The ADM Institute for the Prevention of Postharvest Loss

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Periodic Report

The ADM Institute's Periodic Reports provide updates on recent and upcoming activities, reports, events and accomplishments.

In this issue:

Activities Commence in Bangladesh for Ftf Innovation Lab for Reduction of PHL

In January 2014, a research consortium of lead academic institutions and international partners co-led by Kansas State University (KSU) and the ADMI launched the Feed the Future (FtF) Innovation Lab for the Reduction of Post-Harvest Loss, with the support of a multi-million dollar grant from USAID and cost-sharing by KSU and the ADMI. The ADMI is leading research efforts in Bangladesh, one of 4 focus countries, focusing on piloting technologies, developing sustainable business models, and improving the lives of smallholder farmers through prevention of PHL and development along the rice value chain.

Since January, the ADMI and IRRI have started work on-the-ground to organize local collaborators and determine work strategies. Postharvest Value Chain Specialist at IRRI, Al Schmidley, has coordinated three initiatives in the Bangladesh for the Innovation Lab and the Cereal Systems in Southeast Asia Initiative (CSISA), a related IRRI project for which the ADMI is also providing funding. These initiatives include a rapid assessment of actors and opportunities, an inception meeting with postharvest stakeholders and an initial set of potential local partners, and a technical practicum on troubleshooting and maximizing performance of the CSISA flat bed dryer pilot in Jessore. You can read more details about these initiatives in a recent activity report.

Al Schmidley with participants of stakeholders meeting in Jessore, Bangladesh. Credit: IRRI

Additionally, Director Prasanta Kalita and the Principal Investigator from the ADMI, traveled to Bangladesh with the Innovation Lab's Managing Technical Director, Venkat Reddy. The purpose of their visit was to build relationships with local institutions, visit research activity sites, and in some areas, observe postharvest operations. They also met with female farmers to discuss their needs and what unique challenges they face.

To find out more information about the Ftf Innovation Lab, visit the website reducephl.org.¶

ADMI Co-Hosts PHL Experts Convening with Bill and Melinda Gates Foundation

On May 13-14, 35 leading experts in agriculture, business, and development came together for an event in Washington, D.C., co-hosted by the ADMI and the Bill and Melinda Gates Foundation. Titled, "Postharvest Loss Metrics, Measurement, and Mitigation: Resolving the Unmet Needs", the event focused on identifying fundamental challenges presented by a lack of evidence and information on postharvest loss prevention.

The day-and-a-half convening was facilitated by Principle Associate at Abt Associates, John Lamb. Participants discussed key issues including:

- how to define food loss,
- ways to prioritize commodities and geographies,
- means of targeting intervention points and selecting mitigation measures,
- the need to revitalize the global community of practice,
- and how to build political will and associated funding allocations.

The workshop aimed to achieve consensus around these issues, building off research by the Abt Post-Harvest Loss Team for the Bill and Melinda Gates Foundation as well as the Alliance for the Green Revolution with funding from the Rockefeller Foundation.

The event synthesis, compiled by Abt Associates, will be shared upon completion. ¶

Photo credit: ADMI/K. Wozniak

Rockefeller Foundation Waste & Spoilage in the Food Chain Development Initiative

In January 2014, the ADM Institute for the Prevention of Postharvest Loss (ADMI) received a $500,000 grant from the Rockefeller Foundation to conduct a study addressing three questions identified by the Rockefeller Foundation's Waste and Spoilage Development Initiative Team. Focused on Asia and Latin America, the ADMI research team is identifying and analyzing successful loss reduction interventions along the food supply chains, the process by which promising solutions achieved scale, and implications for smallholder farmers, especially female smallholders.

In April 2014, Project Investigator, Dr. Steve Sonka, presented the Early Learning Assessment in a partner workshop in Nairobi, Kenya for the initiative. The report is broken into two major sections – 1) how successful interventions occur and 2) measurement and economics. Dr. Sonka indicated that the success of interventions is not determined solely by the technology selected but also by how it is implemented. A successful intervention requires a learning process to embed the local needs, a system-perspective approach, and technology services that may involve introducing a new supply chain for the selected technology. Also, a successful intervention doesn't happen without decision-making and incentives. The practice-based measurement approach and the fundamental economics of postharvest loss both serve the role of informing decision-makers regarding the necessary information and motivations to reduce loss.

Dr. Sonka also presented the meeting's kickoff presentation on "Global Perspective on Postharvest Food Loss: Defining the Problem, Developing Solutions." The significance of postharvest loss reduction in the context of global resource scarcity and currently available technologies for postharvest loss reduction were addressed. Simple and available technologies exist, but the question is how to achieve adoption at sufficient scale to achieve impact. Dr. Sonka assessed current methods of measurement and a novel approach, practice-based measurement, to show the potential of estimating loss at low cost and to provide supporting information for decision-makers.

This yearlong project will be completed by December 2014. Presentation slides of the Early Learning Assessment are available at here. More information about the project can be found in the 2013 Progress Report or on the website.

Revealing the Nature of Smallholder Agriculture in Brazil

Focusing on smallholder farmers in Brazil, Dr. Mary Arends-Kuenning, Associate Professor in the Department of Agricultural and Consumer Economics, and her collaborators from University of São Paulo-ESALQ reveal a different aspect of agriculture in Brazil. Although large farms in the Central Western region of Brazil contribute a lot to soybean production, smallholder farmers in the Northeast and South produce significant amounts of commodities such as corn, rice, and beans. According to the 2006 Agricultural Census, 84.4% of Brazilian farmers are smallholder farmers who produce 70% of beans, 46% of corn, and 14% of soybeans of Brazil's annual production. Reducing postharvest loss (PHL) has high potential to preserve grain and increase incomes for Brazilian smallholder farmers.

Dr. Arends-Kuenning and her team started with examining agricultural policies in Brazil. The Brazilian government applies different policies to smallholder farms and large farms. They define smallholder farmers as farmers holding land area no more than four *módulos fiscais*. The size of a *módulo fiscal* varies from municipality to municipality. A farm size of 400 hectares might be a smallholder in Mato Grosso, a state in the Central West, but not in Paraná, a state in the South. Based on the definition, the Brazilian government provides several programs to smallholders, such as subsidizing credits or encouraging the purchase of new machines, to improve agriculture productivity. However, critics claim that smallholder farmers who are most in need of the program do not receive the credits. Most resources go to the larger smallholder farmers. It is a problem inherent to the Brazilian government's definition of smallholder farmers.

To learn more about the actual situation of smallholder farmers, Dr. Arends-Kuenning and her team conducted a pilot survey in southwest Paraná in February 2013. Twenty farmers who mainly produced soybean and corn participated in the survey. A convenience sample was selected by the extension agent from *Empresas de Assistência Técnica e Extensão Rural* (EMATER) dependent on farmers' accessibility and size. The result shows that 18 participants were defined as smallholders with an average age of 50. Twelve participants were affiliates of a co-op, and 14 participants received government programs. Most farms in the sample used family workers, and their income mainly came from farm production.

Poor road conditions from farm to major roads in Paraná. Credit: M. Garcias

Eighteen participants perceived PHL as a significant problem. They estimated that 5-8% of their production was lost. Lack of ownership of machinery, poor transportation infrastructure, and poor storage facilities were reported as the key factors affecting PHL. Farmers who did not own machinery had to delay harvest until equipment became available, resulting in loss. Poor road conditions from farm to major roads increased the possibility of grains spilt on the ground during transportation. Deficient storage facilities led to grain spoilage and rodents.

Corn stored in a storage facility in Paraná. Credit: M. Garcias

From the interview with farmers, the research team also found out that the Brazilian government has special policies targeting PHL reduction. Extension agents hold training programs to teach farmers how to prevent PHL. In Paraná, EMATER held a competition for PHL reduction to raise farmers' awareness and encourage them to reduce PHL. The research team concluded that PHL was a significant problem in the surveyed area. Although some policies target loss reduction and some government programs provide credit to smallholder farmers, there is still a lack of incentives and government programs for PHL reduction.

The project, "The Nature of Small Landholder Agriculture in the Brazilian States of São Paulo and Paraná and Implication for Understanding Postharvest Loss", led by Dr. Mary Arends-Kuenning is funded by the ADM Institute for the Prevention of Postharvest Loss. For more information, please visit the institute website.¶

Measuring Loss in Brazil: Soybean Loss during Transportation

Measuring the extent of postharvest loss is essential to understand the current situation and to formulate strategies with baseline information. A research team led by Dr. Mary-Grace Danao, Assistant Professor in the Department of Agricultural and Biological Engineering, has measured harvest loss, transportation loss, and storage loss of grains in Brazil in collaboration with three Brazilian universities to examine the extent of postharvest loss of soybean and corn in tropical weather.

As part of the loss measurement research in Brazil, the research team measured the transportation loss of soybean in Mato Grosso, Brazil, by installing grain probes in trucks. Soybean transportation loss in Brazil is influenced by the cropping system and distance for transportation. Farmers in Mato Grosso use the double cropping system, *safrinha*, which requires farmers to plant corn quickly after the soybean harvest. Soybean is harvested in hot and humid conditions which may result in postharvest loss without proper handling. Also, most farmers have to transport grains from farm to storage facilities where distance varies and travel time ranges from minutes to hours, not to mention the poor road conditions in Brazil – most highways are unpaved. Measuring transportation loss will be important to establishing guidelines for Brazil on grain handling during transportation.

To measure the transportation loss, Dr. Danao and her team constructed grain probes to monitor grain conditions. The probe monitors temperature, moisture,

The probe Dr. Danao and her team designed to monitor grain condition during transportation. Credit: D.A. Williams

and CO2 conditions of grain and provides location information. Temperature, moisture, and CO2 are identified as key indicators of grain spoilage. A waterproof and durable box is at the top of the probe to house a GPS receiver and data acquisition components. The team also created a program to record the data and to transfer data for real-time display on computers. Truck location and grain conditions are available in real time through the program.

The probe was tested in the lab for feasibility. Two lab tests on CO_2 sensing and one test on the vehicle-based power system were conducted to examine the functionality of the probe. The lab tests showed positive results and the probe was brought to Mato Grosso for field tests. Dr. Danao and her team installed the probes in 23 trucks and monitored 44 trips from farm to storage facilities. With the data collected, Dr. Danao is looking to find patterns of grain transportation to identify efficient methods of transport.

This research is part of the "Measurement, Documentation and Postharvest Processing for the Prevention of Postharvest Losses of Soybeans and Corns" project funded by the ADM Institute. The lab test results were presented at the 2013 ASABE Annual International Meeting. More information about the measurement of harvest loss can be found in the March 2014 Periodic Report and the measurement of storage loss will be featured in the next Periodic Report.¶

Grain probe installed in a truck to measure soybean conditions during transportation in Mato Grosso, Brazil. Credit: D.A. Williams

PHL 101: ADMI to Offer Free Online Course on Fundamentals, Fall 2014

Despite that postharvest loss has received increased attention by the international community in recent years, a lack of knowledge, technical capacity, and resources remains an obstacle for stakeholders worldwide to act on these issues.

In late 2014, the ADMI will offer a Coursera course on global postharvest loss to provide stakeholders worldwide with an overview of loss issues, practices, perspectives, and solutions.

Upon completion, participants will:

- have an enhanced understanding of global situations of postharvest loss,
- be familiar with the whole food supply chain from harvest to market,
- gain fundamental knowledge of the postharvest technologies and their applications in developed and developing countries worldwide, and,
- have an enhanced appreciation of the costs and benefits of postharvest technologies.

This course, titled "*Global Postharvest Loss Prevention: Fundamentals, Technologies, and Actors*", is intended for professionals, practitioners, and students with an interest in food security, sustainability, rural development, and other related topics. Participants do not need prior experience with postharvest loss issues.

Coursera courses are open and free to any users with internet access. In many developing nations, however, internet access may be limited for a large number of people. To reach these populations, ADMI will leverage resources to make course materials available via mobile phones.

For more information, contact Project Coordinator, Kari Wozniak, at wozniak5@illinois.edu.¶

Making the News: ADMI Continues to Inform PHL Network via New, Improved Online Tools

The 100th edition of PHL in the News was recently published. Photo credit: ADMI/ C.Cheng

As an international information hub, the ADMI is dedicated to sharing knowledge and making connections that lead to impact. To its ever-expanding suite of tools for network engagement, the ADMI has made recent noteworthy updates, including establishing the Loss Prevention Portal listserv, and publishing the 100th edition of key resource, PHL in the News.

The Loss Prevention Portal was launched in April 2014 to initiate a central communication outlet for postharvest loss prevention activities. This listserv aims to connect people, organizations, and resources, with an initial capacity of keeping stakeholders and actors informed of progress made in the field of PHL prevention. Currently, subscribers receive a monthly newsletter containing important highlights and updates from the ADM Institute and its partners. The newsletter also includes links to PHL multimedia, newly published reports, and recent news in the media. Special events and opportunities are also announced via the listserv, such as lectures in the ADMI PHL Expert Seminar Series.

These newsletters and other tools, such as the ADMI's Twitter, are essential to building a community of practice for postharvest loss prevention. In the future, the ADMI hopes to expand the Loss Prevention Portal to include more resources and outlets for engagement with more partners and actors in the postharvest field.

As this new tool is introduced, the ADMI celebrates an important milestone for a cornerstone of these resources,

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(cont'd) PHL in the News. In June 2014, the 100th edition of PHL in the News was published. The only online news digest available that is curated specific to PHL, readers have continuously enjoyed that the unique, informative content is easily accessible on a regular basis.

PHL in the News is published twice a month and includes brief summaries of current news articles on loss issues, projects, technology, reports, conferences, and awareness events. In March 2014, the digest got a fresh look, becoming more visually appealing, mobile-friendly, and including a new 'Key Articles' category.

You can subscribe to the Loss Prevention Portal Listserv here, and to receive PHL in the News here.¶

Loss Prevention Portal	PHL in the News
April 2014	May 9, 2014
May 2014	June 6, 2014
June 2014	May 23, 2014
July 2014	June 20, 2014

PHL Blog Corner: Loss-Free Agriculture – Science or An Art?

by Steve Sonka, Ag Economist & Research Professor at the ADM Institute

In early May 2014, I was asked to speak at the 2nd Annual UN FAO SAVE FOOD Congress in Dusseldorf, Germany, on the suggested topic, *"Agricultural Management: The Art of Loss Free Agriculture"*.

That title caused me to reflect on where I learned about the reality of agricultural management— as a boy growing up on a small-scale Iowa farm in the 1950s.

Sonka on his family farm. Credit: S. Sonka

At as early as 8 years old, I was out in the field. *[I thought I was helping but, upon reflection, this actually may have been a form of rural babysitting.]* As I thought about my remarks for the SAVE FOOD event, I compared these recollections with what I've come to observe and learn about farmers around the world. In Bangladesh and India just as much in Iowa, it seems to me, there is both a science and an art to reducing postharvest losses.

The Science

Many know that insufficient use of effective technologies – from harvesting to processing to storage – is a major cause of postharvest losses in developing countries. Often we refer to these types of technology as hard infrastructure: mechanical harvesters, threshers, dryers, storage structures as well as roads and access to electricity. The design, construction, and operation of these technologies is where we think of the science being involved.

The Art – the Appropriate Soft Infrastructure Environment

The art, then, involves how these technologies end up being used by real farmers, managers, and communities. As I shared at the SAVE FOOD Congress, this happens when the appropriate "soft infrastructure" environment is in place.

Reflecting on my family's experience helped me to identify the role of the surrounding environment (an ecosystem, if you will) that fostered the adoption of innovations in our community. That surrounding environment enabled farmers, such as my parents, to be better able to evaluate and adopt innovations which led to enhanced efficiency, including those that reduced postharvest loss.

A Few Key Elements of Soft Infrastructure

This support system is interesting because if one had driven down the road in rural Iowa, it would have been difficult to see or touch the elements of that system. (Today we might describe this as a virtual system.) This system formed soft infrastructure needed to support effective agricultural management – in contrast to the visible nature of hard infrastructure. Some elements of this system are:

1) Local experience, with adaptation

As specified in the classic 'adoption' literature, our community had its share of early adopters, who sometimes successfully and sometimes unsuccessfully, led the charge to improve their farming operations. However, adaptation to the local needs

of farming in our region generally was required, even for innovations that had been "successfully" adopted elsewhere.

2) Multiple, credible, confirming sources of information

Adoption by the majority of farmers did not occur just because one early adopter reported a success. Instead, those farmers in the next cohorts of adoption (early majority and majority) sought out multiple sources of information to confirm the early adopter reports of success. The role of the extension agent and research reports were important; as well as the informed opinion of key agribusiness influencers. Not all the information needed to be uniformly positive; however, a reinforcing feedback system operated (informally) so that a consensus emerged.

3) Assurance of technical support

A key component of the feedback system related to resolution of problems. If a mechanical component of the innovation failed or if its expected performance wasn't achieved consistently, farmers needed to be confident that support would be available to respond to those issues. The extension/research system on the public side and private sector suppliers were essential to responding to those needs.

4) The capability for organizational innovation

In some instances, the economics of employing the innovation exceeded the scale of the typical farmer. However, if the innovation was employed among a number of farmers, the benefits could be provided as an economically attractive option. Therefore in addition to changing the technology of farming, organizational innovation was required. These innovations took various forms (informal farmer groups, cooperatives, and adaptation of offerings of private firms).

Conclusion

I have heard numerous experts assert that reducing postharvest loss is not rocket science. This statement probably stems from the notion that creating appropriate technologies is not a particularly complex topic. Indeed, much of the technology we need already exists. It is important, however, to focus on how innovations are adopted – the art – for loss reduction and more broadly, for making supply chains more efficient and resilient overall. ¶

Women's self-help groups are one example of soft infrastructure. Credit: IRRI

Recent Events

The ADM Institute has been involved both domestically and internationally in events concerning postharvest loss and agricultural development. Below is a partial listing of recent events in which representatives of the ADM Institute have participated:

February

16-23rd

Director Kalita traveled to Naypyidaw, Myanmar with the UIUC Associate Chancellor of Corporate and International Relations, Pradeep Khanna, and the Director of the Office of Public Engagement, Sarah Zehr, to establish a relationship with Yezin Agricultural University. The delegation met with government officials, university representatives, and private sector leaders to discuss opportunities for collaboration, including technical cooperation on postharvest technology.

March

3rd

Director Kalita and ADMI affiliates, Mary-Grace Danao, Marvin Paulsen, Kent Rausch, Luis Rodriguez, and KC Ting, hosted a strategy formulation meeting in New Delhi, India to identify potential opportunities to implement a demonstration project in India with local partners, including Bihar Agriculture University, Haryana Agricultural University, Rajendra Agricultural University, and Indian government entities.

7th

In March, the ADMI published it's 2013 Annual Progress Report that summarizes key activities and accomplishments. This theme of the report is Recognizing Thought Leadership, and is available on the ADMI website.

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Recent Events (cont'd)

May

7th Research Professor Steve Sonka traveled to Dusseldorf, Germany to attend the 2014 SAVE FOOD Congress and presented the lecture, "Agricultural Management: The Art of Loss Free Agriculture".

9th Recent progress made by Scientific Animations With Borders (SAWBO) was featured in University of Illinois news for work in Ethiopia to reduce the loss of the important staple grain, teff. SAWBO produces training videos that are customized to local settings and available via mobile phone. Through collaboration with local institutions, their videos reached an estimated 168,000 teff farmers.

12-14th Research Professor Steve Sonka traveled to Nairobi, Kenya to attend a partners meeting for the Rockefeller Foundation Waste & Spoilage in the Food Chain Development Initiative. Sonka presented the ADMI Early Learnings Report as a part of a study being conducted with support from the Rockefeller Foundation. Sonka also presented the meeting's kick-off presentation, "Global Perspective on Post-Harvest Technologies by Smallholder Farmers: Defining the Problem, Developing Solutions".

28th Dr. Tofael Ahamed, Associate Professor at the University of Tsukuba, Japan, visited the University of Illinois at Urbana-Champaign and gave a lecture on "An Overview of Postharvest Loss of Cereals, Fruits, and Vegetables in Bangladesh: Identification of Losses in the Supply Chain" as a part of the ADM Institute PHL Expert Seminar Series. More details can be found in the video compilation.

27th Director Kalita, Project Coordinator Kari Wozniak, and ADMI affiliates, Kent Rausch, and Shih-fang Chen, visited the Rice Processing Program at the University of Arkansas. The delegation learned about the program, toured facilities, and discussed potential collaborations.

July

1st Director Kalita attended the Clean and Cool Summit hosted by the Institute of Mechanical Engineers. Participants discussed the potential of establishing a "joined-up" cold economy, given the urgent need for an affordable, sustainable cold chain in the developing world.

3rd Director Kalita convened a meeting in New Delhi, India that brought together representatives from government, academia, and philanthropic organizations to discuss research funding for ADMI loss prevention work in the state of Bihar. This meeting was hosted in follow-up to an earlier strategy formulation meeting held in March 2013.

5-10th Director Kalita traveled with Managing Technical Director Venkat Reddy to Bangladesh to visit field sites and strengthen ties with local institutions involved in research activities for the Ftf USAID Innovation Lab for the Reduction of Post-Harvest Loss.

If there is a conference or event that should be brought to the ADM Institute's attention, please do not hesitate to inform us.

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