Post-harvest Loss: Research, Education, and Outreach

Each year, the amount of food lost to postharvest waste would be sufficient to meet the minimum annual food requirements of millions of people. With hundreds of millions of people suffering from food insecurity, addressing postharvest loss (PHL) is a globally significant issue. Through interdisciplinary and international collaborations, the College of Agricultural, Consumer and Environmental Sciences (ACES) at the University of Illinois at Urbana-Champaign is finding innovative ways to address PHL around the world. This flier highlights only a select few of these activities.

In Brazil

Measuring and documenting losses: Profs. Grace Danoa, Richard Gates, and Marvin Paulsen have collaborated with three universities in Brazil to measure and document postharvest losses of soybeans and corn. This study, funded by the ADM Institute for the Prevention of Postharvest Loss, installed probes in trucks to monitor GPS coordinates, time, temperature, relative humidity, and carbon dioxide build-up in grain in trucks during transportation at harvest. The team concluded that by operating a combine carefully and making proper adjustments to the combine, an operator can save about 2 bags per hectare of soybeans which translates to an operator hourly value of $238-$277 in U.S. dollars.


Addressing lack of storage: Prof. Pete Goldsmith employed Geographic Information System (GIS) software to map the coordinates of commercial, cooperative and private grain storage facilities in the Brazilian state of Mato Grosso and find the most and least congested areas. The information will help determine the best and most convenient locations for additional storage. The research was funded by the ADM Institute for the Prevention of Postharvest Loss. Goldsmith, Peter, and Joao Antonio Vilela Medeiros, The Soybean Research Journal (in Portuguese), 2013.

Studying motivations and incentives for reducing PHL: Profs. Peter Goldsmith and Mary Arends-Kuenne are investigating the perceptions of Brazilian farmers – both large and small holders – about postharvest loss with the goal of helping the country maximize its agricultural production. Two separate studies showed that while large-scale farmers accept some postharvest losses to maximize overall production, smallholders may require revised incentives to further minimize their losses. Both projects are funded by the ADM Institute for the Prevention of Postharvest Loss. Goldsmith’s study provides evidence that farmers are rational profit maximizers and trade some postharvest losses for grain production. Specifically, the results showed that farmers will accept soybean harvest losses of at least 6% and short-haul losses of at least 2% as an opportunity cost for not delaying the planting of a second crop, maize. Arends-Kuenne found that for smallholders, the incentives are still not working as they are intended, and her upcoming project will quantify postharvest loss, determine its causes, and investigate the incentives that smallholders face to minimize postharvest loss. Goldsmith, Peter D.; Anamaria Guadencio Martins, and Altair Dias de Moura, “The economics of post-harvest loss: a case study of the new large soybean- maize producers in tropical Brazil” Food Security, 2015, Vol. 7. Number 4.

Please see page 2 for more examples of ACES’ activities towards reducing postharvest losses.
Improving grain storage: Profs. Kent Raush, Vijay Singh, Grace Danao, and Marvin Paulsen worked with Haryana Agricultural University (HAU) to determine quality changes in wheat stored in hermetic silo bags. The study was funded by the ADM Institute for the Prevention of Postharvest Loss. The silo bags, which are hermetically sealed, don’t allow for air circulation and were clear winners in the study. The grain naturally respires and gives off CO₂, which kills insects and prevents mold. The researchers knew the exact species and numbers of insects introduced, and they came back at different intervals to evaluate for the various life stages of the insect—egg, larvae, and adult. The team is continuing to evaluate the bags, including their cost-effectiveness. The team hopes to move the study off the campus to surrounding villages and see if the silo bag works for smallholder farmers and villages.

Reducing losses and increasing value for farmers: ACES economists and engineers are working together to reduce postharvest losses and increase value for farmers in Bihar, one of the most populous and poorest regions of India. Prof. Kathy Baylis (Department of Agricultural and Consumer Economics) is in the midst of surveying 50 households in each of 64 villages as well as all the traders in Bihar to get a complete picture of the region’s grain economies. The information gathered will help inform which technologies a team of engineers, led by Prof. Kent Rausch (Department of Agricultural and Biological Engineering) will test and demonstrate in this area. The survey data will form a baseline against which to measure the actual impacts of new technologies once they are introduced.

In Bangladesh

Improving rice value chain: ACES faculty including Dr. Prasanta Kalita, ACES Professor of Soil and Water Resources Engineering and Director of the ADM Institute for the Prevention of Postharvest Loss, have embarked on a research project with Bangladesh Agricultural University that focuses on the rice value chain, including 1) mycotoxin production in paddy during postharvest operations 2) appropriate drying technologies for paddy; and, 3) appropriate paddy storage technologies for farm households. The project is part of the Feed the Future Innovation Lab for the Reduction of Postharvest Loss Program, in which the ADM Institute is leading the Bangladesh component.

In Sierra Leone

Documenting loss in rice-supply chain: The International Development and Agribusiness Program supported by the ADM Institute for the Prevention of Postharvest Loss partnered students from the University of Illinois with students from Njala University in Sierra Leone to investigate the postharvest practices of rice farmers all across Sierra Leone. The students, led by Prof. Paul McNamara, published a report that concluded that approximately 30% of rice is lost in the postharvest rice supply chain with the greatest amounts occurring at drying and storage stages.