

Management of Global Postharvest Losses

ADM Institute at the University of Illinois



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The world is facing a big challenge of feeding the increasing population, especially when already about one billion people are fighting with hunger, globally. To meet the food demand of predicted population, food production needs to be increased by 70% by year 2050. However, considering the limited arable land, fresh water, depleting energy sources, and climate change issues, this huge increase in crop production is not easily achievable. A promising alternative could be the efficient use of available food by avoiding the losses and wastes. About one third of the food (1.3 billion tons per year) is lost or wasted in the food supply chain (Gustavsson et al., 2011). According to FAO, postharvest loss (PHL) are defined as “measurable quantitative and qualitative loss in a given product including deterioration”. In developing or low-income countries these losses occurs in terms of physical loss and total quality loss during initial stages of the supply chain such as drying, cleaning, storage, transportation, milling etc. In the industrialized and developed countries, food loss occur at the consumption stage in term of “food waste”. It refers to food that goes unconsumed because it is intentionally discarded by the consumer - either before or after it spoils (Lipinski

et al., 2013). In year 2010, estimates suggested that about 133 billion pounds of food (31% of total available food) got wasted at retail and consumer level in the United States. The food waste at consumer level in industrialized countries is estimated almost equal to total food production in sub-Saharan Africa (Gustavsson et al., 2011). Per capita food waste in Europe and North America have been estimated about 95-115 kg/year, compared to 6-11 kg/year in sub-Saharan Africa and South/Southeast Asia. Among different agricultural commodities, the food loss/waste estimated for cereal crops, roots crops, and fruits and vegetables are about 19 %, 20 %, and 44 % (weight basis) respectively (Lipinski et al., 2013).

Poor management practices, lack of infrastructure and technology, lack of grading at farm level, multiple handling, and poor marketing system are some of the major factors responsible for these losses in the developing countries (Fig. 1). PHL increases food prices and reduces farm income, particularly for smallholder farmers (SHF) who have little access to credit, and little capacity for storage. PHL is a very complex problem due to different crops, economies, practices, infrastructure levels, and climatic conditions. For example most of losses in fruits and

vegetables occur at the packing and processing stage, whereas, storage losses predominate in case of cereal crops. The losses vary even among different parts of the country. A study conducted by the ADMI researchers in India found that harvesting losses for black gram were significantly high in Madhya Pradesh (~ 11%) than those in Maharashtra (~5%) due to lack of mechanization. These variations make it very challenging to provide a general solution for PHL reduction, and necessitate the need of long term investigations to identify the sustainable solutions based on local on local issues. Providing the knowledge and creating awareness of this issue among farmers is a big need towards working out solutions of this issue. Farmers should know about the potential interventions and cost-effective usage of that machinery. Government agencies and institutes should work to connect the farmers to the private sector and invest in improving the research, education, and extension services in developing countries. Considering these urgent needs, the University of Illinois established the “ADM institute for the prevention of postharvest loss” (ADMI) in year 2011, with \$10 million aid from the ADM Company.

The institute was established with the aim to act as an international informati-

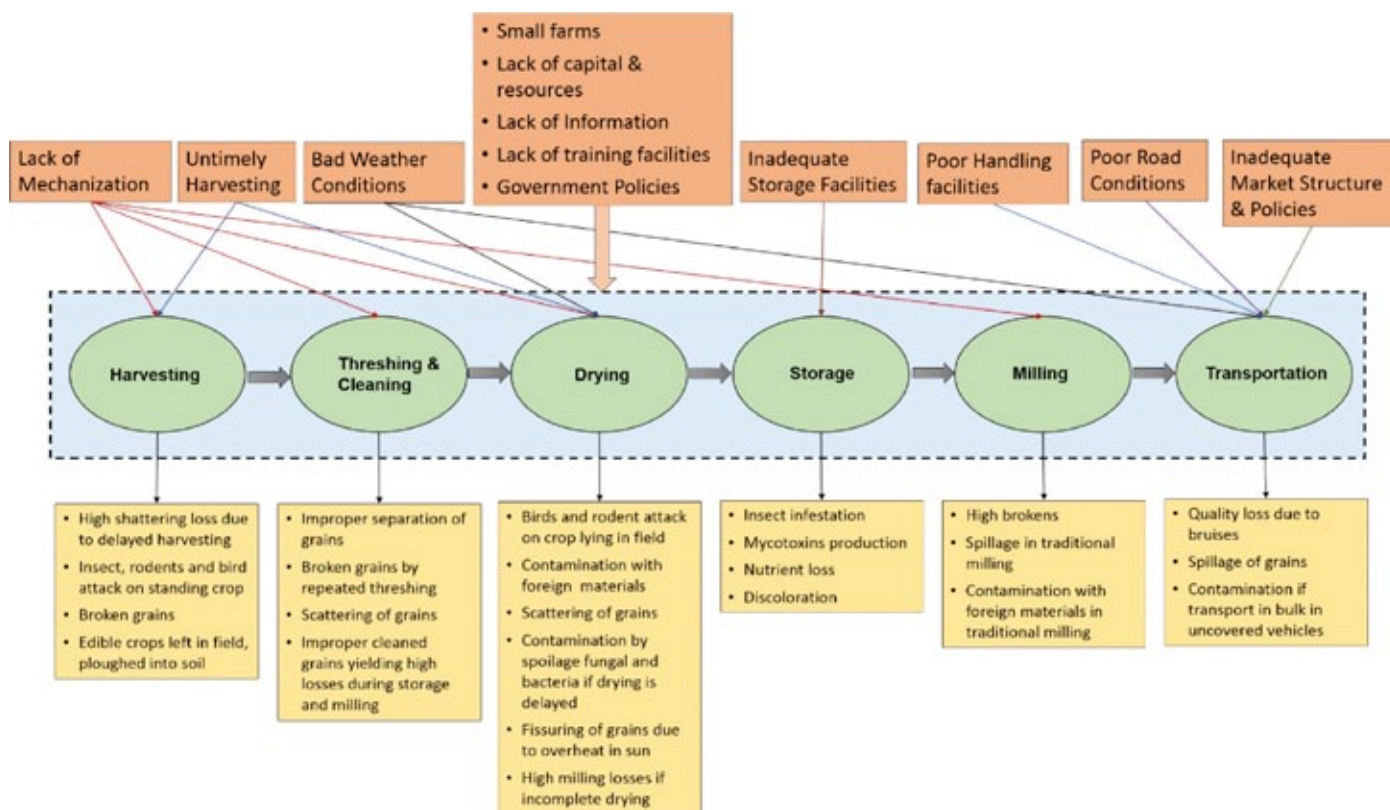


Fig. 1 Various factors and types of losses during supply chain of cereal crops in developing countries

on and technology hub for evaluating, creating, and disseminating economically viable technologies, practices, and systems to reduce postharvest loss in staple crops. The institute focus on four major areas: 1) conduct transformational research activities to mitigate PHL; 2) establish strategic partnership to build a global network; 3) establish ways of information dissemination; 4) develop training courses on PHL issues and prevention technologies. Since its establishment in 2011, the ADMI has quickly become a prominent leader in the field of PHL prevention, and making an impact in the society through capacity building, knowledge dissemination, and developing and testing interventions to reduce postharvest losses across the world.

The ADM Institute has developed strategies and initiated multiple projects for global postharvest loss prevention. In the initial phase, the institute established contacts with interdisciplinary researchers in the University of Illinois and allocated \$2.1 million towards research focused on four themes: 1) Measurement & technology development; 2) Systems information and analysis; 3) policy analysis; 4) education and training. In the

following years, the institute has funded and collaborated with several national and international partners, such as the USAID, International Rice Research Institute, Research Center for Rural Economy in China (RCRE), Bill and Melinda Gates Foundation, Rockefeller Foundation, and several local academic institutes, to work towards postharvest loss prevention projects in Bangladesh, Brazil, China, India, Mexico, and many other countries. In 2014, the ADMI received a \$500,000 grant from the Rockefeller Foundation's Waste and Spoilage in the Food Chain Development Initiative to identify the challenges and opportunities in scaling up the technology interventions to reduce losses for smallholders in Asia and Latin America. The project also emphasize to analyze the gender element in losses and technology adaptation. Several institutes like RCRE, APEC provided funding to institute to develop and analyze surveys on postharvest losses of wheat and rice in several countries. ADMI is also partnering with researchers from University of San Luis Potosi to identify the causes and solutions to reduce postharvest losses of Soybean in Northeast Mexico.

In collaboration with USAID funded "Feed the Future Innovation Lab for the

Reduction of Postharvest Loss" program at the Kansas State University, the ADMI funded a rice value chain focused PHL reduction research project to the Bangladesh Agricultural University, Mymensingh. The efforts from this projects will focus to the establishment of laboratory facilities for detection and remediation of mycotoxins in paddy, and the identification identify suitable and economically feasible storage and drying technologies for smallholders. Through the same program, the ADM institute is also helping in the similar research activities in Ethiopia, Ghana, and Guatemala. These projects include active participation of women through a gender specialist in each of the targeted countries. In January 2015, the ADM Institute for the Prevention of Postharvest Loss launched a research project "Reduction of Postharvest Loss through Community Participation", in Bihar, India, in collaboration with two local agricultural universities. Bihar is one of the most populous states of India with agriculture as the major source of the daily income (less than \$1.25). The focus of this project is to address the PHL issue by evaluating losses at various stages of grain (rice, wheat, maize and lentil) supply chain, identifying suitable

processing techniques, quality measurement and market penetration intervention methods to establish a path in the supply chain to enhance food quality and preservation. The ADMI team is also helping to develop a “PHL Reduction” proposal for the Information Technology Research Academy (ITRA) in the focus area of “IT Based Transformation in Indian Agriculture and Food”.

Keeping up with the mission of being an information hub, the results of ADMI activities have been widely disseminated through our website, reports, newsletters, social media, and blogs to make an impact at various levels on our societies. The ADMI has been recognized as the leading organization in bringing the latest and greatest news on postharvest and food security global population. Over last five years, the ADMI has offered several workshops, seminars, and training courses to disseminate the knowledge of postharvest loss and its prevention approaches. In collaboration with Scientific Animations Without Borders (SAWBO), ADMI developed animated videos on PHL reduction techno-

logies and connected with thousands of farmers across the world. ADMI is planning to develop more of these videos and translate them into various local languages to benefit farmers. In February, 2015, the ADMI offered a free online Coursera course on “Fundamentals of Postharvest Loss Prevention”, which provided the overview of PHL issues, practices, perspectives, and solutions. The course was well appreciated by nearly 4000 participants from 153 countries. ADMI will offer this course again in summer 2015.

In October, 2015, ADMI is organizing the “First International Congress on Postharvest Loss Prevention” in Rome, Italy. The focus of the congress is to assess the challenges associated with postharvest loss within the framework of metrics and measurements that will enable development of better tools and interventions to prevent losses for smallholders in developing countries. This congress will bring together researchers, organizations, institutes, and private sectors working on the PHL reduction around the world, and create a

roadmap for postharvest loss prevention by formulating needs and plans for future actions towards a global consensus on measurement.

Growing rapidly, the ADM Institute will continue to strengthen the reach and impact of its research and engagement programs that seek to reduce postharvest losses and thereby increase global food security, and improve the livelihood of the farmers.

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