

ADMI

ADM Institute for
the Prevention of
Postharvest Loss

2018 Annual Report



I ILLINOIS

College of Agricultural, Consumer
& Environmental Sciences

From the Director



For the ADM Institute for the Prevention of Postharvest Loss (ADMI), 2018 was a year of building synergies across our ongoing projects and taking existing collaborations in new directions. As you will read in this report, 2018 saw ADM's projects consolidate gains from past work and position themselves to transition from discovery to impact at scale.

We are delighted that the United States Agency for International Development (USAID) has renewed the award for the Innovation Lab for the Reduction of Post-Harvest Loss. This renewal will allow ADM to continue to work with Kansas State University and partners in Bangladesh, Ethiopia, Ghana, and Guatemala. We are particularly pleased that the renewal provides funding to allow the University of Illinois' AgReach program to engage in gender- and youth-inclusive scaling-up activities in all four of these countries, while ADM continues to support partners at the Bangladesh Agricultural University as they develop systems for improved off-farm grain drying and seed storage. The new USAID award marks an important transition from identifying technical solutions to nurturing their widespread adoption.

Our programs in India are also undergoing a positive transition as we expand the ADM Village project through integration with India's Climate-Smart Village program. In this process, we are able to build a stronger institutional platform for sustained engagement in India while reaching even more villages, farmers, and entrepreneurs with innovations to improve postharvest management. We are pleased to maintain relationships with our existing ADM Village partners, as the Borlaug Institute of South Asia, Bihar Agricultural University, and Dr. Rajendra Prasad Central Agricultural University are all partners in the Climate-Smart Village program. We are grateful to ADM Cares for providing an award in 2018 to allow the ADM Village project to expand in this way.

The past year brought increased interaction among our partners, strengthening our foundation for impact in 2019. Our Bangladesh partners in the innovation lab projects came to work more closely with our partners in the ADM Village in India, sharing knowledge to improve PHL technology in both countries. Participants in our capacity-building programs with the Bangladesh Ministry of Food began working with researchers on a range of other ADM projects in South Asia. Meanwhile, we began sponsoring long-time associates for new projects in Malawi, Uganda and Brazil.

ADMI is contributing to increased food security by promoting research, outreach and education to reduce postharvest losses in grains and oilseeds. We are making a difference thanks to the generous support of our sponsors, the great abilities of our partners, and the dedication of our staff members.

—Alex Winter-Nelson

The mission of the ADM Institute for the Prevention of Postharvest Loss (ADMI) is to promote research, outreach, education, and capacity building on tools, techniques, institutions and policies to reduce postharvest losses in grains and oilseeds to promote environmental sustainability, food security, and poverty alleviation.

ADMI was established with a gift from the Archer Daniels Midland (ADM) Company to the University of Illinois and is based in the College of Agricultural, Consumer and Environmental Sciences.

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ADMI Village | Scaling Postharvest Innovations for Impact

History

ADMI launched the ADMI Village project in partnership with Bihar Agricultural University (BAU), Dr. Rajendra Prasad Central Agricultural University (RPCAU), and the Borlaug Institute of South Asia (BISA). The model village is located in Dih Sarsauna, approximately 70 kilometers from Patna, the capital of the state of Bihar, India. The ADMI Village has served as a proving ground for postharvest technologies and a center for trainings and demonstrations. Since 2015, more than 7,000 farmers have received training on postharvest technology use.

The Future: Integration with Climate-Smart Villages

Over the next year, the ADMI Village project will transition to become part of a larger effort to mainstream climate-smart technologies in India. Working with the Indian Council for Agricultural Research (ICAR) and ADMI Village partners, ADMI is integrating postharvest technologies into the “Scaling up Climate-Smart Agriculture (CSA) through Mainstreaming Climate-Smart Villages (CSVs) in Bihar” program, initiated by the Government of Bihar Department of Agriculture.

The program represents a significant effort to empower farmers in Bihar to adapt production practices to a changing climate. The project will reach 100 villages to scale up climate-smart innovations and make appropriate technologies and inputs accessible through local suppliers. As part of this program, ADMI will leverage the staff, network, and infrastructure of the larger project to deliver postharvest technologies and training to a wider audience. The supplemental resources provided through ADMI will allow the program to integrate postharvest technologies and information.

The Climate-Smart Villages program will include:

- Provision of grain dryers and drying services in CSVs over three years. Drying services are to be offered on a contract basis by trained service providers using dryers approved by BAU, RPCAU, ICAR, or BISA.
- Subsidized distribution of at least 20,000 hermetic storage bags annually through local entrepreneurs trained in the importance of hermetic storage.
- Training on drying and storage for farmers and service providers in CSVs. Through this process, young farmers/entrepreneurs will be able to provide postharvest-related services like grain drying and selling hermetic bags. Many trainers will be women to help achieve the target of 35% of beneficiaries being women.

ADMI Village Project Highlights

- Approximately 6,000 hermetic bags distributed among farmers of 64 villages
- 79 one-day training sessions held in 32 villages and attended by 3,500 farmers, including 1,500 women
- Two local manufacturers trained in fabrication protocols for local production of adapted STR dryers in Bihar
- Rural youth involved in the fabrication of small-scale grain dryers
- Facilitating local production of hermetic bags in Patna, Bihar, by private manufacturer

ADMI Finds Solutions

- Grain samples from small farms in Bihar, India indicate hermetic bags decrease aflatoxin in maize by over 75%
- Bihar research indicates average farmer could recover market price of a hermetic bag in one season
- Market analysis indicates farmers selling onto informal markets in India receive 80% of the price premium from quality attributes associated with improved postharvest management
- On-farm testing in Bangladesh reveals that the BAU-STR dryer can reduce grain loss during drying to less than 0.5% compared to 3-4% using conventional methods
- Investments in laboratory equipment are promoting research on postharvest management in grains and oilseeds in Brazil, Bangladesh, and India

The transition to the Climate-Smart Villages program from the original ADMI Village project promises to increase the reach of the technologies piloted at Dih Sarsauna and offers a structured mechanism to integrate postharvest training and technology distribution into broader farm supply and farm training networks. The integration of the ADMI Village and postharvest technologies into the Climate-Smart Villages program was made possible by two grants from ADM Cares, the ADM corporate social investment program.

Bihar Farmer Success Story

Mrs. Sunita Devi (pictured below), a resident of Hemra village in Bihar, is an active member of JEEViKA (a rural women's education group) and has a farm of about 1 hectare. She grows rice, wheat, gram, lentil, maize, mustard and potato in both the rabi (spring) and kharif (autumn) seasons. She was eager to learn how to minimize storage losses, and used hermetic storage bags for seed storage. She saw higher production in rice, wheat, gram, and maize in the last two seasons. She is now acting as a lead trainer for postharvest loss prevention and providing training to village women about storage bags.



Muhammad Aslam (right) and Nazmeen Praveen are husband and wife farmers who have been designated progressive farmers in the ADMI Village. They host one of the village's drying centers at their house. They have also adopted an integrated system of cropping potatoes and corn together to get more profit from the same land.

Sunita Devi saw higher production in rice, wheat, gram, and maize in the last two seasons. She is now acting as a lead trainer for postharvest loss prevention and providing training to village women about storage bags.

PHLIL | Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss

Innovation Lab Receives 3-Year Renewal for Phase II

ADMI partners with Kansas State University on the Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss (PHLIL). Now in its sixth year, the USAID-funded PHLIL project operates in Bangladesh, Ethiopia, Ghana, and Guatemala. In 2018, the project received a \$3 million renewal for a three-year Phase II, which will continue through the end of 2021.

In the first phase of the PHLIL project, ADMI concentrated its activities in Bangladesh, working closely with Bangladesh Agricultural University (BAU), and providing support in other PHLIL countries as well. In Phase II, ADMI will continue work in Bangladesh and will also work through the University of Illinois AgReach program to scale up technologies developed in each of the four project countries. ADMI will also support development of a kernel-level grain sorter for aflatoxin management. Our work in Bangladesh will focus on developing systems for off-farm drying that can serve smallholder farmers and with development of seed storage innovations. The scaling efforts will focus on gender and youth inclusion, drawing on the extensive experience and models developed by AgReach from programs around the world.

Highlights from Bangladesh

- Confirmed benefits of BAU-STR Grain Dryer: On-farm measurement found 0.4% drying loss by farmers using the BAU-STR dryer compared to 2.5 to 4% losses using conventional methods.
- Expanded awareness of post-harvest technologies: In 2018, 29 villages in seven districts received training and demonstrations of drying and storage technologies like moisture meters, BAU-STR dryers and hermetic bags. A total of 1,200 participants, including 335 women, were reached in these trainings.
- Disseminating materials: Posters and leaflets on the moisture meter, BAU-STR dryer, and storage bags were created in Bangla and English.
- Gender training: Gender sensitization has been incorporated into training modules for postharvest technologies.
- Multiple fabricators have begun local manufacture of BAU-STR dryers.

Highlights from other PHLIL Country Projects

- In Ethiopia, the PHLIL-sponsored training sessions for farmers and other stakeholders integrated postharvest loss prevention practices, including drying, moisture measurement, and mycotoxin and insect management.
- In Ghana, Sesi Technologies is now selling the locally-produced, PHLIL-developed EMC moisture meter, now called the GrainMate Moisture Tester, for about US\$100 each. Launched by a PHLIL youth entrepreneur, Sesi Technologies has become a new private sector distributor for ZeroFly hermetic storage bags.
- In Guatemala, trainings and promotion of new storage technologies developed by extension specialists are yielding positive changes in postharvest management for grain quality preservation.



PHLIL Key Accomplishments (FY2018)

- 4,399 short-term, and 12 long-term trainees (degree-seeking) directly supported by the PHLIL in FY2018.
- 11 research publications.
- 3 technologies transferred and/or ready to scale.
- 12 public-private partnerships along the pathway to scaling and impact.

—Information from PHLIL 2018 annual report

Read more about the
PHLIL project and ADMI:
go.illinois.edu/PHLIL

SUCCESS STORY

The BAU-STR Dryer | Engaging Local Business and Farmers in Post-Harvest Loss Reduction

Almost all paddy rice drying in Bangladesh is done in open air, either in fields or farmyards, leaving the grain exposed to weather, farm animals and pests, dirt, and fungal toxins. Open-air drying is a significant contributor to farm-level postharvest losses, which amount to about 14% of the country's rice production.

To improve postharvest management, the PHLIL Bangladesh team developed the BAU-STR dryer, modified from a design introduced in Vietnam. This small-batch mobile grain dryer provides an alternative to traditional sun drying. The BAU-STR dryer can dry one-half metric ton of paddy rice in four to five hours. The PHLIL team's adaptations improved efficiency, cost, and mobility, and removed reliance on the national electrical grid. The dryer has been validated for rice, wheat, and maize, and was recently added to the Bangladesh government's agricultural machinery subsidy program, enabling more farmers, millers, and service providers to buy the dryer.

The BAU-STR dryer can now be entirely manufactured in the country, and can be repaired and maintained by local businesses. A small local electronics company in Bangladesh has created a 17-kilogram blower suitable for use with the dryer. Field tests by the BAU team confirm performance comparable to the imported blower.

After seeing a demonstration of the BAU-STR dryer on a televised news report, Mohammed Humayin Kabir from Comilla District, Bangladesh, reached out to BAU to learn how he could acquire a dryer for his seed and grain trading business. Working with BAU and a local fabricator, Kabir acquired his dryer in time for the 2017 aus (summer) season. He found it immediately made his business more profitable, and planned to continue to use BAU-STR dryers in the aus and boro (winter) seasons.



BAU researchers test the new Bangladesh-made blower on the BAU-STR dryer in December.

This small-batch mobile grain dryer provides an alternative to traditional sun drying. The BAU-STR dryer can dry one-half metric ton of paddy rice in four to five hours.

ADMI Hosts PHLIL Annual Meeting

The ADM Institute hosted the 2018 annual meeting for the Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss (PHLIL).

The meeting in May 2018 brought participants from all of the PHLIL countries and programs to the University of Illinois at Urbana-Champaign. All four core countries, Bangladesh, Ghana, Ethiopia, and Guatemala, had project representatives at the meeting. Two additional PHLIL countries, Nepal and Honduras, were also represented. Beyond country representatives, the meeting roster included attendees from the University of Illinois, Kansas State University, USAID, USDA, World Food Programme, Humanitas Global, and more. The meeting provided a valuable opportunity for researchers and practitioners to learn from each other, share experiences in mainstreaming innovations, and plan for a second phase of the program with increased attention to scaling and impact.

Read more about the PHLIL annual meeting on our blog:
go.illinois.edu/phlilmeeting

Research | Understanding the Value of Postharvest Management

Postharvest Technology for Improving Smallholder Income and Food Security

Launched in 2015 in the state of Bihar, India, the Improving Smallholder Income and Food Security (ISIFS) project is a multifaceted field-based study to assess the market viability and technical effectiveness of hermetic storage bags as used by farmers. The study has involved 4,400 households.

Dr. Kathy Baylis and Dr. Kent Rausch from the University of Illinois lead this ongoing project, assisted by graduate students Hemant Pullabhotla, Pallavi Shukla, and Gowthami Venkateswaran, and supported by researchers at Bihar Agricultural University, Dr. Rajendra Prasad Central Agricultural University, and Borlaug Institute of South Asia.

In the initial survey, the research team learned that farmers vastly underestimated the amount of grain they were losing to postharvest loss, which they considered a cost of doing business. Farmers estimated 2 to 3% losses, but losses measured by the research team were closer to 15% during harvest and storage combined. In addition, farmers were unaware of the risks of mycotoxin contamination. The study team found a high incidence of contamination—up to 36% of maize stored in traditional bags was contaminated. In hermetic bags, the rate dropped to 4%.

Early work on the project measured the demand for hermetic bags, the price that farmers were willing to pay for them, and the impact of increased information about health risks and prevalence of mycotoxins on the willingness to pay. During the course of the study, thousands of farmers learned about hermetic storage and gained access to hermetically-sealed storage bags.

In the past year, the team explored the value end users place on the improved grain quality resulting from better postharvest management. The surveys, interviews, and end user tests sought to quantify the effect of hermetic storage bags on grain value at different points in the supply chain—traders, millers, and consumers. Early returns from the data suggest farmers could receive up to an 11% premium for safely-stored grain after one month of storage versus traditional storage.

ISIFS Findings from 2018

- Farmers who use hermetic bags for 1 year are willing to pay 26% more than farmers who have no direct experience with the technology
- An average farmer in Bihar could recover the market price of the bag in one agricultural season
- Using hermetic bags decreased the incidence of aflatoxin contamination in maize over 80%
- Significant demand for better postharvest management of grain exists among end-consumers in urban and semi-urban areas in India
- Consumer surveys suggest a desire for “certified safe” grain designation

ADMI Implements Solutions

- In 2018, local partners instructed 3,500 farmers in India and 1,200 in Bangladesh in grain drying and storage methods
- All components for BAU-STR dryer are now produced in Bangladesh, increasing accessibility for farmers
- USAID Innovation Lab for the Reduction of Post-Harvest Loss received three-year renewal to support scale-up of technology in Bangladesh, Ghana, Ethiopia, and Guatemala
- Climate-Smart Villages initiative expands the reach of ADMI Village project to 100 communities in Bihar, India
- Multi-crop threshers that save labor and reduce grain loss are being manufactured in Ghana, Malawi, and Uganda through ADMI and the USAID Soybean Innovation Lab

Illinois Graduate Student Studies Quality Premiums in Indian Rice Market

A great volume of published research demonstrates a range of technologies for improving the drying, storing and handling of grain by smallholder farmers in the developing world. By contrast, information about whether markets in developing countries reward farmers for improving the quality of their harvested crops through use of these technologies is rarely available. University of Illinois graduate student Hemant Pullabhotla and professor Kathy Baylis are filling this knowledge gap by measuring the return farmers receive from increased grain quality in informal agricultural markets in Bihar, India.

As part of the ISIFS team, Pullabhotla used a novel field experiment to estimate how much value traders place on improved grain quality, and how much of that value is passed on to farmers. In the experiment, farmers offered pre-tested grain samples of high and low quality to a trader in their village and recorded the amount the trader was willing to pay. Researchers also separately presented traders with identical grain samples and recorded their stated willingness to pay for the various qualities of grain. By comparing these two sets of data, researchers could reveal the value that traders placed on higher quality grain and the value that they passed on to farmers.

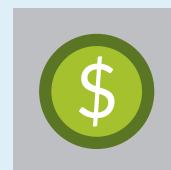
The results showed that farmers could receive an average price premium of more than 4 percent when they presented traders with grain that had been properly dried and handled to maintain high quality. While this premium may encourage higher quality from farmers, the traders themselves indicated an even higher valuation of better quality. The research estimates suggested that farmers receive about \$0.80 of a potential \$1.00 payoff to improved grain quality. The research also found that farmers who have a history with a specific trader receive a higher premium.

Pullabhotla's research indicates that quality premiums could provide incentives for adopting better postharvest management and other quality improvement, even with imperfect market conditions. Hence, raising farmer awareness of technical options for better postharvest grain management and helping them access those options can be a pathway to reduced postharvest loss and improved farmer incomes.

ADMI-sponsored research in India confirms that postharvest technology can address 4 key dimensions of food security by:



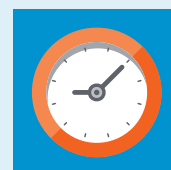
Reducing physical losses to increase availability



Adding value to products to raise farm incomes and make food more affordable



Reducing mycotoxin contamination to enhance food utilization



Allowing longer storage to stabilize availability, access, and food safety over time

RESEARCH BRIEFS

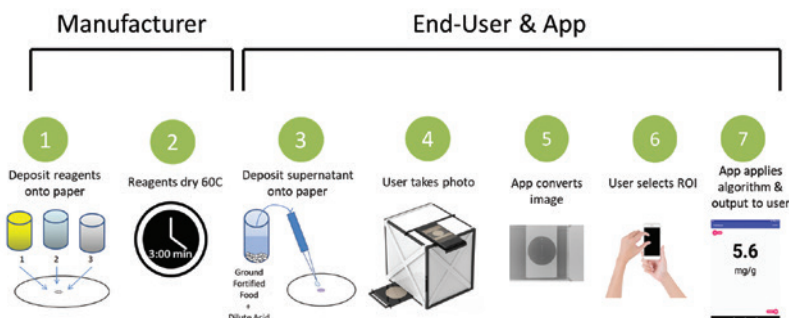
Developing Inexpensive Fortification Monitoring Technology

Food fortification offers a mechanism to address micronutrient malnutrition around the world. But, in countries where cereals markets are not well regulated, inability to verify the nutritional quality of foods can undermine fortification efforts. ADMI-funded researchers are working to enable easy verification of nutrient content in cereals to support improved postharvest management and greater nutritional security.

Dr. Juan Andrade leads the Illinois Global Nutrition Technology (IGNiTe) lab, which focuses on developing and implementing technologies and strategies to address micronutrient malnutrition. Andrade's team is working on a low-cost, paper-based tool to detect iron and other micronutrients in fortified foods.

Despite wide implementation across most low- and middle-income countries, fortification efforts are undermined by inadequate monitoring and evaluation. Many countries require food companies to fortify staples to address micronutrient gaps. However, governments and food companies lack the resources to assess the quality of fortified foods and monitor the foods entering local markets.

To address this challenge, Andrade's team has developed Nu3Px, a low-cost sensing technology consisting of a paper-based, colorimetric assay, coupled with a smartphone camera and an app for the quantification of iron in fortified flour (illustrated above). With funds from ADMI, the team will develop the software and further validate the technology for the quantification of iron in corn flour. Team member Anna Waller received a Fulbright Fellowship to continue the validation of this technology in collaboration with Professor Marcela Gaytan from the Universidad Autónoma de Querétaro in Mexico. Ultimately, technology like Nu3Px can ensure that fortified food is correctly identified and valued in the market and can enable food fortification to have even greater nutritional impact for vulnerable populations.



Waller created a video about the work:

[WATCH NOW](#)

go.illinois.edu/micronutrients

Researchers at BAU received funding from ADMI for the purchase of two machines for their engineering shop: a laser cutter and a lathe machine, both computer-guided.

Precision Equipment for Bangladesh Agricultural University Lab

Modern machinery has been an important component of two ADMI projects in Bangladesh: the Post-Harvest Loss Innovation Lab (PHLIL) and the Appropriate Scale Mechanization Consortium (ASMC). The mechanical innovations developed by researchers at Bangladesh Agricultural University are poised to make a great difference in that country's agriculture economy. However, the machine shops in the area were not equipped to produce or repair all the components of this modern equipment. A resource with precision equipment is needed to support mainstreaming modern machinery.

Researchers at BAU received funding from ADMI for the purchase of two machines for their engineering shop: a laser cutter and a lathe machine, both computer-guided. The new machines will allow the university to provide services for a fee for outside companies, distributors and manufacturers while also conducting high-quality research and teaching.

Determining Optimal Storage Times for Soybeans in Brazil

Dr. Richard Gates, a professor in the Department of Agricultural and Biological Engineering at the University of Illinois, received funding from ADMI to purchase a heated and refrigerated circulating water bath to support research on management practices to reduce postharvest loss in soybeans in Brazilian conditions. This equipment allowed graduate student Ana Beatriz Pereira da Silva to complete research for her master's thesis, "Dry Matter Loss Rates of Soybeans: Effects of Respiration Measurement System, Damage by Splits, and Moisture Content at Elevated Temperatures."

Gates and colleagues in Brazil are working with graduate and undergraduate students in Nebraska, Brazil, and Illinois to create an updated table of maximum allowable storage time (MAST) to account for quality losses in soybeans under different transport and storage conditions. Soybeans in Brazil are harvested wetter and warmer than those in the U.S., so information from the U.S. is not broadly transferrable, and the research also informs U.S. producers during unusual harvest seasons.

The research uses a dynamic grain respiration system (D-GRMS) to replicate transport truck and storage silo conditions. The precise conditions in the D-GRMS are maintained by the new circulating water baths. Since the new equipment was installed, da Silva was able to complete her research and her thesis. She graduated from the University of Illinois in December. Another graduate student has already begun to use the system.



Ana Beatriz Pereira da Silva at her graduation with Dr. Richard Gates.

Evaluating Moisture Meters for Use in Developing Countries

People working in postharvest management face a potentially bewildering array of technical options for activities like monitoring moisture content, drying products, and storing commodities. ADMI is embarking on an effort to provide unbiased information on technical options to assist people and agencies trying to identify the technology that meets their postharvest management needs. Dr. Kent Rausch, Department of Agricultural and Biological Engineering, and PHL Scholar Amir Jafari are conducting a systematic evaluation of moisture meters to contribute to this effort.

Rausch and Jafari are evaluating seven commercially available grain moisture meters for accuracy and precision and to determine their limitations for use in developing countries. Each meter will be measured against the oven-drying method, which is accepted as the most accurate method determining moisture content. Results will be compiled for wheat, rice, and corn, some of the most popular staple crops in developing countries. When completed, the output from their study is to be made available to the public on the ADMI website.

Knowledge Exchange for Accelerated Innovation: Bangladesh, India Researchers Meet to Discuss Postharvest Loss

In March 2018, ADMI facilitated a workshop at the ADMI Village in Bihar to bring together researchers from the Borlaug Institute of South Asia (BISA), Bihar Agricultural University, Dr. Rajendra Prasad Central Agricultural University, Bangladesh Agricultural University, and the University of Illinois to share knowledge about small-scale grain drying technology and discuss postharvest loss prevention in South Asia. Although India and Bangladesh are neighboring countries with similar postharvest challenges, researchers in the two countries rarely interact.

University of Illinois researchers Dr. Kathy Baylis and Dr. Kent Rausch and ADMI Assistant Director Mindy Spencer attended the meeting.

At the meeting, Bangladeshi scientists were able to provide their expertise on optimization of the STR dryer design, while BISA demonstrated the ADMI Mobile Dryer. Because it functions at slightly larger scale than the STR dryer, the ADMI Mobile Dryer design could be useful for husking mills in Bangladesh that need to upgrade from open drying to a more reliable technology. Thus, each team was able to gain knowledge from the other's innovations. The researchers made connections for future efforts to pool resources and expand the footprint of postharvest loss projects.



Bangladeshi and Indian researchers talk over an STR dryer in the ADMI Village in Bihar, India.

Outreach | Scaling Innovations for Impact

Improving Capacity for Food Policy Analysis in the Bangladesh Ministry of Food

As a component of the Bangladesh Integrated Food Policy Research Program, ADMI hosted a three-week short course for persons engaged in food policy issues with the Government of Bangladesh. The course aimed to promote greater understanding of how public policy can support adoption of improved marketing, storage and distribution systems that enhance food security.

In fall 2018, eight staff members from the Bangladesh Ministry of Food visited the University of Illinois for a series of seminars, workshops, and field trips to give them new tools and perspectives for analyzing food systems, food policy, and postharvest management.



The Bangladesh Ministry of Food delegation and food policy course participants on presentation day at the University of Illinois.

Participants learned from experts in a range of fields, including commodity marketing, food fortification, grain storage and processing, and food policy analysis. They focused on guided research and writing related to specific topics identified by in advance by the Ministry of Food. The group went on field trips to ADM facilities in Decatur, local farms and grain elevators, historical sites in Springfield, and the Chicago Mercantile Exchange.

A high-level delegation from the Ministry of Food joined the cohort for tours, final presentations, and a closing ceremony and reception. This delegation included: Shahabuddin Ahmed, Secretary, Ministry of Food; Md. Gazi ur Rahman, Project Director, Modern Food Storage Program, Ministry of Food; and Md. Arifur Rahman Apu, Director General, Directorate of Food, Ministry of Food.

Each participant presented a policy brief on an aspect of food policy in Bangladesh to the Ministry of Food leadership and University of Illinois faculty members. Presentation topics included the role of hermetically-sealed bags in reducing postharvest grain loss, challenges of distributing fortified rice through government programs, adjusting food safety standards, and rice and wheat public storage systems.

Through the Bangladesh Integrated Food Policy Research Program, ADMI has worked with the International Food Policy Research Institute and the Bangladesh Institute of Development Studies to deliver four trainings in Bangladesh for the Ministry of Food. We plan to host two additional programs at the University of Illinois in 2019.

ADMI Spreads the Word

- ADMI affiliates presented findings at regional and international conferences in the U.S., Canada, India, Bangladesh, and Brazil
- ADMI affiliates published 12 research papers in academic and professional journals.
- ADMI staff contributed a book chapter on the ADMI Village project for postharvest extension practices text
- ADMI website reaches global audience. Visit us at postharvestinstitute.illinois.edu

Launching a Multi-Crop Thresher in Malawi

Manual grain threshing is time consuming, strenuous, and can result in losses and damage to crops. The Soybean Innovation Lab (SIL) has been at the forefront of promoting and developing multi-crop machine threshers for use by smallholder farmers in Africa. The SIL strategy involves enabling local manufacturers to build and service the threshers, and training service providers and farmers in their use. With funds provided to ADMI through ADM Cares, the SIL team

has extended this threshing approach to Malawi.

In October 2018, the SIL team provided a hands-on fabrication training event in Lilongwe, Malawi, in which the design and production of SIL's low-cost, multi-crop thresher was introduced and manufacturing methods demonstrated. The SIL multi-crop thresher can shell maize and thresh soybeans, rice, beans, sorghum and other crops. SIL reports that when field tested in Ghana, the thresher was 40 times faster than manual beating.



SIL partner Imoro Donmuah provides instruction to thresher fabrication training attendees in Malawi.

The mechanized option is more time-efficient and also preserves more of the crop, thereby reducing postharvest processing costs and postharvest losses.

In partnership with the NGO Compatible Technology International (CTI) and C to C Engineering, SIL team member Dr. Kerry Clark is adapting the fabrication of the SIL thresher for Malawi's conditions. They will also determine if the thresher can run on pedal power. After the fabrication training is complete, CTI will work to introduce the multi-crop thresher to a wider audience in Malawi.

ADMI Builds Capacity

- Forty staff members from of the Bangladesh Ministry of Food trained in two workshops in Dhaka and eight Ministry of Food staff given a three-week course at the University of Illinois
- Hosted international meetings and symposia for researchers and professionals in postharvest management in Dhaka, Bangladesh; Pusa, India; and Urbana, Illinois
- Four University of Illinois graduate students researching postharvest loss prevention with ADMI support
- Three Bangladesh Agricultural University students supported for graduate degrees related to postharvest loss prevention

Marketplace Literacy | Education as a Path to Better Postharvest Handling

Dr. Madhu Viswanathan in the Department of Business Administration has been studying the real-life impacts of marketplace literacy around the world for 18 years through his Subsistence Marketplaces Initiative. ADMI has been a partner in Viswanathan's subsistence marketplaces class, where he guides students as they envision and implement real-world solutions.

ADMI recently granted funding for Viswanathan to expand his existing marketplace literacy program to highlight postharvest loss reduction and the broader value chain for the specific needs of low-income farmers in rural Tamil Nadu, India.

Viswanathan and his team in southern India have designed the marketplace literacy program they will use to reach 500 individual small farmers, primarily women, over the course of nine months. The team will use farmer diaries and pre- and post-surveys to determine the efficacy of the education modules. A small percentage of the producers will be selected for evaluation 3 to 6 months after the course is completed to identify changes in practices resulting from the education program.



Students from the University of Illinois and Gulu University work with Ugandan farmers in the field to create teaching videos.

Farmer-to-Farmer Videos, Uganda

Using a grant of \$25,000 provided by ADM Cares, the corporate social responsibility program of the ADM Corporation, a team from the University of Illinois AgReach program at the College of ACES has developed a set of farmer-focused videos for delivering training to improve smallholder farming in Northern Uganda. The grant enabled a group of students from the University of Illinois and Gulu University in Uganda to receive training in videography and work together to draft a script with farmers, film footage with local farmers, and edit videos to disseminate relevant information. Because farmer-to-farmer videos feature real farmers who have experience with the techniques they are promoting, they tend to have greater credibility with viewers than other information sources. The video topics were identified with input from local farmers and faculty from Gulu's Department of Rural Development and Agribusiness. Topics included making baby food from local foodstuffs, pig farm management, intercropping maize with cassava, and postharvest grain storage techniques. These farmer-to-farmer videos are to be disseminated by NGOs, Gulu University, and extension agents.

The grant enabled a group of students from the University of Illinois and Gulu University in Uganda to receive training in videography and work together to draft a script with farmers, film footage with local farmers, and edit videos to disseminate relevant information.

Multistakeholder Symposium Allows ADMI Programs to Collaborate

The Regional Symposium on Sustainable Agricultural Mechanization and Postharvest Practices held in Dhaka, Bangladesh, on October 24 integrated four ADMI programs with each other while engaging with private and public sector players in South Asia's food system.

The symposium was led by ADMI partners at the Bangladesh Agricultural University and hosted jointly by the Postharvest Loss Innovation Lab and the Appropriate Scale Mechanization Consortium.

ADMI is a partner in both of these projects. Additionally, ADMI sponsorship allowed partners from the ADMI Village Project in Bihar India to attend and present at the symposium, while representatives from the Bangladesh Ministry of

Food who participated in ADMI's 2018 training on food policy and postharvest management at the University of Illinois joined as well. Representatives of government, the private sector, and non-governmental organizations all participated. This event allowed researchers and stakeholders from across the region to share knowledge and generate new ideas for addressing sustainable agricultural mechanization in South Asia.

During the event, ADMI affiliate Md. Monjurul Alam of Bangladesh Agricultural University presented a paper on "Appropriate Scale Mechanization and Postharvest Loss Reduction Practices in Bangladesh"; Alex Winter-Nelson presented on "The Economic Impact of Appropriate Scale Mechanization Innovation Hub and Prevention of Postharvest Loss Innovation Lab Technologies in Bangladesh"; and Satish Kumar of Bihar Agricultural University presented "ADMI Village: Research and Outreach in Action." The symposium included testimonials from farmers and a brainstorming session with private sector and government representatives. Past participants in the Bangladesh Integrated Food Policy Research Training Program actively engaged in the discussion and brought forth multiple mechanisms for partnering with government to scale up mechanical innovations for addressing postharvest loss.



Distinguished persons at a day-long regional symposium on 'Sustainable Agricultural Mechanization and Post Harvest Practices in Bangladesh' at Lakeshore Hotel in the city on Wednesday. ■ NN photo

One of several stories in the Bangladeshi media to portray the mechanization symposium in Dhaka. The photo includes representatives of the USAID project from the United States and partners from Bangladesh.

Education | Ensuring the Future of Postharvest Management

Introducing our PHL Scholars

Educating the next generation of scholars and leaders in postharvest loss prevention is a central part of the ADMI mission. To that end, ADMI launched the PHL Scholars program at Illinois in the 2018–19 academic year. Two students were selected in the spring to receive graduate research assistantship funding and additional support to advance their postharvest-related research. We are pleased to introduce our first two scholars.

Amir Jafari | Department of Agricultural and Biological Engineering

Amir Jafari is a doctoral student in the Department of Agricultural and Biological Engineering at Illinois. His advisor is Dr. Kent Rausch. Jafari completed a master's degree in biosystems engineering at Shiraz University, in his native Iran.

Jafari plans to pursue research in improving grain drying by using the STR dryer already constructed at the University of Illinois. In addition to making modifications to the dryer, he is also collaborating with Rausch on another project outlined in this annual report, comparing the suitability of various moisture meters for use in developing countries.



Amir Jafari

Pallavi Shukla | Department of Agricultural and Consumer Economics

Pallavi Shukla is a fifth-year doctoral student in the Department of Agricultural and Consumer Economics. She has worked for three years on Dr. Kathy Baylis' ADMI-funded project, Improving Smallholder Income and Food Security (ISIFS), based in Bihar, India. Before beginning doctoral work, she worked with the Government of India and UNICEF India.

Shukla continued her work on the ISIFS project last semester, conducting research to understand the end user preference for aflatoxin-free wheat and rice. She is pictured here with members of the ISIFS team. More information about that research can be found on page 5.



Pallavi Shukla (far left) is pictured here with members of the ISIFS project team.

Student Research Project Award | Ayesha Sarker

Ayesha Sarker, a graduate student in the Department of Agricultural and Biological Engineering, received an ADMI project award for postharvest loss research this past spring.

Sarker is collaborating on research with the Royal University of Agriculture in Phnom Penh, Cambodia, to test novel storage and preservation methods for fruits and vegetables. Specifically, Sarker is exploring an aloe vera edible gel coating which would reduce moisture loss, respiration rates and microorganism growth. This would serve a dual purpose of lowering postharvest losses and extending the marketable life of the crop.

After receiving the grant, Sarker traveled to the Horticulture Innovation Lab at the University of California-Davis to learn about measuring quality parameters. Since summer 2018, Sarker has been conducting experiments with the coating. She plans to travel to Cambodia in March 2019 to discuss research methods and outcomes with local researchers and farmers.



Ayesha Sarker is pictured working in the lab this summer, testing an aloe vera coating for fruits and vegetables.

External Advisory Board and Scientific Review Panel

The ADM Institute is grateful for the continued support of our external advisory board and our new scientific review panel. We are fortunate to have a diverse group of academic and industry experts to help us move the institute forward in 2019 and beyond!

External Advisory Board

Robert Easter

(Chairperson), President Emeritus,
University of Illinois

Usha Barwale-Zehr, Chief Technology
Officer, Mahyco Seeds

Alesha Black, Director, Global Food
and Agriculture Program, Chicago
Council on Global Affairs

Dennis Fisher, Director Compliance,
Ag Services and Corn Processing,
Archer Daniels Midland Company

Ashok Gulati, Chair Professor
of Agriculture, Indian Council for
Research on International Economic
Relations

Charlene McKoin, Principal,
RogersMacJohn

Kent Miller, Global Director, Enterprise
Strategic Quality, John Deere

Marcelo Duarte Monteiro, Secretary
of State for Infrastructure and
Logistics, State Government of Mato
Grosso, Brazil

Jimmy Smith, Director General,
International Livestock Research
Institute

Robert Zeigler, Director General
Emeritus, International Rice Research
Institute

Scientific Review Panel

Kathy Baylis, Associate Professor,
Agricultural and Consumer Economics,
University of Illinois at Urbana-
Champaign

Hao Feng, Professor, Food Science
and Human Nutrition, University of
Illinois at Urbana-Champaign

Peter Goldsmith, Professor,
Agricultural and Consumer Economics,
University of Illinois at Urbana-
Champaign

Alan Hansen, Professor, Agricultural
and Biological Engineering, University
of Illinois at Urbana-Champaign

Dirk Maier, Professor, Agricultural and
Biosystems Engineering, Iowa State
University

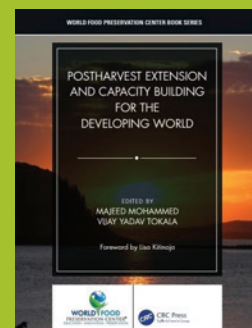
Mike Miller, Associate Professor,
Food Science and Human Nutrition,
University of Illinois at Urbana-
Champaign

ADMI staff contribute to book on postharvest extension practices

The ADM Institute staff authored a chapter about the ADMI Village project for the recently released book, *Postharvest Extension and Capacity Building for the Developing World*, published in December 2018 in the World Food Loss Prevention Center book series. The book focuses on postharvest extension and outreach programs, capacity building, and practical applications for extension professionals and outreach specialists in the field.

The book is divided into four sections: Section I focuses on postharvest loss assessment methods; Section II on capacity building; Section III on training; and Section IV on postharvest extension models. ADMI's chapter appears in Section IV.

The book is available in hardback or e-book format on the CRC Press website.



ADMI External Advisory Board members (left to right): front row: Usha Barwale-Zehr, Robert Easter (chairman), Alex Winter-Nelson (ADMI director), Marcelo Duarte Monteiro, Robert Zeigler; back row: Jimmy Smith, Alesha Black, and Dennis Fisher (ADM representative). Not pictured is Charlene McKoin.

Current Projects

Projects Supported by ADMI in 2018

ADMI Village | Bihar, India

Dinesh Rajak, Bihar Agricultural University; Satish Kumar, Dr. Rajendra Prasad Central Agricultural University; Dr. Rajkumar Jat, Borlaug Institute of South Asia.

Improving Smallholder Income and Food Security | Bihar, India

Dr. Kathy Baylis, Dr. Kent Rausch, University of Illinois.

Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss | Bangladesh

Dr. Md. Monjural Alam, Bangladesh Agricultural University (*Shared financing with USAID through Kansas State University*)

USAID Appropriate Scale Mechanization Consortium

Dr. Alan Hansen, University of Illinois (*Shared financing with USAID through Kansas State University*)

Bangladesh Integrated Food Policy Research Program

Dr. Alex Winter-Nelson, University of Illinois (*funding from Government of Bangladesh through International Food Policy Research Institute*)

Post-harvest loss reduction using locally fabricated multi-crop threshers | Malawi

Dr. Peter Goldsmith, Soybean Innovation Lab, University of Illinois

Farmer-to-farmer instructional videos | Uganda

Dr. Paul McNamara, AgReach, University of Illinois

Paper-based assay and mobile platform for evaluation of micronutrient content in fortified cereals

Dr. Juan Andrade, University of Illinois

Postharvest losses of soybeans stored at elevated levels of moisture content, temperature, and split beans content with a dynamic grain respiration system | Mato Grosso, Brazil

Dr. Richard Gates, University of Illinois

Marketplace Literacy education as a tool to reduce post-harvest losses among subsistence farmers | Tamil Nadu, India

Dr. Madhu Vishwanathan, University of Illinois

Evaluation of moisture meters suited for developing countries

Dr. Kent Rausch, University of Illinois

Projects Starting in 2019

Integrating postharvest technology into climate-smart villages | Bihar, India

Dr. Rajkumar Jat, Borlaug Institute for South Asia

Stress cracking and drying in rice | Haryana, India

Dr. Pawan Takhar, University of Illinois

Solar dryer for peanuts | Haiti

Dr. Bruce Litchfield, University of Illinois

Notes



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