishment to complete a master’s degree while continuing to work full time and still have an active family life. We are looking forward to acknowledging all of our students, alumni, faculty, and staff in a 10-year celebration this fall,” says Lori Youngberg, Seed Technology and Business Graduate Program Coordinator.

The Seed Technology and Business graduate program attracts students from Iowa who are currently employed by several major seed companies. Yet, because the STB program is delivered completely online, the program’s enrollment of out-of-state and international students has increased steadily over the last 10 years. Since 2007, the STB program has enrolled students from more than 22 states and 11 different countries worldwide.

The graduate program in Seed Technology and Business is accepting applications for the spring 2018 semester through November. Orientation courses are now being offered every summer. For more information about the STB online graduate program or online learning in the College of Agriculture and Life Sciences at Iowa State University, contact Lori Youngberg at 515-294-9137, or email seedgrad@iastate.edu.

National Seed Health System Launches New Website

The National Seed Health System (NSHS) has launched a new website at seedhealth.org. The website includes current NSHS news updates and information about seed health testing methods along with a comprehensive list of all NSHS testing methods and codes. NSHS accreditation application information is also available.

The NSHS is a program authorized by USDA-APHIS and administered by the Iowa State University Seed Science Center. It accredits both private and public entities to perform activities needed to support the issuance of Federal phytosanitary certificates for the international movement of seed.
Commentary: ISU Seed Lab Certified to Test for Dicamba Tolerance, The Importance of Recruiting Next Generation Seed Analysts

by Iowa State Seed Laboratory Manager Mike Stahr

ISU Seed Lab certified to test for Dicamba tolerance and other biotech traits

Individuals who submit seed samples to the Iowa State University (ISU) Seed Lab to be tested for the presence of biotech traits normally do so for two reasons. First, they want to ensure that one or more specific biotech traits are present in a sample so that it will provide protection from insects and/or tolerance to herbicides. Or, secondly, they want to ensure that a biotech trait is not present in a sample because they plan to use the seed for organic production. Or, that the trait is present at a sufficiently low level so as to be acceptable.

One of the newest biotech traits tested at the ISU Seed Lab is tolerance to Dicamba. Dicamba is a growth-regulator herbicide that selectively kills broad-leaved weeds. Conventional soybeans are susceptible to this herbicide, but varieties with the Dicamba tolerance trait can tolerate the herbicide without visible damage. The ISU Seed Lab’s Trait Lab is certified to test for this trait, and to determine if seed is suitable for selling under the Dicamba tolerance trait label.

Seeds are tested using an herbicide bioassay test. This test exposes seed to Dicamba herbicide and only Dicamba-tolerant seed produce a normal seedling under these conditions. Control seedlings without the trait exhibit herbicide-toxicity symptoms. Similarly, when Dicamba-tolerant soybean plants are sprayed with Dicamba, broad-leaved weeds are killed, while the soybean plants remain healthy. Unfortunately, off-target movement of this herbicide can induce herbicide-toxicity symptoms even at very low doses. This drift could potentially affect yield, and in some cases the seed quality of susceptible plants. The ISU Seed Lab is uniquely positioned to test soybean seed for this and other biotech traits.

For more information about biotech trait testing, contact mgstahr@iastate.edu.

The importance of recruiting and educating the next generation of seed analysts

Because seed is the most critical element in the production of grains for food, fiber, and other purposes, seed companies, farmers, and others in the industry depend on those seeds to be accurately tested. Whether a seed is desirable, or is simply a weed, it must be correctly identified in a mechanical purity test (and possibly in a noxious weed exam) and its germination level must be accurately determined. Testing may also be required to determine the seed sample’s overall vigor, genetic purity, biotech trait purity, and so on.

In recent years, there has been growing concern across the seed industry as seed analysts and genetic technologists retire and leave the workforce. The question on everyone’s mind is: Will there be a sufficient number of certified seed analysts, seed technologists, and genetic seed technologists to meet future industry needs?

As the number of qualified seed analysts decreases, the Society of Commercial Seed Technologists (SCST), the Association of Official Seed Analysts (AOSA), and the American Seed Trade Association are making it a priority to recruit and educate new professionals into the industry.

Resources

ASTA’s Future Seed Executives (FuSE) program focuses on educating and supporting young seed industry professionals. It encourages networking opportunities and promotes management skills for those with an interest in joining the seed industry.

The SCST and the AOSA are also reaching out to seed industry professionals. These organizations, composed of seed company and private labs, and state and federal labs, routinely offer free webinars. (See analyzeseeds.com.)

In addition, SCST, AOSA, and the International Seed Testing Association (ISTA) offer seed workshops at their annual meetings and at member labs.

Locally, Syngenta Seeds Quality Assistance Manager Brent Reschly and I recently discussed seed science careers and the seed industry with students in the ISU Agronomy Club.

Each year the ISU Seed Lab offers a two-week seed analyst short course in late April and a seed quality assurance workshop in August. Both training opportunities offer in-depth, hands-on training in seed analysis.

And finally, in February 2018 the SCST Genetic Testing Super Workshop will again be held at the ISU Seed Science Center. It is targeted to those individuals preparing to take the genetic technologist exams, but the series of one-day workshops is also beneficial to those new at genetic testing as well as those with experience.

For more information visit: seedlab.iastate.edu/training; betterseed.org/about-asta/fuse; and analyzeseeds.com.
**Research Highlights—**

**Bacteriophages: An Alternative Biological Seed Treatment**  
Chad Kimmelshue, Susana Goggi, and Rebecca Cademartiri

Bacteria can cause important plant and seedling diseases, which are challenging to control due to a lack of effective bactericides. Chemical control of bacterial diseases traditionally consists of antibiotics and copper-based compounds. However, overuse of these chemicals has generated resistant strains of many plant pathogenic bacteria. One potential alternative to these chemicals are biological bactericides such as bacteriophages, which are natural viruses that attack and lyse specific bacteria.

Biological seed treatments are essential to resistance management because seed treatments reduce the exposure of microorganisms to chemicals, thus reducing the development of resistance. In order for biological seed treatments to be useful, they must have compatibility with current seed coating polymers. Seed coating polymers are not only used for adhesion to the seed, but they can also help stabilize the biological onto the seed, reduce dust off, and improve flowability.

The research team of Kimmelshue, Goggi, and Cademartiri is investigating ways to stabilize bacteriophages against *Clavibacter michiganense subsp. nebraskense* (pathogen causing Goss’s wilt in corn) with different polymers as seed treatments in corn, assess shelf-life of treated seed, and determine if the treatments affect seed physiology and the pathogen.

To date, they have successfully and stably coated the bacteriophages onto seed corn. They used three commercially available polymers, tested the stability of the bacteriophages and their effectiveness against bacteria in vitro, and ultimately tested the effect of these seed treatments on germination. Bacteriophages remained active after 8 weeks of storage at 4 °C. The team has determined that seed treatments containing bacteriophages have the potential to neutralize *Clavibacter michiganense subsp. nebraskense*, before they cause Goss’s wilt while not inhibiting germination.

**Does Sudden Death Syndrome Affect Soybean Seed Quality?**  
Josh Knight, Susana Goggi, and Silvia Cianzio

Soybeans (*Glycine max*) are one of the most widely grown crops in the United States and around the world. Their seeds are rich in protein and oil, making them ideal for many end uses such as animal feed, industrial products, and much more. Every year, the seed producers’ plants are influenced by many environmental aspects such as disease. One of the most serious diseases in soybean is sudden death syndrome (SDS) caused by the fungi *Fusarium virguliforme*. This disease infects the soybean plant through the roots and secretes toxins into the plant. Around the time when the seeds fill the pod cavity, the plant leaves begin to show symptoms of interveinal chlorosis and necrosis and can quickly lead to sudden plant death, seriously reducing yield.

The research team of Knight, Goggi, and Cianzio is investigating how this disease affects seed physiological quality, such as germination, vigor, seed weight, protein, and oil. They are using two soybean recombinant inbred line populations segregating for SDS-resistant genes. These segregating populations provide a broad spectrum of disease resistance allowing them to measure the impact on seed quality traits across different disease pressures. So far, results indicate that SDS does not influence seed quality across a range of disease pressures. The researchers are collecting second-year data and anticipate that results from this study will greatly benefit producers of soybean seed.
Center Provides Training for Scientists from China’s Jilin Academy of Agricultural Sciences

Seed Science Center Scientist and Senior Engineer Yuh-Yuan Shyy hosted a delegation of 12 senior scientists from the Jilin Academy of Agricultural Sciences (JAAS) in Ames August 7-25. The group from Jilin, China, traveled to Iowa State to study about agriculture, seed science, and the seed industry. Led by JAAS Vice President Qiyun Li, the delegation included scientists from the academy's corn, crop germplasm sciences, and environmental research institutes.

Faculty and staff from Iowa State, the USDA, and others provided lectures for the group on seed quality and production, seed health and conditioning, GMO risk, germplasm management, maize and sorghum breeding, soybeans, modern breeding technologies, and grain quality and utilization.

While in Iowa, the delegates attended an ISU Horticulture Field Day and visited ISU’s Research and Demonstration Farm, BioCentury Research Farm, and Schnable Lab. They also toured the USDA Plant Introduction Station and visited Syngenta, DuPont Pioneer, Stine Seeds, and the Iowa Soybean Promotion Board.

Shyy was responsible for operation of the delegation’s program and designing the training agenda. He worked with ISU Global Program Director Denise Bjelland who facilitated the group’s lodging and logistics.

2017 Summer Workshops and Short Courses

Seed Conditioning Specialist Alan Gaul and Seed Lab Manager Mike Stahr facilitate Seed Science Center short courses and workshops for seed industry professionals around the world each year from April through August.

This year a total of 12 workshops and two short courses covered topics from seed testing and cleaning, to gravity separation, color sorting, and seed treatment.

“ Our color sorting and seed treatment workshops were very popular again this year,” said Gaul. “Many plants have installed new equipment to take advantage of current optical sorting and treatment application technology. The workshops help operators better understand and utilize the new hardware.”

Gaul said that in addition to multiple presentations regarding advanced seed treatment technology at the large ISU Hansen training facility, the 2017 seed treatment workshop included a tour of a new equipment demonstration site and the opportunity to learn about new seed treating equipment.

The Seed Science Center at Iowa State has provided training for seed industry professionals for more than 43 years. In 2017, 171 individuals traveled from 18 states in the U.S. and 6 countries including Argentina, Australia, Canada, Germany, Taiwan and the U.S. to attend seed conditioning and quality workshops at Iowa State. Visit seedlab.iastate.edu/training for more information.

2017 Lambert ‘Hunger Fighter’ Scholarship Recipient to be Announced During Borlaug Dialogue

The 2017 recipient of the David Lambert ‘Hunger Fighter’ Memorial Scholarship will be announced Thursday, October 19, during a luncheon held in conjunction with the World Food Prize’s Borlaug Dialogue. This is the second year that the scholarship that honors David Lambert, an internationally recognized advocate for global food and nutrition security, will be awarded. A Seed Science Center Distinguished Fellow, Lambert was an avid supporter of the World Food Prize and was passionate in his fight against world hunger.

In 2016, two ‘Hunger Fighter’ scholarships were awarded. Recipients were Katelyn Fritz from Pleasant Hill, IA, and Michelle Friedmann of Mendota Heights, MN. The $1,000 scholarship is awarded annually to an ISU sophomore or junior who exhibits a demonstrated interest in seed science, global food security, and/or childhood nutrition.

“This scholarship means so much more to me than just the funding for my education that it has provided. To me, I feel as though others believe I can make a difference that I so hope to make, that they can see my passion for the subject of childhood malnutrition, and that others see me as the ‘Hunger Fighter’ that I strive to be.”

—Katelyn Fritz, 2016 scholarship recipient
After spending a few minutes with Postdoctoral Research Associate Silvina Arias, it is evident that she is enthusiastic about her maize research and having the opportunity to conduct it at Iowa State.

A native of Cordoba, Argentina, Arias conducts research with Seed Health Testing Coordinator Charles Block and Plant Pathology and Microbiology Professor Gary Munkvold. Since joining the Seed Science Center in September of 2016, Arias has been studying the risk associated with maize seed from plants infected with *Xanthomonas vasicola pv. vasculorum* (Xvv), the causal organism of bacterial leaf streak (BLS). Because BLS is a relatively new corn disease, Arias believes her findings could have a significant impact on U.S. grain trade. “As a result of the importance of corn in the U.S., and the implications of the emergence and spread of a new disease, seed-borne and seed-transmission studies are of critical importance to the corn industry,” she says. “If the seed can act as a pathway, it is important to determine whether any risk is associated with it in order to protect trade and prevent movement of the pathogen.”

Hailing from the Argentinian corn belt, Arias hopes to continue her maize studies in the future. Of particular interest to her are diseases caused by *Fusarium* and plant pathogenic bacteria. “Cordoba, Buenos Aires, and Santa Fe are all key maize-producing areas,” she says. “Producing quality grain through processes that prevent or control plant pests and pathogens and exploring new strategies for the control of crop diseases is essential for our export markets.”

Prior to coming to Iowa State, Arias earned a B.S. and a PhD in biochemistry from the National University of Cordoba. As part of her PhD research, she investigated the role of fumonisin B1 (FB1) as a possible pathogenicity factor in susceptible and resistant maize genotypes infected with *F. verticillioides*. She also taught food microbiology to undergraduate students and held a postdoctoral position in a phytopathology molecular laboratory in Argentina.

As an international scholar and scientist, Arias has found the atmosphere at ISU welcoming. “I come to work happy every day,” she says. “People here at the Seed Science Center and from my lab are like a family that enveloped me from my first day. Drs. Block and Munkvold are not only renowned researchers, but they are excellent people.”

Arias will soon have an opportunity to pass on that welcoming spirit and goodwill. She plans to take part in a mentoring program sponsored by the ISU Graduate College. Designed for first year graduate students, the program helps students transition through their first year of graduate school at Iowa State. “Mentoring is rewarding, and I want to help young scientists face the challenges of their first year and to reach their objectives in an enthusiastic and productive way,” she said.

Originally from Chico, California, Agronomy graduate student Chad Kimmelshue became interested in agriculture at an early age by working on his family’s almond and walnut farm.

Kimmelshue, who is pursuing an M.S. in agronomy crop production and physiology with an emphasis in seed science, joined the center in August 2016. As part of his assistantship, he is taking part in an interdisciplinary research project with Agronomy Professor Susana Goggi and Chemical and Biological Engineering Assistant Professor Rebecca Cademartiri.

Kimmelshue’s research focuses on biologic seed treatments. “Instead of using synthetic chemicals to treat seeds, which is the most common form of treatment, I am investigating the use of bacteriophages—natural organisms found in the soil, that attack specific bacteria—to coat seeds for bacterial disease protection. We are testing the compatibility of the bacteriophages with various seed treatment polymers to determine the best way to adhere the bacteriophages to the seed.” Once the bacteriophages are coated on the seed, Kimmelshue will test their stability; or how long they remain active on the seed. Later, he will study the effectiveness of the bacteriophages in controlling seed borne, seed transmitted, and soil borne bacterial diseases.

Research like Kimmelshue’s can significantly impact industry, because use of bacteriophages is new for controlling bacterial diseases in crops. However, they have been approved for use as preventive methods to eliminate bacterial food-borne illnesses in food. “With the issues pertaining to antibiotics, more research needs to be conducted on controlling bacterial diseases,” he said. “If my work is successful, it will provide growers a sustainable and natural option to combat bacterial disease.”

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Prior to coming to Ames, Kimmelshue attended California Lutheran University in Thousand Oaks, CA, where he earned an undergraduate degree in Biological Engineering. Following graduation, he conducted seed treatment research for Bayer CropScience in West Sacramento, CA. His focus was on using natural microbes as a means to produce pesticide, fungicide, and herbicide products.

“Specifically, I worked with biological-based seed treatments. That motivated me to return to school to learn more about seed treatments, the technologies associated with them, and their effects on seed.”

Kimmelshue credits Goggi for helping him to improve his analytical skills. “Dr. Goggi is always there to give her opinion, support, and consult when needed, but she leaves the details of the experiments up to her students. That has taught me how to conduct research and make insightful and educated research decisions.”

Kimmelshue admits that he has learned a great deal since arriving at Iowa State. “Coming from California where the crops we grow are totally different from those grown here in Iowa, it has been a big learning curve for me, but a fun one. Let’s just say that corn and soybeans are much different than almonds and walnuts,” he said. “Also, at the Seed Science Center people are open and willing to help. Ask anyone a question, and in a few minutes they will be helping you with exactly what you need.”

However, Kimmelshue’s transition to Iowa hasn’t been without its challenges. “Life in Ames has been a big adjustment for me. Coming from California where a freezing cold day is 30 degrees, the winter has been interesting. But, I enjoy Ames. It’s a fun town with a great culture and people.”

Visiting Scientist Caroline Pierozzi

Visiting Scientist Caroline Pierozzi joined the center in April 2017. Originally from Itapira, São Paulo, Brazil, Pierozzi is conducting research with Plant Pathology and Microbiology Professor Gary Munkvold while working on her PhD.

Pierozzi is studying seed transmission of Fusarium oxysporum f. sp. lycopersici. This is an important pathogen that causes Fusarium wilt of tomatoes, and the role of seeds in the disease cycle is controversial. There are several different races of the fungus, and the races may differ in their capacity to be seed-transmitted.

“Working with Dr. Munkvold, I have been able to increase my scientific knowledge and I’m learning new techniques in plant pathology and seed pathology,” says Pierozzi. “I enjoy the daily challenges and the possibility for beneficial discoveries in this area of research,” she added.

Before coming to ISU, Pierozzi studied at the Universidade Estadual Paulista in São Paulo, Brazil. There she earned an undergraduate degree in Agronomy and an M.S. in Forestry Science.

Although Pierozzi has enjoyed her time at ISU, she admits that achieving this professional goal was not without its difficulties. “Working at the center has been a great career opportunity,” said Pierozzi. “But it was a big challenge to leave my country for the first time to spend six months improving my seed science knowledge here in Iowa,” she said. Pierozzi says that it was not only a professional challenge, but also a personal one for her. “It was necessary to learn a new language so that I could communicate with everyone,” she said. “But at the Seed Science Center everyone has given me a friendly welcome, which has made the challenges more enjoyable.”

At the end of September Pierozzi will leave Iowa to finish her degree and explore employment opportunities in her home country. “Now I’m going back to Brazil and I’m going to start looking for a job, and that will be the new challenge in my life. I hope it will be as enjoyable as my time here!” said Pierozzi.

NGRAC Committee Meets in Kansas City

The National Genetic Resources Advisory Council (NGRAC) met in Kansas City in July. Seed Science Center Manjit Misra has served as chair of the council since being appointed by former U.S. Secretary of Agriculture Thomas Vilsack in 2012. His second term ends in 2017.

During Misra’s tenure, the Council has authored nine recommendations for submission to the Advisory Committee on Biotechnology and 21st Century Agriculture (AC21) and has examined issues such as crop genetic vulnerability, animal genetics conservation, aquatic genetic efforts in the Agricultural Research Service (ARS), genetic resources, and tribal issues.

As part of their efforts, an NGRAC Crop Vulnerability Subcommittee was formed to recommend methods to enhance baseline crop genetic vulnerability data. In addition, an Animal Genetics Subcommittee was also created to provide opportunities for animal and aquatic genetic resources.

Re-established in 2012 as a permanent subcommittee of the NAREEE Advisory Board, the NGRAC formulates recommendations on actions and policies for the collection, maintenance, and utilization of genetic resources; makes recommendations for coordination of genetic resources plans of several domestic and international organizations; and advises the Secretary of Agriculture and the National Genetic Resources Program of new and innovative approaches to genetic resources conservation.

Above: NGRAC members attending the Kansas City meeting included: Front row (l to r) Shirley Morgan-Jordan, Manjit Misra, Michele Esch, Sarada Krishnan, Tim Johnson, and James McFerson. Back row (l to r) Terry Williams, Preston Hardison, Kevin McCluskey, Peter Bretting, Terrence Tiersch, and Harvey Blackburn.
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