



IOWA SEED & BIOSAFETY

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Above: (from left) Seed Science Center and BIGMAP Director Manjit Misra, IICA Director General Chelston Brathwaite, USDA Deputy Under Secretary for Farm and Foreign Agricultural Services Burnham "Bud" Philbrook, and Iowa State University College of Agriculture and Life Sciences Senior Associate Dean Joe Colletti participate in a joint agreement signing ceremony held during the World Food Prize Symposium in October.

SEED SCIENCE CENTER AND IICA SIGN GENERAL AGREEMENT

by Regina Hendrickson and IICA

In a special ceremony held October 15 during the 2009 World Food Prize Symposium, the Inter-American Institute for Cooperation on Agriculture (IICA) and the Seed Science Center at Iowa State University signed a general agreement to promote joint actions for the sustainable development of the agricultural sector and rural communities of the Americas.

The agreement outlined the following objectives: to develop innovative projects and initiatives in order to respond to new challenges faced by farmers and rural communities; to proactively seek funding for the development of seed sectors in regions or countries of the Americas with an emphasis on technical assistance and training; to cooperate in the preparation and implementation of seed projects in conjunction with donor agencies and related organizations; and to provide a legal framework and basis for future cooperative agreements or letters of understanding stemming from mutual interests or collaborations proposed by either party.

To commemorate the event, USDA Deputy Under Secretary for Farm and Foreign Agricultural Services (FFAS) Burnham "Bud" Philbrook; IICA Director General Chelston Brathwaite; Iowa State University College of Agriculture and Life Sciences Senior Associate Dean Joe Colletti; and Seed Science Center and BIGMAP Director Manjit Misra spoke prior to the signing of the document.

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"This collaboration between the IICA development organization and the Iowa State University Seed Science Center is one that holds tremendous promise for the future. We believe it will greatly aid in ensuring food security in Latin America and the Caribbean, and hopefully will serve as a model for other regional organizations throughout the world."—USDA Deputy Under Secretary for FFAS Burnham "Bud" Philbrook



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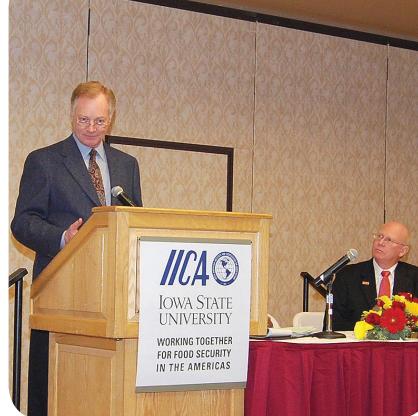
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Above left: USDA Deputy Under Secretary for FFAS Burnham "Bud" Philbrook commends ISU and IICA for creating an 'innovative' collaborative agreement. Right: Key staff members from IICA, ISU, and the USDA pose with Deputy Under Secretary Philbrook for a group photo following the general agreement signing ceremony.

"Much like a small seed, this general agreement will grow, and I am confident it will produce products—research products, and the education, extension, and outreach products that are necessary to make the Americas sustainable in agricultural production, and also in rural development."—Joe Colletti, senior associate dean, College of Agriculture and Life Sciences, Iowa State University



ISU/IICA AGREEMENT

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During his comments, Philbrook commended IICA and the Seed Science Center for creating what he termed an 'innovative' agreement. "This collaboration between the IICA development organization and the Iowa State University Seed Science Center is one that holds tremendous promise for the future," he said. "We believe it will greatly aid in ensuring food security in Latin America and the Caribbean, and hopefully will serve as a model for other regional organizations throughout the world."

For IICA's Director General Chelston Brathwaite, the collaboration is timely. "Iowa State University is recognized as a leading research university," he said. "We believe that this partnership could encourage us to build on Dr. Borlaug's achievements and pursue a new development model where agriculture and rural life are central to development and where poverty, hunger, and food insecurity will be eradicated from our world."

Joe Colletti, senior associate dean of the College of Agriculture and Life Sciences at Iowa State University, said that the ISU/IICA agreement couples the strength, not only of Iowa State University, the

Seed Science Center, and BIGMAP; but it also captures the strengths, abilities, knowledge, and the skills of IICA. "It is a good partnership, and it is one that we enter into willingly and with great expectations," he said. "Much like a small seed, this general agreement will grow, and I am confident it will produce products—research products, and the education, extension, and outreach products that are necessary to make the Americas sustainable in agricultural production, and also in rural development."

Seed Science Center and BIGMAP Director Manjit Misra said that the ISU/IICA partnership is a unique opportunity. "The Seed Science Center is very pleased to team with IICA in this important initiative," he said. "...[Our] mission of improving access to quality seed to feed the world fits nicely with IICA's unique position to address agriculture in the hemisphere." He added, "With offices in 34 countries in the Americas, IICA is in a one-of-a-kind position to understand the needs of the small farmer to feed himself and his family."

Misra also recognized the contribution of Seed Science Center Global Seed Programs Leader Joe Cortes and IICA Deputy Director General Christopher Hansen in facilitating the agreement.

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The agreement between IICA and Iowa State is designed to foster cooperation and linkages with international institutions and organizations. In addition, it will facilitate activities and the promotion of agricultural health and food safety, food security, the development of biosafety guidelines, the promotion of the harmonization of seed policies and regulations at the regional level, and the expansion of quality seed utilization and national seed industry development. It also promotes the development of a permanent institution on seed science and technology in Latin American countries as well as technology and innovation for the modernization of agriculture and rural communities in the region.

"You cannot build peace on empty stomachs," said IICA Deputy Director General Christopher Hansen. "A life of dignity for the rural poor can be achieved in our time, if we provide the education, the infrastructure, and the appropriate policies to unleash the creativity and enterprise of the peoples of the Americas." He added, "Both institutions recognize the existence of areas of mutual interest, in which joint work could help achieve their respective objectives and strengthen cooperation."

About IICA: Established in 1942, the Inter-American Institute for Cooperation on Agriculture provides innovative technical cooperation to its member states, with a view to achieving their sustainable development in aid of the peoples of the Americas. Today, 34 IICA offices are working to meet the needs of countries in areas such as: trade and agribusiness development; sustainable rural development; agricultural health and food safety; technology and innovation; education and training; and information and communication.

For more information about IICA visit www.iica.int.



Above: (from left) Prabhu Pingali, deputy director of agricultural development for the Bill and Melinda Gates Foundation, and Josette Lewis, director of agriculture for USAID Economic Growth, Agriculture, and Trade (EGAT) were featured speakers at the Sixth Annual BIGMAP Symposium held April 21-22 in Ames.

SIXTH BIGMAP SYMPOSIUM FOCUSES ON FOOD AND FUEL CROPS

Over 130 agricultural industry leaders gathered to learn about current research on food and fuel crops, to explore food and fuel crop priorities for developing countries, and to examine how climate change plays a role in meeting food and fuel production goals at the Sixth Annual BIGMAP Symposium held April 21-22 in Ames, Iowa.

The symposium titled "Food and Fuel Crops: Issues, Policies, and Regulation," was expanded to a 1 1/2-day event made up of three half-day sessions. Speakers for the symposium represented the cutting-edge of research and policy in biotechnology.

The symposium focused on both the needs of Iowa and the developing world and offered valuable and timely information to all persons involved in food and fuel crop issues, especially as they relate to biotechnology innovation. Highlights of the symposium included a luncheon address by **Prabhu Pingali**, deputy director of agricultural development for the Bill and Melinda Gates Foundation, who discussed the Foundation's work in Africa; the keynote address on trends in world agriculture by **Josette Lewis**, director of agriculture for the USAID Economic Growth, Agriculture,

and Trade (EGAT); and a discussion of tensions in global agriculture by **Judy Chambers**, president of Emerging Market Solutions.

The opening session of the symposium was devoted to "Food, Fuel, and Climate Change in the Upper Midwest" and was chaired and moderated by **John Lawrence**, professor of economics at ISU and event co-organizer. Speakers included **Gene Takle**, professor of agronomy and geological and atmospheric sciences at Iowa State University, who addressed "Designing Crops for Food and Fuel in a Changing Climate: What is the Target?"; **Mariam Sticklen**, professor of crop and soil sciences at Michigan State University, who examined "Genetically Engineered Feedstock Crops for Cellulosic Biofuels"; and **Emily Heaton**, assistant professor of agronomy at Iowa State, who discussed "Biomass Crops for Iowa." **Elizabeth Lee**, professor of plant agriculture at the University of Guelph, Ontario, Canada, was the final speaker of the session. She focused on "Genetic Enhancement of Corn Productivity."

A poster session ended the first day of the symposium. Over 22 researchers shared their findings relating to food and fuel topics.

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LAMBERT NAMED BIGMAP DISTINGUISHED FELLOW

The Biosafety Institute for Genetically Modified Agricultural Products (BIGMAP) named David Lambert a Distinguished Fellow effective January 1, 2009.

Lambert, who has served on the Seed Science Center/BIGMAP advisory council for 5 years, is a nationally recognized leader in global food security. He has also served as a member of candidate Barack Obama's Agricultural Policy Committee.

"David is an ideal choice for a BIGMAP distinguished fellow," said Seed Science Center and BIGMAP Director Manjit Misra. "Not only is his knowledge of government policy, agricultural trade, and the safety and security of the world's food supply unsurpassed, but his many years of interactions with international agencies have kept him abreast of the issues that are of importance to BIGMAP and the Seed Science Center."

As a distinguished fellow, Lambert will represent BIGMAP and the Seed Science Center at international events organized by the Food and Agricultural Organization of the United Nations (FAO), the World Bank, and think tanks. In addition, he will prepare speeches, make presentations, and will be engaged in interactions that promote science-based policymaking. He will also consult in the preparation of proposals to USAID, other governmental agencies, foundations, and the private sector.

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Symposium panel members (from left) Judy Chambers, Michael Wach, Jeff Wolt (moderator), Russ Sanders, and Neil Hoffman answer questions during an afternoon question and answer session.

SYMPOSIUM FOCUSES ON FOOD AND FUEL CROPS

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The symposium's second session titled "Food and Fuel Crops for the Developing World," was moderated by **Gary Munkvold**, associate professor of plant pathology at Iowa State University and seed science endowed chair. Speakers of the session included **James Aketch Okeno**, BIGMAP policy associate, who spoke on "Crop Productivity and Food Security for Sub-Saharan Africa in the 21st Century"; and **Monica Pequeño Araujo**, coordinator of the Biotechnology Office, INASE, SAGPyA, Argentina, who discussed "Is Latin America Ready for Biofuels?"

The third session of the symposium, moderated by **Jeff Wolt**, professor of agronomy at Iowa State, was titled "Biotechnology-derived Crops for Food and Fuel." Speakers of the session included **Neil Hoffman**, director of the Environmental Risk Analysis Division of the Biotechnology Regulatory Services for the USDA/APHIS. Hoffman discussed the current status of the APHIS proposed rule. **Michael Wach**, managing director of Science and Regulatory Affairs for BIO, spoke on "Responsible Management and Use of Biotechnology-derived Plant Products." **Russ Sanders**, director of

End-use Marketing for Pioneer Hi-Bred International, Inc., was the final speaker of the session with his presentation "Biotechnology: Helping Farmers and Changing the Future of Agriculture."

According to Seed Science Center and BIGMAP Director Manjit Misra, the topic of biofuels as they relate to biotechnology innovation was timely. "Biofuels are on everyone's mind right now," said Misra. "This year's symposium drew one of the largest crowds that we have ever had. Attendees had the opportunity to hear the latest from cutting-edge researchers and policymakers—valuable information for anyone involved in food and fuel issues."

Support for the symposium was provided by the Food, Feed, and Fuel Initiative: Iowa and the USDA/APHIS.

Plans are underway for the 2010 BIGMAP symposium. It is scheduled to be held April 27-28 at the Gateway Hotel and Conference Center in Ames, Iowa.

BIGMAP provides science-based analysis of the risks and benefits of genetically modified plant and animal products as well as guidance and education to help safeguard consumers and the environment. For more information visit www.bigmap.iastate.edu.

MAKE PLANS NOW TO ATTEND THE

2010 BIGMAP Symposium April 27-28

Three half-day sessions will be offered on the topic of
**"FOOD, FEED, AND FUEL FOR THE WORLD:
SEED AND BIOTECHNOLOGY"**

at the Gateway Hotel and Conference Center in Ames, Iowa
For more information, visit: www.bigmap.iastate.edu



Left: Seed Science Center and BIGMAP Director Manjit Misra (left), AGRA President Namanga Ngongi (center), and BIGMAP Distinguished Fellow David Lambert (right) discussed seed and biosafety issues in Nairobi, Kenya, in September.



DELEGATION PAVES THE WAY FOR FUTURE COLLABORATIONS

BIGMAP Distinguished Fellow David Lambert and Seed Science Center and BIGMAP Director Manjit Misra traveled to Africa September 13-19 in response to an invitation from Namanga Ngongi, President of the Alliance for a Green Revolution in Africa (AGRA).

Joined in Africa by BIGMAP Policy Associate James Aketch Okeno, the delegation visited key institutions and stakeholders in Kenya and Ghana.

The main focus of the trip was to promote sustainable agricultural development by exploring collaborations on seed technology and biosafety issues. Of special importance to the mission also, was furthering collaborations between AGRA, the University of Nairobi, and Iowa State University.

According to Misra, the Seed Science Center's interest in working with AGRA was sparked in October 2008 when Ngongi visited the Iowa State campus to present the keynote address at the dedication of the Center's expansion. During the event, Iowa State President Gregory Geoffroy and Ngongi participated in a ceremonial seed exchange. Later in his address, Ngongi highlighted the work

that AGRA was doing in Africa and cited the Seed Science Center's work in over 30 African countries. "The Iowa State University Seed Science Center is known as one of the best seed laboratories in the world," said Ngongi. "The Center can assume a leading role in setting seed systems, policy, and biosafety."

Misra noted that the dialogue between the two groups quickly began to center around mutual aspirations. "When President Ngongi visited us, we realized that we had some very important goals in common," he said. "We both have the conviction that to improve the livelihoods of African farmers, we must first provide them with access to high quality seed."

In addition to meeting with representatives from AGRA and the University of Nairobi, the Iowa State delegation visited with individuals from the Kenya Agricultural Research Institute (KARI), the Kenya Plant Health Inspection Service (KEPHIS), the African Seed Trade Association (AFSTA), the Seed Trade Association of Kenya (STAK), the West Africa Centre for Crop Improvement (WACCI), the University of Ghana, and other seed dealers and institutions.



Above: During a visit to the University of Ghana, Manjit Misra (pictured at right) discussed the plight of the African farmer with (from left) Kwame Offei, Dean of the School of Agriculture; Eric Danquah, Director of the West Africa Centre for Crop Improvement (WACCI); and Charles The (WACCI).

A representative from the Kenya Plant and Health Inspection Service (second from left) met with the Iowa State delegation in September.

DISTINGUISHED FELLOW

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Lambert was appointed by President Clinton as a Foreign Agricultural Service Counselor to the United Nations U.S. Mission in Rome in 1999. He served in the position until 2003 where he promoted U.S. policies on global food security, nutrition, food safety standards, and agricultural trade policies to the UN and other international agencies. Since that time, Lambert has been a regular member of the U.S. Delegation to the United Nations Codex Alimentarius Commission in Rome and Geneva, has represented the United States at the UN World Food Summit, and has served on several humanitarian missions throughout Asia and Africa.



VISITING SCIENTIST COLLABORATES ON BIOSAFETY ISSUES, PROCESS MANUAL

Faculty and staff of the Seed Science Center welcomed Monica Pequeño Araujo as a visiting scientist for six weeks this past spring.

Pequeño, who is coordinator of the Biotechnology Office for the INASE (National Seed Institute), SAGPyA (Secretariat of Agriculture, Livestock, Fisheries, and Food) in Argentina, was invited to come to Iowa State by Seed Science Center Scientist Adelaida Harries.

"Adelaida knows my job quite well, and in that sense, she proposed that I visit Iowa and participate in the BIGMAP symposium," said Pequeño. "She also asked me to collaborate with her on a biosafety proposal and to assist her in translating BIGMAP process management manuals for environmental release and food and feed safety."

In addition to speaking at the BIGMAP symposium in April, where she gave a presentation on Latin America's readiness for biofuels, Pequeño and Harries worked together to develop a project proposal for the harmonization of biosafety procedures for MERCOSUR countries. Finally, the two jointly worked to complete the Spanish translation of the "Process Management Manual for Release into the Environment of Genetically Modified Agricultural Organisms" that Harries authored in 2005.

Pequeño says that she believes the manual and the other projects that she



INASE's Monica Pequeño Araujo spent six weeks at the Seed Science Center last spring collaborating with Adelaida Harries on the harmonization of biosafety procedures and translation of a process management manual into Spanish.

and Harries completed during her stay at Iowa State will serve as valuable resources in harmonizing the processes by which field releases are risk assessed for Spanish-speaking countries. "BIGMAP and the Seed Science Center are making a great effort through the work of their scientists to help ensure that developing countries have access to new science-based technologies," she said.

Pequeño and Harries first became acquainted when they worked together on projects funded by the Food and Agriculture Organization of the United Nations (FAO), The World Bank, GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit), and the governments of Spain and Italy for the Secretariat of Agriculture. Later, Pequeño and Harries worked together again in 1991 at the National Seed Institute where Harries served as president.

Today, as a member of CONABIA, the National Advisory Board on Biotechnology, Pequeño coordinates special projects on biotechnology for the National Seed Institute in Argentina. One of her duties is to perform risk assessments on plant transformation events not authorized for commercialization in the Republic of Argentina. Pequeño is also in charge of training field inspectors for field release of the events and in organizing the follow-up of the crops.

"Argentina has been the second country after the United States to accept the commercialization of a GMO," said Pequeño. "It has been a pioneer in Latin America on all matters related to GMOs, and has advised governments of

developing countries on the issue."

Pequeño says that many Latin American countries are privileged to be located in the sub-tropics where the land and rain regimes permit the growth of a variety of crops—including many plants that are not used for food and feed—that can be used to produce biofuels. She says that Latin American countries have looked into using corn for the production of biofuels, but because of negative public perception regarding the issue, have made the decision to grow other plants for that purpose.

Seed Science Center and BIGMAP Director Manjit Misra said collaborations like the one between Pequeño and Harries are important. "We welcome the opportunity to collaborate with the best minds in the world on seed and biosafety issues," he said. "The exchange of ideas and resources that result from partnerships like this one between Pequeño and Harries is extremely important in accomplishing our Center's mission."

Harries' manual can be accessed at [www.seeds.iastate.edu/pages/research.html](http://seeds.iastate.edu/pages/research.html) and www.bigmap.iastate.edu/pages/news.html, respectively.

The Seed Science Center's Food, Feed, and Fuel Initiative: Iowa project has a new website. To learn more about initiative research, visit www.seeds.iastate.edu/foodandfuel.





CORTES SPEAKS AT SECOND WORLD SEED CONFERENCE

Global Seed Programs Leader Joe Cortes spoke at the 2nd World Seed Conference held September 8-10 at the Food and Agricultural Organization of the United Nations (FAO) headquarters in Rome, Italy.

The event titled "Responding to the Challenges of a Changing World: The Role of New Plant Varieties and High Quality Seed in Agriculture" was designed for policy makers, government officials, plant breeders, seed specialists, researchers, and farmer and consumer organizations.

Cortes' presentation "Overview of the Regulatory Framework in Seed Trade" was part of a session focusing on the facilitation of trade and market development under the responsibility of the Organisation for Economic Co-operation and Development (OECD).

During the conference, speakers highlighted the critical role of new plant varieties and high quality seed in providing a dynamic and sustainable agriculture to meet future global challenges. They stressed that urgent government measures and increased public and private investment in the seed sector is necessary for the long term if agriculture is to meet upcoming challenges of food security in the context of population growth and climate change.

The conference was organized by the FAO, OECD, International Union for the Protection of New Varieties of Plants (UPOV), International Seed Federation (ISF), and the International Seed Testing Association (ISTA).

—World Seed Conference



CENTER SCIENTISTS FACILITATE SADC REGIONAL VARIETY RELEASE CATALOGUE WORKSHOP

Seed Science Center Global Seed Programs Leader Joe Cortes, Scientist Adelaida Harries, and IT Specialist and Scientist Yuh-Yuan Shyy facilitated a workshop on the Southern African Development Community (SADC) regional variety release catalogue October 26-29 in Lusaka, Zambia.

Attending the workshop were representatives from the private sector including the African Seed Trade Association (AFSTA) and from 13 SADC member countries. They included Angola, Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe.

Objectives of the meeting were to: 1) analyze existing seed varieties on the national list based on information submitted by 10 SADC countries; 2) identify varieties with different denominations that have been released in at least two countries and that are potential varieties for inclusion in the SADC catalogue; and 3) introduce and train attendees on a new Web-based software system being developed by the Iowa State University Seed Science Center.

The software, being designed and implemented by Shyy, will allow

applications for new variety releases in two countries to be entered on-line into the SADC variety release system. National seed authorities will also be able to use the system to operate their national variety release systems.

"The outcome of this workshop was very significant," said Cortes. "We made a great deal of progress in analyzing the national variety listings of the 10 countries for future inclusion in the regional variety release catalogue," he said. "It is one of the first crucial steps in providing access to seed of improved varieties to benefit farmers, breeders, and seed companies—the whole seed system. Add to that the training, which signifies that this electronic system is becoming a reality, and it is clear that the momentum has begun. There is no doubt that this project will pick up speed and produce dramatic results."

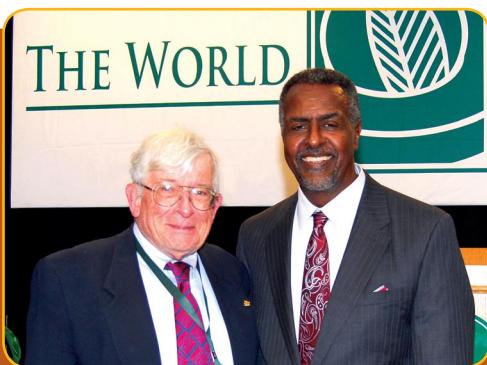
Organized by Iowa State University and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the workshop was part of the Southern African Seed Systems Development Initiative Project for the SADC countries. It was funded by USAID Southern Africa.

DID YOU KNOW?

The Iowa State University seed conditioning tower located in the Seed Science Center is the only facility of its type devoted specifically to education and research in the nation.



Left: Seed Science Center Global Seed Programs Leader Joe Cortes addresses attendees of the 2nd World Seed Conference in Rome in September. **Right:** Yuh-Yuan Shyy (far left) and Adelaida Harries (center) pose in Lusaka, Zambia, with attendees of the SADC regional variety release catalogue workshop.



Seed Science Center/BIGMAP Advisory Council Chair Bruce Maunder (left) is pictured with 2009 World Food Prize Laureate Gebisa Ejeta (right) following the Laureate's Luncheon at the Marriott hotel in Des Moines in October.



COMMENTARY:

by Bruce Maunder, Seed Science Center/BIGMAP Advisory Council Chair

The choice of Dr. Gebisa Ejeta as the 2009 World Food Prize Laureate could not have been more fitting as the last to be selected under the auspices of Dr. Norman Borlaug. The son of Ethiopian subsistence farmers, Dr. Ejeta matriculated from a one-room school 12 miles from his home, through University, and then graduate school at Purdue University, to dedicate himself to the reduction of famine and poverty in Africa where no less than a billion people worldwide face these challenges on a daily basis. This Distinguished Professor at Purdue University has used his ability to provide the first hybrid sorghum in Sudan, a country along with Ethiopia, considered to be the likely center of origin of sorghum. Hageen Dura-1 not only doubled and tripled yield, but greatly improved drought tolerance of the crop, for which 500 million in Africa are dependent as their principal food and feed source.

Returning to the faculty of Purdue in 1984, Gebisa became a major player in the USAID program, INTSORMIL, where he teamed up with Dr. Larry Butler, a biochemist, to unravel the mysteries of the parasitic weed, *Striga*, a yield robber to crops such as sorghum and corn in Sahelian Africa. This basic research led to the development of a genetic control, so essential where chemicals are costly, or not available. Now, new and improved varieties, too often slow to be accepted compared to traditional landraces, can express their genetic potential and overcome the reduction in yields that are only offset by increasing areas for production, all too often in fragile and marginal soils lacking in fertility.

The accomplishments of Dr. Ejeta exemplify the opportunities of enhanced genetic resources in a traditional African crop such as sorghum. He, however, would be quick to acknowledge the need for an infrastructure to provide the quality and quantity of seed to further his goal of reducing famine and poverty. Certainly, the Iowa State University Seed Science Center Global Seed Programs affecting 30 African countries regarding seed policy and regulations, will contribute to his efforts of an African Green Revolution. As a friend and colleague of Gebisa since 1977, I can attest without hesitation to his enthusiasm, capacity for work, and on-going dedication to alleviate hunger."

Maunder recounts how he became acquainted with Ejeta:

"In the fall of 1977 I traveled to West Lafayette, Indiana, to look at the sorghum research being conducted by John Axtell and students. An emergency meeting called by an administrator caused John to be tied up, but he indicated that a graduate student, Gebisa Ejeta, knew as much or more about the research and he would gladly accompany me for the afternoon. How fortuitous! We had a great visit on plant breeding and my perspective from the commercial side.

Shortly thereafter, Gebisa took a plant-breeding job with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and was located in Sudan. There he successfully developed Hageen Dura-1, the first hybrid in the country, and asked that I participate in the symposium held in Wad Medni in 1983 to introduce this high-yielding, drought-tolerant grain sorghum.

Gebisa was then hired by Purdue University, where he was an outstanding contributor to the INTSORMIL USAID program for which I served on the external evaluation panel for 21 years. This gave me an opportunity to appreciate the creativity, dedication, and accomplishments of Dr. Ejeta. His progress reports always showed cutting-edge, new science and an ability to utilize a team effort. As important, also, was his willingness to spend significant time in the host countries. His nurseries were well managed, with emphasis on utilizing the world collection of more than 40,000 cultivars.



As recently as 1998, we traveled together in Ethiopia where Dr. Marco Quiñones, manager of Global 2000 in northeast Africa, told us of the impressive plots of *Striga*-resistant sorghum Gebisa and his team had developed, with this success being passed on to Dr. Borlaug, a major proponent of the program funded by the Sasakawa family.

For 32 years I have had the good fortune of keeping in touch with Gebisa, a true friend, be it in the field in Africa, or in his laboratory and nursery in Indiana. These visits always left me with renewed encouragement for alleviating hunger and poverty in Africa."

For more information about Gebisa Ejeta, visit: www.worldfoodprize.org/laureates/Past/2009.htm.

About Bruce Maunder: In addition to serving as Chair of the Seed Science Center/BIGMAP advisory council, Maunder is a retired senior vice president of Sorghum Research at DEKALB Genetics. Maunder earned a bachelor's degree in Agriculture from the University of Nebraska and a master's and PhD in Plant Breeding and Genetics from Purdue University. During his 37 years at DEKALB, Maunder developed as many as 150 forage and grain hybrids that have been grown on 4 million hectares in more than 35 countries. He has served as an advisor to the National Sorghum Producers, to private sector entities such as the World Food Prize, and to federal and state agencies. Maunder has received recognition as an industry leader, as a scientist, and for improving the world's food supply through his research. During his career, Maunder has been honored with several prestigious recognitions. They include the American Seed Trade Distinguished Service Award, the Monsanto Distinguished Career Award, the Australian Award for Worldwide Sorghum Improvement, and the Henry Beachell Distinguished Alumni Award. Maunder resides with his wife in Lubbock, Texas.



AOSA Past President Brent Turnipseed (left) passes the gavel to incoming President Mike Stahr during the AOSA annual meeting in June. (Photo by Brent Reschly)

STAHR ASSUMES DUTIES AS AOSA PRESIDENT

Seed Lab Manager Mike Stahr recently assumed the office of president of the Association of Official Seed Analysts (AOSA). Stahr became president of the AOSA in June after serving as vice president since 2007.

As AOSA president, Stahr's duties include presiding over meetings, chairing the executive board, approving the appointment of committee members, reviewing reports on committee activities, representing AOSA at affiliate meetings, and working with others within and outside of AOSA to promote the accurate, uniform testing of seed.

Stahr, who has worked in the field of seed testing for 30 years, said he is excited to serve AOSA in this new capacity. "I am honored and grateful to have the opportunity to serve as AOSA president and to represent the organization at conferences, meetings, and other events where there is interaction among seed professionals," said Stahr. "I look forward to promoting cooperation and collaboration between AOSA and other seed organizations, and I am interested in working on the many issues involved in testing seeds and in facilitating the movement of seed around the world."

The AOSA is a member organization made up of official state, federal, and university seed laboratories located across the U.S. and Canada. Formed in 1908, the AOSA sets national standards for seed-testing protocols and works to perfect and make publicly known uniform rules for seed testing.

Stahr's term as AOSA president will end in June 2011. In addition to serving as AOSA president, he continues to serve as an executive board director at large and member of the Genetic Board of Examiners of the Society of Commercial Seed Technologists (SCST). Stahr previously served on the International Seed Testing Association's (ISTA) GMO Task Force.

For more information about AOSA, visit www.aosaseed.com.

YOU ARE INVITED TO ATTEND THE Society of Commercial Seed Technologists (SCST) Genetics Super Workshop—Feb. 1-5, 2010

at the Iowa State University Seed Science Center, in Ames, Iowa

Attend one-day workshops on: Herbicide Bioassay, Immunoassay (ELISA & Lateral Flow Strips), Electrophoresis, or PCR. A fifth workshop day will include lectures on topics such as molecular biology, genetics, and plant breeding. Attend one or all five days (or any combination). The workshop is open to individuals studying to take one or more of the genetic technologists exams, or to those wanting exposure or hands-on experience in the areas listed above. **For more information visit: www.seedtechnology.net.**



Dylan Ward

After working for 10 years in various agricultural roles, Dylan Ward decided he was ready for a change. That's when he learned about Iowa State University's Graduate Program in Seed Technology and Business (STB)—a distance education program designed for individuals who are currently working in the seed sector, but want to increase their knowledge of seed science and technology while acquiring skills in business and management.

"I heard about the Graduate Program in Seed Technology and Business through a press release announcing the new program," said Ward. "I applied for the program because it matched perfectly with what I was looking for in a graduate program."

Ward added that taking courses in more than one discipline immediately appealed to him. "I was looking at both traditional MBA and agronomy programs, but I really wanted a program that was a combination of both science and business. When the Seed Technology and Business program was announced, it was an easy decision to apply."

Students from eight countries currently are enrolled in the on-line distance education program that was developed by the College of Agriculture and Life Sciences and the College of Business at Iowa State University. Lectures are captured on video, edited, copied to CD-ROM, and then distributed to students.

Students in this "global classroom" communicate with instructors and

CONNECTING FOR SUCCESS:

Student Dylan Ward shares his experiences with Iowa State's new on-line distance education Graduate Program in Seed Technology and Business

"I was looking at both traditional MBA and agronomy programs, but I really wanted a program that was a combination of both science and business. When the Seed Technology and Business program was announced, it was an easy decision to apply."



fellow students via the course Internet site and email. This affords them the opportunity to compare their knowledge and experience in the seed industry and to participate in group projects with students located around the world. Effective delivery of course content, keeping students engaged, and ensuring prompt instructor response time are all high priorities for STB educators involved in designing the program.

Although Ward says that the wide range of seed topics covered in the program has challenged him, the unique distance education format offers him opportunities that other students in traditional classrooms may never experience. "The diverse group of professors and students allows for many different views of the seed industry," he said.

Ward admits that balancing the daily demands of work and a home life while also working towards a master's degree isn't always easy. That's when developing a set schedule and sticking to it helps to keep him on track. "With a full-time job, and three kids under the age of six years old, that can be a challenge," said Ward. "I do most of my studying in the evenings after the kids go to bed and on weekends. The strategy that helps me the most is to schedule time for school work, just like you would with a traditional class."

Having already earned a graduate certificate in the STB program, Ward is confident that the program has had a positive impact on his career. "I think the [STB] courses have made me a better-

rounded employee in the seed industry," he said. "I feel confident that I can move into a wider variety of roles and be successful."

Planning ahead and having a support system are two things that Ward says have helped to make his experience in the graduate program possible. "My advice is to make sure that you can commit the time to be successful in the program and to stay current on the lessons," said Ward. "It also helps to have an understanding spouse!"



STB graduate student Dylan Ward resides in Nebraska with his wife Susan and their three sons (from left) Landon, Spencer, and Brady. Ward is employed by Syngenta Seeds, Inc.

"I think the [STB] courses have made me a better-rounded employee in the seed industry. I feel confident that I can move into a wider variety of roles and be successful."

For more information about STB program application deadlines see page 13.



WORKSHOPS FOSTER CENTER OUTREACH MISSION

Education and outreach are an integral part of the Seed Science Center program. Each year, Center scientists and seed analysts conduct workshops and short courses for individuals involved with the domestic and international seed industry.

In 2009, Center scientists conducted two Association of Official Seed Analysts (AOSA) workshops, one quality workshop, and 12 seed conditioning workshops for a total of more than 270 attendees at the Seed Science Center. Eight additional seed conditioning programs were held at other locations. Attendees taking part in the workshops were from 22 states and 4 countries, including Argentina, Mexico, Canada, and the U.S.

"Our summer workshops are typically very popular, and 2009 was no exception," said Seed Conditioning Specialist Alan Gaul, who coordinated the events. "There has also been increasing demand for on-site training, probably as a result of new operators entering the industry. On-site training can be an economical option for training larger class sizes on a few specific topics."

Gaul explained that the seed conditioning sessions hosted by the Center included a mix of classroom and "hands on" equipment demonstrations given by Iowa State personnel and industry guest

speakers. In addition, tours of the Iowa State Seed Testing Lab were included at the end of most sessions. "Workshop topics have historically included seed corn and soybean/small grain seed conditioning; as well as dedicated sessions for gravity separation, color sorting, and seed treatment," said Gaul. "Coverage of technology required for additional seed crops and food-grade products has been gradually expanding as a result of increased demand," he added.

SEED CORN CONDITIONING

A four-day commercial seed corn conditioning workshop was offered in June, followed by a three-day workshop for small research lots in August. Sessions focused on appropriate machinery and methods for various lot sizes and included presentations on typical seed conditioning operations from harvest through packaging and storage.

SOYBEAN/SMALL GRAIN CONDITIONING

Two soybean and small grain seed conditioning workshops were held in July. Topics covered during each of the two three-day workshops included harvesting, material handling, bulk storage and aeration, cleaning, spiral and belt separation, length grading, density separation, color sorting, treating, and packaging.

GRAVITY SEPARATION

Seed industry members attended two gravity table workshops in August. As part of the events, presenters provided information on

the adjustment, operation, and effectiveness of fluidized bed density separation equipment for removing foreign material and upgrading seed quality.

COLOR SORTING

Three two-day workshops were conducted for Satake and Sortex color sorting machines in early June. During the workshops, participants worked with equipment as it sorted seed corn and food-grade soybeans. Factory technicians from both companies helped provide training on the adjustment, operation, and maintenance of their respective machines.

SEED TREATMENT

Seed treatment was the focus of a large two-day workshop held in June to provide in-depth training and updates on seed treatment chemicals and application techniques. University and industry speakers presented information on the historical aspects of seed treatment, seed pathogen and health testing issues, common seed treatment chemicals, and adjustment, operation, and maintenance of seed treating equipment. Typical treating equipment for batch and continuous flow operation was also demonstrated for the attendees. The 2009 treatment workshop included recertification credit for the Iowa Commercial Pesticide Applicator program (categories 4 and 10).

Workshop dates are being selected and registration will be available online in the near future for 2010 program offerings. Workshops and short courses will be held in the Iowa State Seed Science Center starting in March. Enrollment is limited. Registration is accepted on a first-come, fees-paid basis.

KAN WANG: BIOPHARMA FIELD TESTING UPDATE

by Paul Christensen and Kan Wang, edited by Paul Christensen

In 2005, *Iowa Seed & Biosafety* included an article on the corn biopharma work being conducted by Professor Kan Wang of the Agronomy Department at Iowa State and BIGMAP. Wang recently provided this update.

Wang started by telling about a conference that she recently attended in Europe. Originally the European Association of Plant Breeding Research organizers had asked her to speak about biofuels. Because biofuels are somewhat remote from the subjects with which Wang works, she asked if she could change the topic of the presentation. "When I spoke about biotech and nanotech for biotech transformation, the audience was shocked." Both of the topics were controversial for a largely European audience. Wang was not too surprised. Since leaving her native China in the 1980s, Wang has learned a thing or two about cultural differences and how culture influences the direction of science more in the U.S. and Europe than "I would have expected from the image that I had when I was young."

Wang recounted some of the regulatory tendencies in plant biopharma. The original promise of plant biopharma was to allow the cheap and safe production of vaccines and some other pharmaceutically active agents. Currently, the conventional way is to produce many of these vaccines in bioreactors using cultured animal cells. The most widely used system uses Chinese hamster ovary tissue. The one advantage of using plants is that they are less closely related to humans than are hamsters, and plant diseases are generally not related to human diseases. Another is that common plant species like corn have been selected to have few human allergens. The human allergens on crop plants are well known in the medical profession, and the people that suffer from these allergens, generally know what to do to avoid problems. In short, one does not have to worry as much about the

contaminants from vaccine production in commonly used plant species. The original human plant pharma expectation was to keep costs low, by either avoiding purification, or by using partial purification.

Wang said, "Technical belief in the plant system for production of pharmaceutical agents peaked in 2000." The escape of corn volunteer plants from Prodigens' pilot production of an animal vaccine, and mixing of the corn grain with the soybeans that were harvested from the field the following year, produced concerns with some members of the public, and perhaps more importantly, with companies in the food industry. Those public and industry concerns caused the major pharmaceutical companies to stop or sell off their biopharma projects to much smaller start-up businesses. Wang said, "There was also pressure from the companies producing proteins in animal systems to apply the same purification standards to plant-produced proteins that are applied to products from animal cell bioreactors. Higher purity standards removed much of the cost advantage that plant systems promised initially. Edible vaccines have largely disappeared from human plant biopharma discussion. There was pressure from both technology opponents and competitors in drug production."

Much of the controversy concerns the possible escape of biopharma organisms into the food chain. Current regulation of the experimental products requires a zero tolerance for escapes. In a crop plant such as corn, this standard is hard to maintain on a long-term basis. The proteins used in Wang's project are not harmful to humans, but there is no regulatory tolerance for escapes. If they occurred under some unusual condition, escapes could be pharmaceutically active.

Wang pointed out that part of the argument for calling for high levels of purification relates to the possibility that the pesticides, herbicides, and fertilizers

that are normally used for production of a crop like corn might remain in a protein produced in a corn system. Partial purification would increase the concentration of this kind of chemical. Thus, requiring some purification seems to lead to a position of requiring complete purification.

When the newsletter last reported on Wang's work, it was 2005. New regulations had just been proposed for the experimental production of plant pharmaceutical products in the field. Those regulations subsequently became official and are now the rules that govern field production of biopharma plants. For corn, the regulations require 1 mile isolation and 28 days of planting date delay for pollen isolation. Previously the standard had been the same as the standards for biotech traits that were expected to be approved for food use. Wang had grown trials in the field in 2002 and 2004. The 2005 planting included heightened security around the plot, and pollen flow studies.

After 2005, in response to the increased public concern, Wang's program decided that they would focus on conversion of the plants to male sterile forms. She related that much of the work in the program was done in greenhouses. The production in 2006 in Rhoades, Iowa, was detasseled, so that the transgenic plants would not produce any pollen. The 2007 production in Burlington, Iowa, had male fertile plants because pollen was needed for the next step in backcrossing. The cytoplasmic male sterility system, as some readers of this newsletter know, requires that male fertile plants carrying the sterility genes exist so that succeeding generations of male sterile seed and plants can be produced. The 2008 field production had only male sterile plants in the field. In 2009, all of the production was in the greenhouse.

(continued on page 13)



Kan Wang is an Agronomy Professor at Iowa State University and a BIGMAP affiliate faculty member. Her research interests include plant genetic transformation and gene regulation.

Kan Wang

BIOPHARMA

(continued from page 12)

Wang reports that the regulatory approvals for her field production experiments have gone smoothly. She has good relations with the regulators and knows what they want to see. Currently, Wang says she is "alone in the U.S. in my application of biopharma to a cross pollinated food crop." SemBiosys (Canada) is working on safflower, which is self pollinated, although it has a high frequency of bee outcrossing, but safflower isolation is easy to find. The others that are involved are using self-pollinated crops, which have lower risks of pollen escape, but still face potential problems with mixing.

Wang's most recent work in this area is in a swine vaccine against H1N1. In this application, there is an economic need for a large amount of relatively cheap vaccine. Although it does not appear that there is any evidence that swine were involved directly in the origin of this H1N1 virus, swine can get the disease, and can contribute to spread of the virus to people. Vaccinating pigs could break that path of infection. Wang says, "I had the good luck of partnering with Dr. Hank Harris of Iowa State Animal Science before the recent H1N1 outbreak." It remains to be seen if the urgency of measures to control H1N1 virus will lead to reconsideration of the ethics, relative risk, and regulation of the production of vaccines in plant systems. Purification of the active ingredient will not be required for use in swine, but significant challenges regarding confinement and channeling of the grain will remain.

SEED LAB APPROVED FOR AGRISURE TRAIT TESTING

The Iowa State University Seed Testing Laboratory has recently been approved as an Agrisure® trait testing lab.

According to Iowa State Seed Lab Trait Testing Coordinator Christa Hoffman, Syngenta requires that Agrisure licensees use approved Agrisure trait testing labs to verify that the products that they sell meet the quality standards that the company sets forth for Agrisure traits.

"Testing labs need to be deemed proficient in three different areas in order to be an approved lab," Hoffman said. "The areas include: Glyphosate Herbicide Bioassay, Glufosinate Herbicide Bioassay, (this test also represents corn borer resistance for the Agrisure trait), and Agrisure Rootworm Immunoassay."

Hoffman says that once a lab receives notice of approval, they will be listed on the Agrisure Internet site, and can then begin to perform the tests. "As an approved lab, we are now able to conduct testing on Agrisure traits," she said. "That's another testing service that we can offer our customers to meet their needs."

The Iowa State University Seed Testing Laboratory is one of the largest testing laboratories in the world and one of the first public labs to be ISO-certified. Laboratory staff test around 50,000 samples each year from over 300 species of seeds.

For more information about the Iowa State University Seed Testing Laboratory visit www.seeds.iastate.edu/seedtest.

STB PROGRAM APPLICATION DEADLINE IS APRIL 15

Over 30 students from eight countries are currently enrolled in the Graduate Program in Seed Technology and Business (STB).

Applications for the upcoming fall semester should be received before April 15.

GRE or GMAT standardized tests are not required to apply to the STB program, but may be submitted as evidence of potential success as a graduate student.

There is no residency requirement to apply to the STB program and international students are encouraged to apply.

Preference is given to individuals that apply to the program prior to April 15.

To apply to the Graduate Program in Seed Technology and Business, visit www.seedgrad.iastate.edu, or contact Paul Christensen at 515-294-8745 or seedgrad@iastate.edu.



Above: (from left) Seed Science Center Molecular Quality Research Associate Anania Fessehaie discusses his DNA research with USDA Deputy Under Secretary for FFAS Bertram "Bud" Philbrook; Seed Science Center and BIGMAP Director Manjit Misra; and members of Philbrook's staff. Philbrook toured the Seed Science Building while in Iowa for the 2009 World Food Prize Symposium and ISU/IICA signing ceremony.



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2009 VEISHEA DISPLAY HIGHLIGHTS CARVER SCULPTURE

Seed Science Center visitors got a chance to literally "walk in the footsteps of George Washington Carver" as part of this year's Seed Science Center/BIGMAP VEISHEA display. Held April 18 during the 2009 Iowa State University VEISHEA celebration, the theme and activities of the Center display were designed to highlight the new George Washington Carver sculpture located at the South entrance to the Seed Science Building. The sculpture was dedicated in November 2008. (See the Fall/Winter 08-09 issue of *Iowa Seed & Biosafety*.)

Greeted by a storyboard cut-out that featured a giant peanut and sweet potato, visitors of all ages were guided by "Carver footprints" past the sculpture and into the building where they had the opportunity to interact with Center faculty and staff while participating in various learning stations.

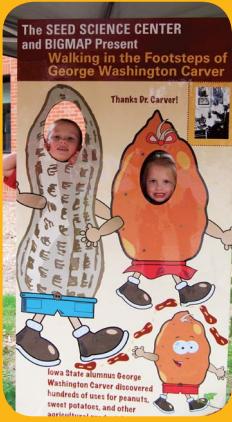
As part of the exhibit, George Washington Carver wall displays, coloring sheets, and a slide presentation acquainted attendees with Carver's life and accomplishments.

Additional stations offered viewers a chance to identify, touch, smell, and even taste—in the form of free popcorn—seeds of all shapes and sizes.

Finally, attendees had the opportunity to visit one-on-one with seed scientists and observe the machines that they use to sort, count, package, and perform other tasks as they work with seeds each day.

"Every year the Seed Science Center faculty and staff go all out to make our VEISHEA display a worthwhile experience for those that visit," said Seed Conditioning Specialist Alan Gaul. "This year was no exception. I continue to be amazed by their efforts. You can tell that they really have an interest in what they do here and enjoy sharing that with others."

**The 2009 Seed Science Center/BIGMAP VEISHEA display
"Walking in the Footsteps of George Washington Carver"**
offered persons of all ages an opportunity to view the new Seed Science Center Carver sculpture, learn more about Carver's life and accomplishments, and experience seeds and the equipment that seed scientists use daily.



CRIPPEN RETIRES FROM ISU SEED LAB IN JUNE

Bonnie Crippen retired from the Iowa State Seed Testing Laboratory in June after working in customer service for more than 24 years.



Bonnie Crippen

"It was a privilege working at one of the world's best seed science centers," said Crippen. "I enjoyed interacting with the customers and being able to help them in any way that I could. I was always proud of what we as a center could do for Iowa and the world."

Crippen's retirement plans include traveling and spending time in her Des Moines home with family and friends.

HEGNA ANNOUNCES PLANS TO RETIRE AFTER 35 YEARS

Seed Analyst Sandra Hegna has announced plans to retire from the Iowa State Seed Testing Laboratory effective January 29, 2010.

Hegna, who was recognized by Iowa State University in February 2009 for 35 years of service (see the Fall/Winter 08-09 issue of *Iowa Seed & Biosafety*), has been employed at the Seed Laboratory since September of 1972.

Over the years, Hegna has taught and trained seed analysts and others attending Seed Science Center short courses. She is AOSA certified in purity and germination, is a registered seed technologist with the Society of Commercial Seed Technologists, and has received an Outstanding Service Award from the Iowa State Seed Testing Lab. In 2005, Hegna also received the Anna Lute Award from the Front Range Seed Analysts.

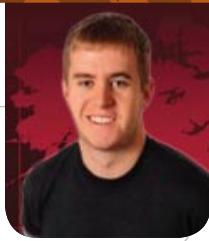
Following retirement, Hegna plans to reside in Madrid, Iowa, with her husband and spend time with her three children, six grandchildren, and 12 great grandchildren.



Sandra Hegna

SEED SCIENCE CENTER PROFILES

Ross Ennen
Graduate Student



A graduate student in the Seed Science Center since fall 2008, Ross Ennen's research focuses on the use of non-traditional harvest and drying techniques to extend harvest periods while maintaining seed quality in soybean seed.

Ennen earned a bachelor's degree in Agronomy from Iowa State in 2008 prior to coming to the Center. Currently he is working toward a master's degree in Crop Production and Physiology under the direction of Agronomy Associate Professor Susana Goggi and Agronomy Professor Russ Mullen.

In addition to conducting research, Ennen serves as a teaching assistant for Agronomy 114 and 212 courses at Iowa State University.

Ennen says that his interest in his current area of research peaked during an internship with Pioneer Hi-Bred in Johnston, Iowa, when he worked with the Parent and Seed Production Research group. "The internship provided me with the fundamental knowledge of the many steps that must occur for corn and soybean cultivars to reach producers," he said. "The employees that I associated with helped me to realize what was needed to become successful in the industry."

Ennen, who is from Forest City, Iowa, says that he enjoys the friendly people and relaxed atmosphere at the Seed Science Center. In addition, he has enjoyed his interaction with Goggi. "Dr. Goggi has provided me with excellent research ideas and feedback during my time here. My research and teaching experience, as well as the personal relationships that I have formed, will stay with me for a very long time."

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Huong Tran
Graduate Student



Born and raised in Ho Chi Minh City, Vietnam, graduate student Huong Tran came to the Iowa State Campus in 2004 to finish her master's degree. First working with Ramesh Kanwar in the Department of Agricultural and Biosystems Engineering, Tran later took up residency in the Seed Science Center in 2008 when she began her PhD work under the direction of Agronomy Professor Jeff Wolt.

Prior to coming to Iowa State, Tran earned a Bachelor's of Engineering degree in Food Technology from the University of Technology in Ho Chi Minh City in 2001. She later attended Wageningen University in the Netherlands where she took coursework towards her master's degree.

As part of her research with Wolt, Tran is currently studying the characteristics of protein activity with environmental ligands through crystallization and x-ray diffraction as a means for understanding the environmental degradation and persistence of industrial proteins genetically engineered into corn.

Tran says that she feels very lucky to have the opportunity to work with Wolt. "Dr. Wolt is very professional, but also flexible. He understands the difficulty international students face in a new environment," she said. In addition, Tran said that Wolt has helped her to learn to think critically when dealing with problems in risk assessment and to become more confident in her protein research.

"I hope that my research with Dr. Wolt will provide a better understanding for the environmental impact of the transgenic protein residue in soil," she adds.

Tran plans to finish her PhD within the next 2 1/2 years. After that, she hopes to return to Vietnam with her husband and son and work to establish a laboratory at a university there.

Jose Pablo Soto-Arias
Graduate Student



Increasing his knowledge in plant pathology to help solve problems that farmers face day-to-day is one of the many goals that graduate student Jose Pablo Soto-Arias (above left) has set for himself.

Soto-Arias, who conducts research with Plant Pathology Professor Gary Munkvold, grew up in San Jose, Costa Rica. He came to the Seed Science Center in January 2008 after earning a bachelor's degree in Agronomy with an emphasis in Plant Sciences from the University of Costa Rica. He is currently working on a master's degree in Plant Pathology.

Assessing interactions within the virus-insect vectors-*Phomopsis* complex in soybeans is the focus of Soto-Arias' research. He believes the study can benefit future soybean growers by providing information to help reduce yield loss from soybean viruses-insect vectors as well as offering them a better understanding of the interactions of the pests and pathogens so that they can optimize their management practices.

Soto-Arias admits that he had little knowledge of seeds before coming to the Seed Science Center. "I have always been interested in plant pathology," he said. "But before coming to ISU, I had no background in seed science. Working with Dr. Munkvold has involved me in a new area of plant pathology that I had never considered. It has definitely made me aware of its importance."

According to Soto-Arias, working in Munkvold's lab has taught him both teamwork and how to conduct his own research. "My work will hopefully provide a practical approach to growers," he said.

Soto-Arias plans to complete his master's degree in 2010. After that, he hopes to continue his research and earn a PhD in Plant Pathology.



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✓ SAVE THE DATE—BIGMAP SYMPOSIUM APRIL 27-28, 2010