



Expertise Rewarded

K-State home to three USAID innovation labs

Kansas State University's standing as a leader in global food systems received a major boost in fall 2013 when the U.S. Agency for International Development (USAID) awarded the university more than \$27 million for three projects that will reduce hunger, poverty, and undernutrition in developing countries.

The three projects — part of USAID's "Feed the Future" initiative — allow K-State Research and Extension to conduct research, education, and outreach in developing countries, and transfer that knowledge to U.S. agricultural practices.

Many believe that K-State's work will help boost agricultural trade globally.

"If you have countries with stronger economies, they will have higher demands for grains," said Dirk Maier, head of the Department of Grain Science and Industry. "To feed nine billion people by 2050, more grain will need to be produced, preserved, and sold for food."

Nina Lilja, director of international agricultural programs, called the competition "fierce" for the USAID work. She helped develop the numerous partnerships, in addition to some of the technical writing, for the grants.

"USAID looked for global leadership in these three areas," Lilja said. "Getting these projects is a big nod for K-State and an opportunity to be recognized as the global center of excellence in these three areas. USAID is making a significant investment, and it's important for us to deliver."

Leading Center for Sorghum, Millet



Collaborative Research on Sorghum and Millet

USAID selected K-State Research and Extension as the management entity for a \$13.7 million grant to advance the science of sorghum and pearl millet in semiarid regions of the world. The five-year grant is renewable for an additional five years.

Timothy Dalton, associate professor of agricultural economics, serves

A West African farmer transports harvested sorghum heads to the village for threshing.



Courtesy of INTSORMIL

as director of the Feed the Future Innovation Lab for Collaborative Research on Sorghum and Millet, also known as the Sorghum and Millet Innovation Lab.

“No one has the breadth in sorghum research that Kansas State has.”

Two projects have been awarded to K-State. Crops geneticist Geoffrey Morris will work on accelerating the genetic enhancement of sorghum in West Africa with genomics-enabled breeding. Research on improved crop genetics, production practices, and processing methods for increased productivity and nutrition for smallholder sorghum producers in Ethiopia will be handled by K-State sorghum breeders Tesfaye Tesso and Ramasamy Perumal.

“No one has the breadth in sorghum research that Kansas State has,” Dalton said.

“Additionally, we have been a part of the Center for Sorghum Improvement for more than a decade, which gives us the very strongest science base and expertise to tap into when we have questions.”

The lab focuses on increasing the resiliency of small-scale producers in

the face of climate change by improving the productivity, disease resistance, agronomy, and value of sorghum and millet crops in Ethiopia, Senegal, and Niger.

Researchers also train scientists in those countries and develop improved crop varieties that will benefit other sorghum-producing countries in sub-Saharan Africa and around the world.

“The overall goal is to improve farmers’ productivity with sorghum and millet, which will reduce poverty and hunger,” Dalton said. “Additionally, we want to expand value-added product development to increase benefits to consumers, the private sector, and farmers.”

Nat Bascom, assistant director for the lab, said the research done in those countries will have the potential for wide-scale impact, including on the U.S. sorghum industry and many western Kansas producers.

“Sorghum and millet are interesting crops for Kansas because, as water becomes more of a scarce resource, we’re going to need to look at new models that will provide income and be more adapted to the resources that we have available,” he said.

“These crops have seen thousands of years of very harsh environments, yet still provide enough grain for families to survive and thrive. They have been really under-researched.”

Work in the three African countries is in partnership with the USDA and more than two dozen universities, national research centers, and

nongovernmental organizations from the United States, Africa, Europe, and Asia.

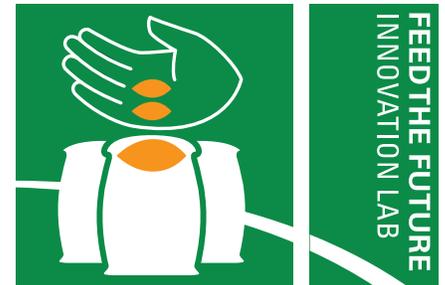
While the research will affect millions of African impoverished farmers and their families, it also presents the opportunity for numerous advances in sorghum genetic enhancement that will positively affect U.S. producers.

“If we can increase the global demand for sorghum, then there is potential to see increases in trade volumes, whether it be in feed, food, or malting industries,” Dalton said.

“Our goal is to create a strong value and more robust sorghum economy which, in the end, will benefit farmers, consumers, and the industry as a whole.”

For more information visit, www.ksu.edu/smil.

Reducing Post-Harvest Losses



Post-Harvest Loss Reduction

K-State received \$8.5 million over five years to establish the federal government’s new Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss.

Co-leaders for the lab are Dirk Maier, director of the International Grains Program, and Polamreddy Venkataramana Reddy (MS ’82, PhD ’96 grain science), who recently retired from General Mills as a global technology platform manager and senior principal engineer.

“As much as one-third to half of the world’s harvest is lost every year for a variety of reasons,” said John Floros, dean of the College of Agriculture and director of K-State Research and Extension.

“Through this innovation lab, we are working toward solutions that reduce postharvest losses and help preserve greater quantity and better quality food



Polamreddy Venkataramana Reddy (seated) and Dirk Maier serve as co-directors for the Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss.

for the world's growing population. By doing so, we also help reduce the waste of the precious natural resources used to produce our food."

"As much as one-third to half of the world's harvest is lost every year for a variety of reasons."

The initial focus is to reduce postharvest losses and food waste for grain and oil seed crops, tuberous root crops, and peanut and legume crops in Bangladesh, Ethiopia, Ghana, and Guatemala.

"A tremendous amount of time and effort is being put into improving crop yields in the developing parts of the world, but then 20 to 30 percent of those crops are lost soon after harvest and before they reach the consumer," Maier said.

"We will research what can be done in an effective manner to decrease these

unacceptably large losses, especially among smallholder and subsistence farmers."

K-State faculty in the departments of Grain Science and Industry, Human Nutrition, and Communications and Agricultural Education developed the grant proposal.

Maier calls it "a powerhouse alliance" with six other U.S. universities, five government and corporate partners, and several universities and organizations in the four countries.

"It's a great honor and responsibility," Maier said. "I think it will spotlight the state and the expertise and capabilities of K-State's faculty, staff, and students as well as those of our collaborators."

For more information, go to www.reducephl.org.

Improving Wheat's Resilience

USAID awarded \$5 million over five years for K-State Research and Extension to develop wheat varieties that are resilient to the warming effects of climate change. The initial focus will be on wheat in South Asia, which typically produces 20 percent of the world's wheat crop.

Jesse Poland (BS '03 agronomy, MS '04 plant pathology), assistant professor of plant pathology, leads the Feed the Future Innovation Lab for Applied Wheat Genomics. The team includes K-State agronomists and plant pathologists, the International Maize and Wheat Improvement Center (CIMMYT), and Cornell University.

"Globally, wheat production is increasing at a rate of 1 percent annually, but there is evidence of yield



Jesse Poland (right), director of the Wheat Genomics Innovation Lab, and graduate student Sandra Dunckel examine wheat in a Kansas Wheat Innovation Center greenhouse.

Project partners in the Applied Wheat Genomics Innovation Lab examine research plots in Jabalapur, India, February 2014.



Courtesy of Jesse Poland

stagnation in some regions, including South Asia,” Poland said.

“In fact, climate models predict that in tropical and subtropical regions such as South Asia, yield will decrease by 10 percent for every 1 degree rise in temperature. Given current cultivars and production practices, this would likely reduce production levels by 30 percent in these regions.”

A 30 percent drop could prove devastating for people in South Asia and other developing regions, which rely on the wheat crop for not only a source of income, but also their own food, Poland said.

Wheat provides 21 percent of the food calories and 20 percent of the protein for more than 4.5 billion people in 94 developing countries.

“In the developing world, wheat is the primary staple for more than 1.2 billion people and an important food source for 2.5 billion living in poverty, many of whom are living on less than \$2 (U.S.) a day,” Poland said. “And wheat is the primary income source for some 30 million poor wheat farmers and their families.”

The economic benefits likely will be felt back in Kansas and across the United States.

“Over the past two years we have already begun implementation of these advanced breeding methods in the KSU wheat programs through support from the Kansas Wheat Commission and Kansas Wheat Alliance,” Poland said.

“This new project expands this work on a global scale. The improved lines developed through CIMMYT could be

“Wheat provides 21 percent of the food calories and 20 percent of the protein for more than 4.5 billion people in 94 developing countries.”

brought back to Kansas as parents with good heat tolerance, and the prediction models developed will further our understanding of selecting for yield under heat stress.”

For more information, go to www.wheatgenetics.org.

FEED THE FUTURE

The U.S. Government’s Global Hunger and Food Security Initiative

Successful Programs and Experience Will Feed the Future

K-State was the only U.S. university to receive three U.S. Agency for International Development projects in 2013, and only the University of California–Davis has more active USAID projects (four).

Since the 1950s, the College of Agriculture and K-State Research and Extension have been heavily involved in international projects. With expertise in the production, processing, distribution, and protection of food crops and food animals, our objectives align closely with those of Feed the Future, the U.S. Government’s Global Hunger and Food Security Initiative.

Current research on drought-tolerant crops, efficient irrigation systems, soil fertility, pesticide and fertilizer use, food and feed safety and security, production systems and financial management, animal genetics and welfare, and grain storage and transportation positions K-State to tackle future food insecurity issues.

Dean and Director John Floros uses the term “sustainable intensification” to describe projects underway in multiple departments. Sustainable intensification offers a practical pathway toward the goal of producing more food with less impact on the environment by intensifying food production while ensuring the natural resource base — on which agriculture depends — is sustained and improved for future generations.