2022 ADMI ANNUAL REPORT

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INTRODUCTION

Throughout the past year, ADMI continued to support research, scale innovations, build capacity, and disseminate knowledge to address poverty and build sustainability through improved postharvest management. The activities summarized in this report collectively demonstrate the food systems perspective that characterizes ADMI's work.

For example, the continued scaling of the BAU-STR dryer is emerging as much from the soundness of the technical innovation as from efforts to embed the technology in a system for manufacturing, servicing, and supplying the dryers, as well as sensitivity to the needs of millers, traders, and households, and the opportunities for public sector support and promotion. Emerging work in India with new partners is likewise guided by an understanding of the grain markets, agricultural input markets, and scope for price premia that recognize improved postharvest management.

Highlights from 2022 include projects for innovation and scaling with the Postharvest Loss Innovation Lab in Ghana and Bangladesh as well as continued capacity development with the Bangladesh Ministry of Food, Njala University in Sierra Leone, and the University of Development Studies in Ghana. Knowledge dissemination through webinars, international conferences, and published online content was a key focus in 2022 that will continue.

With an eye to the future, we gratefully acknowledge ADM Cares support for three new projects. Two of these projects build on ADMI's previous work to reduce postharvest losses in India and Bangladesh. The third gives us a springboard to future work in Indonesia.

- **Addressing postharvest losses with farmer groups in India** – Continuing to advance ADMI's food systems approach, we will work with farmer groups in Madhya Pradesh, Bihar, and Maharashtra with a diverse range of partners to scale postharvest technologies and management practices. Details on this project are presented in this report**.**
- **Entrepreneurial training for young people in Bangladesh: Mechanized drying** – This project will allow Illinois researchers to partner with long-time ADMI collaborators and researchers at Bangladesh Agricultural University to work with women farmers and train rural youth entrepreneurs to start businesses with the BAU-STR grain dryer.
- **Public-private-producer partnerships in Indonesia's agricultural sector: Can resilient producers lead to resilient value chains?** – Working with Indonesia's Ministry of Agriculture and Bogor Agricultural University, Illinois researchers will explore how public private partnerships can affect the resilience of smallholder farmers and the value chains they use.

With these new projects and other emerging activities, we look forward to more food systems work to reduce postharvest losses and improve livelihoods in 2023.

RESEARCH AND INNOVATION

1.1 Drying and Storage Innovation in Bangladesh

Scaling the BAU-STR dryer

The BAU-STR dryer has continued to be an outstanding success story in research, development, and scaling. The team at Bangladesh Agricultural University (BAU), led by Professors Md. Monjurul Alam and Chayan Saha, has refined the BAU-STR dryer into an effective tool for reducing postharvest loss and improving food security in Bangladesh within the Feed the Future Innovation Lab for Reduction of Post-Harvest Loss (PHLIL).

Image 1: BAU researchers hold a farmer training session for the BAU-STR dryer in May 2022.

A wide network of partnerships has ensured the successful scaling of the dryer. Local manufacturers are now responsible for all components of the dryer. Agreements with ADI Foundation and ACI Motors Ltd. created channels for marketing and after-sales servicing. In 2022, a joint effort by ADMI, IFPRI South Asia, and BAU was structured under the Modern Food Storage Facilities Project to further scale the BAU-STR dryer. The project, "Developing small-scale mechanical paddy drying service providers for grain loss prevention and climate resilience in Bangladesh", will build capacity for mechanical dryer service provision by small-scale entrepreneurs and demonstrate a model for mobile grain drying services provided by entrepreneurs using BAU-STR dryers. This will include training and supporting a set of drying service providers who will operate in rural areas from which Ministry of Food Local Supply Depots (LSDs) source grain, testing the viability of a service provider model linked to the public distribution system.

BAU has long-standing collaborations with the Government of Bangladesh and has had success in influencing policy decisions at the national level. In 2020, the Government of Bangladesh formally included the BAU-STR dryer in a list of farm equipment eligible for subsidies of 50-70%, making the dryer more accessible. In 2022, the Bangladesh Department of Agricultural Extension (DAE) produced videos highlighting the BAU-STR dryer and hermetic bag/cocoon use, which are available on YouTube and in the Resources section of the ADMI website.

The dryer has attracted interest outside Bangladesh. BAU recently began a collaboration with the University of Arkansas - Pine Bluff to test the dryer with underserved communities in Arkansas (USA). The project funded by USAID's LASER (Long-term Assistance and SErvices for Research) PULSE (Partners for University-Led Solutions Engine) also includes testing the dryer for use with maize in Bangladesh, which would also increase its appeal outside Bangladesh.

Developing and testing the 12-ton mesoscale dryer with rice mills

Drying paddy during the rainy Boro and Aus harvests in Bangladesh is difficult for small- and medium-scale rice husking mills, which handle 45% of the total paddy production. These mills are a primary market for smallholder farmers to sell their harvest. Farmers increasingly want to sell "wet paddy", which creates a problem for the farmers and the mills.

In response to this local demand, BAU engineers collaborated with Moti Auto Rice Mill to develop, manufacture, and install a 12-ton dryer, made with locally available parts and components. The 12-ton dryer is well suited to small mills because its capacity matches the capacity of typical husking mills and it can handle both parboiled and aromatic rice. The dryer operates in any type of weather and in much less time than open air-drying -- 15-16 hours for parboiled rice and 7-8 hours for aromatic rice.

Image 2: Workers at the Moti Auto Rice Mill hurry to bring wet grain off the open drying floor ahead of the rain. The grain was dried in the 12-ton dryer, which extends above the main building at center.

In June 2022, the BAU team relayed the following anecdote about the 12-ton dryer: "On June 27, workers of Moti Auto Rice Mill were in rush to accumulate spread paddy on concrete drying floor owing to sudden adverse weather condition. However, now Moti Auto Rice Mill has PHLIL-Bangladesh developed 12-ton capacity recirculating batch dryer. With the help of the dryer, the rice mill was able to dry another batch of paddy, and could supply rice to customers in time."

At the end of 2022, all verification experiments were completed, and the dryer became fully operational at the Moti Auto Rice Mill. BAU researchers are using the data generated by the dryer to define standard operating procedures for such automated dryers. Unlike husking mills, modern automatic mills in Bangladesh use mechanical dryers, but there are no established local standards for their operation. "This dryer operates really efficiently compared to others," said Md. Monjurul Alam, BAU team leader. "We will use this dryer to establish benchmarks and hopefully set up standards."

BAU researchers published two papers about their work on the 12-ton multipurpose recirculating grain dryer in the past year. Both can be accessed here (Paper 1 - Paper 2) and on the ADMI website.

Testing hermetic cocoon use for seed storage with BADC

Researchers at BAU have been testing 30-ton hermetic cocoons for seed storage at the Bangladesh Agricultural Development Corporation (BADC) processing and storage sites for the past three years. The most recent 30-ton capacity hermetic cocoon pilot was conducted at the BADC seed processing and storage center at Netrakona. After 98 days, BAU researchers opened the cocoon in early November 2022, and they observed no insects or variation of moisture content.

In the past year, BAU researchers compiled documents setting forth best management practices and protocols for large-scale paddy seed storage in hermetic cocoons. Research results published and presented at the American Society for Agricultural & Biological Engineers (ASABE) have shown that cocoon storage is preferable to existing conditions, considering the overall reduced expenses and risk, and higher overall seed germination rates.

1.2 Benefiting women farmers with access to postharvest information, technologies, and services

Improving grain storage for safe poultry feed with women farmers in Ghana

As part of ADMI's work with PHLIL, AgReach is engaging Ghanaian researchers, women farmers, extension workers, and entrepreneurs to improve the corn to poultry value chain in Ghana. Grain losses in storage impose a significant direct cost on the poultry industry and mycotoxin development in poorly stored grain can have a negative impact on poultry health and productivity in Ghana. AgReach researchers Professor Paul McNamara and Dr. Anna Snider have been working with the Women in Poultry Association and the Women in Poultry Value Chain Apex in the Brong-Ahafo Region of Ghana since 2019 to help address these problems.

Image 3: Women poultry farmers examine hermetic storage bags during an information session in Ghana.

AgReach connected the organizations and their farmers to other PHLIL researchers, who offered educational opportunities to improve practices and incorporate technologies. The farmers were also connected to distributers of postharvest technologies developed and promoted by PHLIL, such as the ZeroFly hermetic bag and the GrainMate moisture meter. To begin to understand how an equitable scaling process may be designed, AgReach studied how similar technologies had been scaled in smallholder communities. Snider trained a group of researchers in the Department of Gender, Development and Extension at the University for Development Studies (UDS) in Tamale, Ghana, on how to conduct a Gender Technology Assessment. After a three-part training, UDS researchers conducted 15 focus group discussions with members of farmers organizations, as well as interviews with extensionists, NGO staff, and input suppliers. The results showed that disseminating postharvest technologies through farmers organizations gave both women and men access to the technologies. However, women had little control over the technologies, as they often did not have a leadership role in the farmers organizations and often were not able to attend the trainings.

Ongoing research on scale out is investigating whether other models such as working through women's-only groups such as the Women in Poultry Value Chain Apex or employing women as micro-distributors of the technologies could give women more control over the technologies.

Women's adoption of mechanization: Assessment of gender gaps in access to micro-entrepreneurs and single-shed service providers

In Bangladesh, rural women make up over 50% of the agricultural labor force. Yet women do not receive the same support as male farmers. Women smallholder farmers face barriers in accessing training, insurance, land, credit, and machinery, and the same access to resources does not always guarantee equal returns for women farmers. Mechanization can help smallholder farmers increase farm productivity sustainably, adapt to climate change, and build resilience. PHL Scholar Ghaida Alrawashdeh, Assistant Professor Samantha Lindgren, and Maria Jones are assessing women smallholder farmers' access to mechanization through micro-entrepreneurs (local service providers) and farmer groups.

The research will identify gaps women smallholders face in accessing mechanization service providers, such as BAU's single-shed entrepreneurs or youth service providers and assess the impact of women's groups in enabling women to access and benefit from mechanization. This includes access to postharvest mechanization options such as drying services and threshing services. Alrawashdeh will present early research outputs at the annual meeting of the Comparative and International Education Society (CIES 2023) on February 14-15, 2023. This research is funded as part of ADMI's Postharvest Loss Reduction Scholar program (PHL Scholars) and the Appropriate Scale Mechanization Consortium, part of the USAID Feed the Future Innovation Lab for Sustainable Intensification. Additional applied research in collaboration with Assistant Professor Keilin Jahnke from the University of Illinois Technology Entrepreneurship Center will focus on identifying specific barriers youth entrepreneurs face in scaling postharvest management services and address needs through contextually appropriate trainings.

1.3 Estimating postharvest losses in India with ICRIER

In 2021, ADMI partnered with the Indian Council for Research on International Economic Relations (ICRIER) on the Postharvest Loss Reduction Policy Initiative to inform and amplify the policy discussion regarding reduction of food loss and waste along the food value chain in India. Led by Dr. Ashok Gulati, Infosys Chair Professor for Agriculture, the ICRIER-ADMI initiative is developing postharvest loss focused research to provide evidence-based recommendations about polices and advance policy solutions.

In 2022, ICRIER conducted a survey and landscape assessment of food loss and waste in a paper titled, "**Food loss and food waste in India – a macro perspective**". The paper provides an assessment of postharvest losses in India in cereals, pulses and oilseeds and includes policy initiatives by the government of India to reduce postharvest losses.

ICRIER has also completed "**Estimating Harvest and Post-harvest Losses in Wheat - A study of Gwalior and Raisen Districts in Madhya Pradesh**" to estimate the harvest and postharvest losses (both quantitative and qualitative) in wheat. The study presented an improved methodological design to conduct a comprehensive loss assessment across the supply chain. The study interviewed 200 wheat farming households and 16 market-level stakeholders and conducted direct measurements (observation method) for 20% of the farming households (40 farmers out of 200 farmers) and four storage units (FCI and private warehouses), two transporters, and two wholesale distribution units across two districts. Initial results showed that the aggregate loss across the supply chain is 8.53%, while the quantity loss was 6.26%, and the quantities affected or lost by quality deterioration was 2.27%. The aggregate

quantity loss at the farmers' end is 5.78%, of which loss during harvesting is 4.38%. The estimated loss in the market channels (transport, storage, wholesalers and retailers) is 0.48%.

The study recommended improving machine-friendly crop varieties, better and quicker weather advisories, state support to minimise hurdles in mandis, marketplaces, transportation, and construction of adequate modern silo storage facilities, incentivizing hermetic bag use, and augmenting existing labour skills with mechanization.

1.4 Postharvest Scholar Research

Through the Postharvest Loss Reduction Scholar program, ADMI is building the next generation of scientists working to address postharvest loss. This program supports graduate assistantships and limited research funding to enable promising students at the University of Illinois at Urbana-Champaign to focus their research on themes consistent with the ADMI mission. These students and their advisors engage in innovative research that may signal future innovations in postharvest management for a safer, more efficient, and more sustainable food system. Current PHL Scholar research projects include:

Far UVC Light for Reducing Postharvest Cereal Loss

A major biological threat that causes PHL arises from filamentous fungi and pests. The fungi can secrete hazardous chemicals that can result in the loss of food. Estimates are that that 25-40% of cereal worldwide is contaminated by mycotoxins produced by fungi. Doctoral student Zhenhui Jin with advisor Yi-Cheng Wang, Department of Food Science and Human Nutrition, is investigating the potential for using far ultraviolet-C (UVC) light to reduce postharvest losses.

Jin is using 222 nm far-UVC light to inactivate the fungi Aspergillus flavus that commonly grows on cereal grains causing postharvest losses. Krypton chloride (KrCl) excimer lamp (222 nm far-UVC lamp) has been used to treat cereal grains that are inoculated with fungi. Initial results have shown that 222 nm far-UVC light can effectively inactivate this type of fungi, and effectiveness is highest when four sides of the kernel are exposed to the light. Upcoming research includes examining how the light affects the fungi and its effect on other fungal strains. Jin and Wang anticipate that by optimizing the treatment system, UVC light can become a novel and safer way to reduce postharvest loss of grains.

Spectral Analysis to Remove Mycotoxin Contaminated Grain

PHL Scholar Ruben Chavez with advisor Matt Stasiewicz, Department of Food Science and Human Nutrition, have focused on reducing postharvest losses in corn through single-kernel spectral identification of mycotoxins.

In spring 2021, with the help of a PHLIL Ghana project collaborator, Chavez imported 76 samples of maize from poultry farms in Ghana to train the spectral sorter on high-risk features associated with mycotoxin contamination and test it with the imported samples to assess a reduction in mycotoxin contamination. While prior research in the field has used wet chemistry coupled with spectral analysis to classify kernels, Chavez and Stasiewicz rely only on visual features for the classification of mycotoxin, which can offer a cost-effective solution for mycotoxin classification.

Results have shown that sorting based on high-risk features associated with mycotoxin contamination showed a significant aflatoxin reduction ($p < 0.001$, 73/76 samples reduced, mean reduction 31 ppb,

range -9.7 – 67 ppb) and reduction in fumonisin contamination ($p < 0.001$, mean reduction 1.9 ppm, range 9.3x10-2 –6.1 ppm). In terms of rejected mass, they could observe that only a small fraction was rejected after sorting (12%) and that the rejected mass contained an average of 46% of the total aflatoxin (range 4.3% – 97%) and 88% of the total fumonisin (range 10% – 84%). Results show that visual characteristics associated with mycotoxin contamination can inform classification models, which are improving sorting contaminated kernels to reduce aflatoxin and fumonisin contamination in maize.

Image 4 PHLIL Ghana researcher Bismark Opoku (right) works with the kernel sorter.

SCALING FOOD SYSTEMS INNOVATIONS IN INDIA

ADMI is embracing a food systems perspective by developing partnerships with different players in the grain value chain in India to scale the adoption of better postharvest management practices by farmers. The insights from a postharvest-focused value chain assessment have been used to design targeted interventions that aim to enable farmers to use improved postharvest methods and connect those farmers to markets that reward improved postharvest management.

2.1 Video-based extension services with Farmer Producer Organization (FPO) in Madhya Pradesh

Satpura Mahila Kisan Producer Company (MKPC) is a women-member FPO in Chhindwara, Madhya Pradesh, which trades maize and wheat. The FPO aggregates maize and wheat during the Rabi and Kharif seasons respectively, stores it in local warehouses managed by warehouse service providers, and sells it based on market conditions. While Satpura MKPC does not currently provide technical training to its farmer members, prior studies in the field have shown that FPOs are an effective platform for improving agricultural practices at scale by lowering information costs and providing members with access to agricultural inputs, credit, and logistics.

In partnership with Grow Indigo Pvt Ltd, a digital agriculture startup, ADMI researchers Madhu Viswanathan (Loyola Marymount University) with Arun Sreekumar (IIM Ahmedabad) are developing and testing video-based extension and advisory services with Satpura MKPC on better postharvest management practices. Building on the insights from the Madhya Pradesh value chain assessment, which identified contextually appropriate training topics, Viswanathan, Sreekumar, and Abhimanyu Dhankar (Grow Indigo) designed a suite of video-based participatory trainings for pilot testing in January 2023. If justified by the initial pilot, the trainings will be scaled using a training-of-trainers approach to reach more smallholder farmers. Research on adoption and uptake of practices will be used to develop an adaptable framework for working with FPOs to reduce postharvest losses.

ADMI Madhya Pradesh Value Chain Assessment

In September 2022, Maria Jones, ADMI, and Abhimanyu Dhankar, Grow Indigo, conducted a postharvest-focused value chain assessment to gain a better understanding of the grain value chain, from smallholder farmers to FPOs to big buyers. The assessment was conducted in Madhya Pradesh, India, and included interviews with FPO leaders, FPO farmer members, warehouse service providers, grain buyers, advisory service providers, and digital institutions that liaise with farmers after harvest. The assessment revealed that there was dearth of awareness among farmers and value chain stakeholders about the extent of losses, although farmers bore the monetary brunt of poor-quality cereals with reduced prices from local traders or having their crops rejected by bigger buyers. The assessment also revealed the variation in farmer's behavior and practices and the importance of developing a suite of appropriate technologies and practices that ties improved postharvest management practices with an increased financial benefit.

2.2 Packaging postharvest solutions with organic farmers in Maharashtra

The ADMI Madhya Pradesh value chain assessment revealed that a critical barrier to adoption of better storage technologies by farmers in India is the lack of sufficient and reliable price premiums for the attributes preserved through improved storage technologies. These attributes may include reduced damage, moisture content, or freedom from chemical pesticides. Moreover, farmers often prefer to sell sooner than benefits of improved storage technology can be realized, as they seek to address cash liquidity constraints and avoid risk of future price reductions. To address difficulties accessing premium prices for quality attributes, ADMI is partnering with ADM India to test the benefits of following a package of postharvest management practices for organic Bengal gram production.

ADM India has a strong partnership with farmers in Latur, Maharashtra, and has a network of 3,500 smallholder farmers who sell organic pulses to ADM. Moreover, as a major multinational corporation dealing directly with smallholder farmers, ADM India is aware of quality losses and has strict parameters for the grain it accepts in a purchase. The ADM Institute will work in partnership with ADM India to pilot a package of postharvest management practices, including the use of hermetic bags for chemical-free storage of organic pulses. The pilot will help us test grain quality with better postharvest management and related financial benefits to identify if there is a tangible financial benefit for better-managed grain.

2.3 Engaging women's groups in Bihar

The Sehgal Foundation is an India-based non-profit focused on community-led development initiatives across rural India. The foundation works with smallholder farmers through the provision of agricultural demonstrations, trainings, furthering entrepreneurs, and providing mechanization. ADMI is partnering with the Sehgal Foundation to develop and test community level solutions for better postharvest management.

Smallholder farmers in Bihar struggle with high moisture in maize and wheat, which results in lower prices at sale and spoilage during storage for household consumption. Moreover, existing mechanization availability is low and inaccessible, especially for women farmers. This collaboration will intentionally integrate a system of input service providers and output buyers by developing fee-for-service arrangements with women's groups. Fee-for-service arrangements have made agricultural mechanization substantially more accessible to smallholder and resource-constrained farmers, who no longer need to purchase capital-intensive machinery to make use of equipment. The project will enable women to both access to these custom services for drying or threshing, and benefit from operating such businesses through self-help groups. This will facilitate the co-development of simple business models with the women farmers. In addition, farmers will receive the postharvest-focused video-based training curriculum piloted in Chhindwara, Madhya Pradesh, with additional training on business development skills. Moving forward, an initial survey with regional women farmers will help determine specific contextual needs and solutions.

All activities will be managed with on-ground support from Grow Indigo and are funded through financial support from ADM Cares.

CAPACITY BUILDING

3.1 IFPRI Modern Food Storage Facilities Project

The Modern Food Storage Facilities Project (MFSP) is a multi-year project of the Bangladesh Directorate General of Food (DG Food), funded by the World Bank. MFSP started the Integrated Food Policy Research Program (IFPRP) in 2016, in collaboration with the International Food Policy Research Institute (IFPRI), Bangladesh Institute of Development Studies (BIDS), and UIUC. Since 2016, ADMI has played a key role in strengthening capacity of government officials by hosting multi-week trainings at UIUC.

A **knowledge tour** held on May 20, 2022, brought four senior public officials working in the Bangladesh Ministry of Food to the UIUC campus. The tour included visits to state-of-the-art campus laboratories, providing the delegates with an example of leveraging universities for research and education expertise to influence government food policy and engage with the private sector to test research in real-world situations. Delegates also saw firsthand the impact of hands-on training and research. Finally, the tour sought to develop a basis for future interaction between the senior delegates and faculty at UIUC to create an ongoing dialogue for food policy discussion, technology development and research. Delegates included Dr. Mosammat Nazmanara Khanum, Secretary; Muhammad Masum Billah, Deputy Secretary; Mohammad Shahiduzzaman Faruki, Director General Food Planning and Monitoring Unit; and Abdullah Al Mamun, Director General and Additional Director General.

More recently, ADMI hosted a third short course for government officials from the Bangladesh Ministry of Food, "**Food Systems and Food Policy Training Program**" from November 6-18, 2022. The course provided 16 government officials with a deeper understanding of the food system with particular emphasis on the economics of food systems from farm to fork and with technical issues involved in maintaining or enhancing value in cereals after harvest. Participants gained knowledge of the technologies and practices used in the cereals value chain in the United States through expert-led seminars. Seminars included topics such as food safety, US food and agriculture policy, basics of grain flow and grain markets and gender considerations within food systems.

Image 4: Bangladesh Ministry of Food officials tour the Feed Technology Center as part of the knowledge tour.

Illinois faculty members who led seminars include Alex Winter-Nelson, ADMI director and professor in Agricultural & Consumer Economics; Matthew Stasiewicz, Food Science & Human Nutrition; Shibu Kar, Pratik Banerjee, and Zach Grant, Illinois Extension; Jonathan Coppess, Joe Janzen, Sarah Janzen, Mike Mazzocco, and Anna Snider, Agricultural & Consumer Economics; and Prasanta Kalita, Agricultural & Biological Engineering. Professor Emeritus Mike Mazzocco led field trips to agricultural entities in the region, including GROWMARK agricultural cooperative, the Illinois State Department of Agriculture and Clarkson Grain Company. The field trips play a critical role in helping participants practically view and learn from North American systems. Participants reflected on their learning and observations over the two-week trip and presented applications to the Bangladesh context over the closing session.

Image 5: Participants in the food policy short course enjoyed a sightseeing trip to Chicago during their time in Illinois.

3.2 Postharvest training hub at Njala University, Sierra Leone

With assistance from ADM Cares, AgReach has worked with Njala University to co-create a Postharvest Loss Experimental Training Hub to train students and faculty, serve farmers, and link farmers to private sector partners in Sierra Leone. Building on a long-standing partnership between UIUC and Njala University, the goal of the PHL Experimental Training Hub is to educate the next generation of men and women on postharvest loss reduction by promoting appropriate-scale PHL technology adoption for sustainable intensification.

Work on the Training Hub started in 2019, when UIUC professor Paul McNamara worked with colleagues at Njala University to envision a center that would allow students and faculty to build, test, and adapt new and existing postharvest technologies in the context of Sierra Leone's smallholder farming systems. The hub would not only provide practical experience to prepare students for the workforce, a critical element that is often lacking in the Sierra Leone university curriculum, but also serve as a space for local farmers to learn, give practical feedback to researchers, and voice their own questions and concerns about postharvest loss. The private sector was also viewed as a critical stakeholder, and the hub was seen as a platform to link the private sector actors with farmers and academics.

In the first year, funds were used to purchase and set up dryers, moisture meters, and hermetic bags for the hub. During study abroad trips to Sierra Leone in 2020 and 2021, students and faculty from UIUC and Njala University worked together to investigate the cultural, social, and economic factors that affect local stakeholders and their preferences for and use of postharvest practices and technologies. Students

interacted with several hundred farmers using local-language videos and demonstrations to explore appropriate extension methods to reach smallholder farmers in the context of rural Sierra Leone.

A second year of funding helped expand the PHL hub's activities. A learning event at Njala University in March 2021 brought together staff members from local NGOs, the Ministry of Agriculture, private sector providers, students, faculty, and farmers. Several different types of grain dryers were built before and during the event and tested by the participants.

Image 6: Njala University and UIUC faculty, staff, and students deliver a training to men and women farmers on postharvest loss reduction technologies at Julan village in Tikonko Chiefdom, Sierra Leone.

Five animated postharvest videos created by SAWBO have been translated into the local Krio language and used to train farmers on topics such as how to build and use a solar grain dryer and how to hermetically store dried grains and legumes. The PHL Experimental Training Hub will continue to be a source of information and support to farmers in Sierra Leone and offer practical learning opportunities for students.

KNOWLEDGE SHARING & BUILDING PARTNERSHIPS

4.1 Tenth anniversary webinar series

In the first quarter of 2022, ADMI hosted the "**Reducing PHL: A Food Systems Approach**" webinar series to mark our 10-year anniversary. The webinars brought together experts from a variety of backgrounds to discuss successful scaling of postharvest loss innovations, capacity building to improve postharvest management, and the importance of policy in addressing PHL. The three-part webinar series was well attended, with more than 200 unique participants joining us live from all over the world.

The first webinar on "Enabling successful scaling of postharvest loss innovations" highlighted three innovators – Professor Md. Monjurul Alam from Bangladesh, Isaac Sesi from Ghana, and Professor Kerry Clark from the United States. The speakers discussed the technologies they have helped develop (BAU-STR dryer, Grain Mate moisture meter and the SIL multi-crop thresher) and key solutions that have enabled adoption and scaling. The webinar was moderated by Professor Alex Winter-Nelson.

The second webinar highlighted the "Importance of capacity building in promoting better postharvest management". Strengthening institutional and human capacity is a frequently overlooked topic in promoting improved postharvest management. National and local research institutions, non-profits, and farmer cooperatives play critical roles in extension, knowledge sharing, farmer training, and enabling change. This webinar featured speakers Professor Madhu Viswanathan from Loyola Marymount University, Dr. Lisa Kitinoja from the Postharvest Education Foundation, and Professor Paul McNamara from the University of Illinois, who discussed successful interventions in postharvest management training in ways that build capacity for people and institutions. The webinar was moderated by Professor Samantha Lindgren.

The third and final webinar on "Food systems perspectives in policy to address postharvest losses" featured three experts who spoke of the importance of food systems perspectives in policy to address postharvest losses at a national scale. Dr. Ashok Gulati from ICRIER, Professor Kathy Baylis from University of California-Santa Barbara and Dr. Tanya Stathers from the Natural Resources Institute and African Postharvest Losses Information System (APHLIS+) discussed key food policy issues related to managing postharvest loss. The webinar was moderated by Dr. Bob Zeigler.

ADMI intern Bradley Brinkley authored blog posts with the main takeaways from each of the webinars. Blog posts, webinar recordings and details about the speakers are available on the ADMI website.

4.2 Borlaug International Dialogue participation

In October, ADMI staff members traveled to Des Moines, Iowa, to participate in the 2022 Norman E. Borlaug International Dialogue. Associate Director Maria Jones was a panelist in a side event sponsored by Michigan State University, "Capacity Strengthening for Building Resilient Food Systems". The panel included participants from the Bill & Melinda Gates Foundation, Bayer, Pennsylvania State University, Texas A&M University, and Michigan State University. Jones spoke about the impact that postharvest losses have on smallholder farmers and the different approaches ADMI has taken to contribute to human and institutional capacity building for postharvest solutions.

The Borlaug Dialogue was a great opportunity for ADMI to connect with partners and colleagues in the postharvest loss space and to make new connections for possible future collaborations. Among these connections was a meeting with ADMI external advisory board member Usha Barwale Zehr. Other connections are listed under ADMI Partnerships Development

4.3 BAU International Symposium

ADMI was a co-sponsor for the International Symposium 2022 entitled “Agricultural Transformation: Role of Appropriate Scale Mechanization and Postharvest Loss Reduction Innovations” organized by Bangladesh Agricultural University. Sponsors included the USAID Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss and the Appropriate Scale Mechanization Consortium.

The two-day international symposium was held on November 9-10 at the Lakeshore Hotel in Dhaka. More than 200 people attended the symposium, which was also available via livestream. The schedule included technical sessions, poster presentations, and panel discussions. Presentations were also given by Samantha Lindgren and Ghaida Alrawashdeh on their ADMI-funded work “Agri-Entrepreneurship Enablers and Barriers for Young People and Women in Bangladesh: A Systematic Review”, detailed earlier in this report.

4.4 ADMI Partnerships Development

Date	Institution	Participants	Where
April 6	USDA FAS	Jim Suits	Urbana
May 20	Bangladesh Ministry of Food	Dr. Mosammat Nazmanara Khanum, Secretary Mr. Muhammad Masum Billah, Deputy Secretary Mr. Mohammad Shahiduzzaman Faruki, Director General, Food Planning and Monitoring Unit (FPMU) Mr. Abdullah Al Mamun, Additional Director General, Directorate General of Food	Urbana
June 9	ADM—Starches and Sweeteners	Kris Lutt, President, Sweetening and Texturizing Solutions	Urbana
June 16	ADM—Sustainability	Kai-Uwe Ostheim, VP Sustainability	Urbana
Aug. 16	Food Tank	Danielle Nierenberg	Chicago, Food Tank Summit
Aug. 23	ADM	Kris Lutt, President, Sweetening and Texturizing Solutions Conrad Givers, Vice President, Strategic Differentiation Jennifer Ballinger, Director, ADM Cares	Virtual
August – September	Satpura Mahila Mahila Producer Company	Sohan Singar, Chief Executive Officer	Chhindwara
	ITC	Rajeev Buisen, Choupal Sagar In-Charge	Chhindwara
	Arya.ag	Piyush Tripathi, State Head	Bhopal
	Access Development Services	Raj Kumar, Value Chain Expert	Bhopal
	ICRIER	Dr. Ashok Gulati, Infosys Chair Professor, ADMI EAB	New Delhi
	ADM India	Apoorve Garg, Head Commercial (Plant) Varnika Gupta, Assistant Manager, Business Development	Gurgaon
	Nestle India	Chirapravo Gosh, Head of Procurement Ashish Bhatnagar, Head of Procurement	Gurgaon
	Agri-Dry Solutions	Rajan Reddy, Director, Agri-Dry Solutions	Virtual
Oct. 10	Embrapa (Brazil)	Guy de Capdeville, Exec Director R&D Bruno Brasil, Secretary R&D	Urbana
Oct 19-22	Michigan State University, College of Agriculture and Natural Resources	Dr. Karimbhai Maredia, Professor and Director of International Programs Dr. Callista Rakhmatov, Academic Specialist Dr. Ramjee P. Ghimire, Specialist - Global Outreach and Networks	Des Moines, Borlaug Dialogue

	Grow Indigo	Dr. Usha Bharwale-Zehr, CEO & ADMI EAB	
	Sehgal Foundation	Jay Sehgal, Executive Vice President	
	Food and Agriculture Organization, United States	Jocelyn Brown, Director, FAO United States	
	Harvest Plus	Arun Baral, Chief Executive Officer Benjamin Uchitelle-Pierce, Special Assistant, Chief Executive Officer	
	Penn State University	Annalyse Kehs, Plant Village Coordinator	
	Louisiana State University	U. Nichols Manalo, Philippines Jonathan M. Hubchen, Assistant Director, AgCenter Global Network	
Dec. 2	Can Tho University, Vietnam	Dr. Ha Thanh Toan, Rector Dr. Le Van Lam, Director of International Relations	Urbana
Dec. 7	Bayer, Sustainability Team	Erin Jones, Global Head of Sustainability & Outreach, Plant Breeding Masha Trenhaile, Head of University Strategy & Outreach, Plant Breeding Susana Diaz-Amaya, Head of Innovation Center @ Purdue University, Plant Breeding Blake Giles, Head of Innovation Center @ UIUC	Urbana
December 2022	Bountiful International	Alexandra Spieldoch, Chief Executive Officer Stefano Perugini, Head, Grants and New Business Development	Virtual

NOTE OF THANKS

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We appreciate your time and dedication!

2022-2023 External Advisory Board Members

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