

WORLD GRAIN®

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FIGHTING HUNGER

ADMI seeks to reduce postharvest loss

Global grain market review

Focus on Australia

Recruiting the next generation of millers



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ON THE COVER: Farmers in Bihar, India, work with hermetically-sealed grain bags at the ADMI Village. Photo courtesy of ADMI.

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FIGHTING TOWARD ZERO HUNGER

In a world where one in nine people are suffering from chronic malnourishment, having 1.3 billion tonnes of food per year go to waste postharvest is a tragedy, particularly since much of that waste occurs in regions where starvation and malnutrition are most prevalent.

While some of the total occurs in wealthier, developed countries where excess prepared food is discarded, more than half is lost earlier in the supply chain between production, post-harvest handling and storage stages, according to the Food and Agriculture Organization (FAO) of the United Nations.

In recent years, one of the world's largest agribusiness companies, Chicago, Illinois, U.S.-based Archer Daniels Midland Co. (ADM), has sought to reduce this unnecessary loss by establishing the ADM Institute for the Prevention of Postharvest Loss (ADMI) at the University of Illinois in Urbana, Illinois, U.S.

The institute, which was founded in 2011 with a five-year, \$10 million gift from ADM, has focused on helping smallholder farmers in the developing world preserve millions of tonnes of grains and oilseeds — including wheat, corn, rice

by Arvin Donley

ADMI's initiative to reduce postharvest loss is making a difference in India, Bangladesh, Brazil and other countries

and soybeans — lost each year to pests, disease, mishandling and other factors.

While the program has had a positive impact in several countries around the world, many of its resources have been dedicated to India, the world's second most populous country, which is the epicenter of food loss in the early portion of the supply chain. According to a 2016 report in the *Times of India*, from 2013-15 the Food Corporation of India (FCI) allowed 46,658 tonnes of food grain to rot in nearly 2,000 warehouses across the nation. The report said the amount of rotted grain could have fed 800,000 people. The FCI has an insufficient number of modern grain storage facilities so millions of

Smallholder farmers in India are giving demonstrations on storing grain in GrainPro bags, which are hermetically sealed. Photos courtesy of ADMI.



In Brazil, ADMI is studying ways to prevent postharvest loss due to inefficiencies in transportation.

tonnes of grain are stored in inadequate storage facilities or in outdoor piles.

“India is obvious target when it comes to trying to make an impact in the world of post-harvest loss,” Mindy Spencer, assistant director of the ADM Institute, told *World Grain*. “More than 194 million people go hungry there each day. Where we’re working, in Bihar (a state in eastern India), the average income per day is \$1.25 and the post-harvest losses are huge. It’s a place where our technologies are being adopted and the people there are very receptive to us helping to make a change.”

In January 2015, ADMI launched the “Reduction of Postharvest Loss” project in Bihar, in collaboration with Bihar Agricultural University, Dr. Rajendra Prasad Central Agricultural University, and the Borlaug Institute for South Asia. As part of the project, ADMI created an initiative called the ADMI Village, which demonstrates the positive impact of post-harvest loss reduction interventions on food availability, income and livelihoods by identifying “hotspots” in supply chains, testing suitable technologies and providing training and education.

The Bihar initiative, which provides support to nearly 5,000 farmers, the majority of which own less than one-half hectare of farmland, has focused its efforts on improving grain storage and drying practices of smallholder farm-

ers. More than 20,000 low-cost and reusable hermetic storage bags, at a cost of almost \$30,000 to the institute, have been distributed in 30 villages as part of a subsidized intervention program. The farmers, who receive up to five bags per family, were individually informed about proper storage and the benefits of hermetic bags, in addition to information regarding safe storage practices, drying techniques and the dangers of mycotoxins. Once they had this information, they were willing to pay 20 rupees per bag, more than three times the price charged for traditional jute bags.

“We’re looking at having them put some skin in the game,” Spencer said. “Adoption is usually better if the farmers have an investment in the tool that we’re providing. What our researchers found was that people weren’t always using the bags for their intended use if the bags were free.”

She said the money that is made from selling the bags will be used to purchase more bags that can be distributed throughout Bihar.

“This really should be a sustainable model,” Spencer said. “We made the preliminary investment and we might have to make one more investment in bags but then it should be able to run itself.”

ADMI also introduced the farmers to low-cost, half-tonne capacity STR grain dryers, which in 4 to 6 hours can drive moisture levels in grain down from 20%

to 12%, Spencer said. The dryers are accompanied by other mechanization tools such as threshers, mills and moisture meters.

“The idea is that the dryers can be built in country for somewhere around \$750,” she said. “It is a low-cost, easy-to-build dryer.”

In addition, researchers at the University of Illinois are developing a system consisting of an in-bag sensor, a data hub, and a phone app that will allow farmers to monitor moisture levels remotely without requiring Internet access.

As part of implementing the bags and dryers initiatives, ADMI and its partners are educating the smallholder farmers about the benefits of reducing grain spoilage and loss. Most farmers in the region did not realize that post-harvest loss reduces their income by 15%. After learning about the dangers of mycotoxin contamination in grains and how hermetic bags can reduce this incidence, they were willing to spend more money on improved storage.

“A lot of farmers living in remote places don’t really think about it as a loss,” said Sarah Bingaman Schwartz, communications coordinator for ADMI. “We asked them about post-harvest loss and even with the translation they don’t really grasp that because it’s just been a part of doing business for them. They just take for granted that they lose a certain

amount of grain. And they really didn't have the resources or materials to help them prevent that. They didn't use grain dryers — they just literally spread the grain on a tarp or dirt and let the sun dry it. Birds, rodents and all sorts of things can get into the grain in that situation. So many things can go wrong."

One measure of the program's success, Spencer said, is that the seed germination rate for the bagged and dried grain has improved from 35% to 95%. She also said farmers have stated that by switching to the hermetically sealed bags they make a profit of 203 rupees per six months versus a loss of 275 rupees per six months due to costs associated with pesticide/insecticides and crop losses. Researchers also have found that after 300 days in storage, no visible grain damage was found in wheat that was dried to 20% moisture content and stored in hermetically sealed bags.



Mindy Spencer, ADMI assistant director, and Ashley Nagele, ADMI village coordinator, working at the ADMI Village in Bihar, India.

Other projects the ADMI is working on include introducing solar dryer technology, which may be used even during monsoon season as well as providing grain quality measurement kits, designed to provide uniform testing be-

tween farmers and traders.

"What's nice about working in Bihar is that the government of India is making a really big push in agriculture right now," Spencer said. "By 2022, they want to double the farmers' income so



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it's a really exciting time to be in Bihar and we're hoping to grow our funding base and our partnerships so we can do more there."

OTHER PROJECTS

ADMI also is having success reducing postharvest loss in rice in neighboring Bangladesh, which has malnutrition rates among the highest in the world with more than 54% of preschool-age children (about 9.5 million) stunted and underweight, according to the FAO.

ADMI is collaborating with the USAID-funded Feed the Future Innovation Lab for the Reduction of Post-harvest Loss program at Kansas State University on a rice value chain-focused PHL reduction research project

with Bangladesh Agricultural University.

The project encompasses three main components: mycotoxin detection; appropriate drying and storage technologies; and gender issues in post-harvest loss prevention.

Spencer said a 2010 study found the estimated total postharvest loss of rice paddy in Bangladesh was about 14%, of which drying and storage losses are 2.3% and 3.8%, respectively.

"Our researchers in Bangladesh have recently reported that with properly dried grains stored in hermetically sealed bags, zero insects were found six months after storage," Spencer said. She noted that a postharvest loss reduction target of 5% has been set for the project at the household or farm level, and this

reduction loss could mean a corresponding reduction in household food expenditure for rice roughly equaling 5% to 10% more household income.

South America is another continent that is on ADMI's radar.

"We've done a lot of work in Brazil," Spencer said. "The needs in Brazil are different than in India. In India, we are doing a lot of one-on-one work with small-holder farmers. Brazil will involve larger projects. Grain transportation, for example, is a huge issue there. Dr. Richard Gates (professor in the Department of Agricultural and Biological Engineering at the University of Illinois) has been leading a pretty successful project there on transportation and carbon dioxide loss in grain."

The world's leading soybean producer and exporter, Brazil transports 60% of its crop by truck from farms to processing, storage and export terminals. Spencer said only 20% of Brazil's more than 1.7 million kilometers of roads are paved, and thus issues such as poor road conditions, improper truck maintenance, overloading, and inefficient transfer of grain are major causes of postharvest grain loss.

As part of a PHL transportation study funded by ADMI, University of Illinois researchers have found that carbon dioxide concentration increased with harvest moisture, temperature and trip duration, ranging from 2,000 to 200,000 parts per million and tending to accumulate at the bottom of trailers over time. Lower carbon dioxide levels were observed with drier beans, shorter trips and fewer damaged beans.

She added that recent research has shown that monitoring carbon dioxide provides earlier detection of spoilage than conventional temperature monitoring, and in the absence of fungal growth, carbon dioxide levels reflect the amount of grain matter loss due to grain respiration.

New ADMI director named



The ADM Institute for the Prevention of Postharvest Loss (ADMI) announced in October that Dr. Alex Winter-Nelson has been selected as the institute's new director. Winter-Nelson has served as the director of the College of Agricultural, Consumer and Environmental Sciences (ACES) Office of International Programs at the University of Illinois for the past five years.

"Since its inception in 2011, the ADM Institute for the Prevention of Postharvest Loss has made terrific strides in raising awareness about postharvest loss and food waste, building a community of interest on the issues, improving

our understanding of the nature of the problem, and identifying technical solutions," Winter-Nelson said. "As I take on the directorship of ADMI, I owe a debt of gratitude to the staff and the past directors who have put the Institute where it is today. I am excited about the chance to work with partners at the University of Illinois and around the world to take ADMI into its next phase."

In addition to new leadership, ADMI has become part of the Office of International Programs (OIP). He said the move to OIP will allow ADMI to leverage expertise in international partnerships to create a sustainable future for the institute.

In his role as the director of the Office of International Programs, Winter-Nelson launched the International Food Security at Illinois (IFSI) program dedicated to using University of Illinois expertise to build food systems that enhance food security. This move brings ADMI in closer alignment with this group.

Winter-Nelson succeeds Dr. Prasanta Kalita, who left the position this summer after serving as director of ADMI for several years.

Winter-Nelson is a professor in the Department of Agricultural and Consumer Economics, in addition to his director appointment. He has been at the University of Illinois since completing doctoral studies in applied economics at Stanford University in 1992. Winter-Nelson has authored dozens of scholarly papers appearing in academic journals and books and coauthored *The Atlas of World Hunger*, winner of the 2011 James M. Blaut Innovative Publication Award from the Association of American Geographers.

ONLINE COURSES

In an effort to expand its reach as far as possible, ADMI has developed an online postharvest loss course with

Coursera. Since it was launched in 2015, the course has been taken by more than 7,000 people in 170 countries.

Informally referred to as PHL 101, the course targets four key areas: an overview of post-harvest loss; supply chain activities including harvesting, drying, and storage; economics and markets; and an introduction to the network of actors working in the field of PHL prevention.

“We’ve had enthusiastic feedback from people who have taken the on-line course,” Bingaman said. “It’s a big part of our awareness goal. The course is a concerted way to get the message across.”

FUNDING CHALLENGE

While ADMI’s work is bearing fruit in places like India, Bangladesh and Brazil, the institute leaders say they have barely scratched the surface in

their mission to reduce post-harvest losses around the globe. As in any endeavor of this type, funds are needed to convert ideas into action. After its five-year \$10 million gift expired at the end of 2015, ADM donated \$500,000 last year and Spencer said there are indications that the company will provide future funding. But ADMI will need additional funding streams to expand its global footprint.

“One of the things I’ve done in my past is fundraising, and ADM has made it very clear that they want to see this institute do nothing but grow and evolve and keep making an impact,” Spencer said. “The ADM Cares Board really cares about our success and in order to increase our footprint and make a bigger impact, they are encouraging us to increase our funding.”

To tell ADMI’s story and make as many connections as possible, Spencer

and her colleagues have been on the road in recent months attending events such as Food Tank Summit and the World Food Prize. In 2015, ADMI held its first International Congress of Postharvest Loss Reduction in Rome, Italy, and the event received financial backing from the Rockefeller Foundation, the Bill & Melinda Gates Foundation, and John Deere among others.

“We’re working on trying to build new partnerships,” she said. “We’re looking to grow partnerships with more corporations so we not only can increase diversification of funding, but so we can increase awareness of postharvest loss needs throughout the world. We’ve done great work and made noticeable strides, but I know that with strong partnerships our global impact will grow.” **WG**

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