

ADM Institute for the Prevention of Postharvest Loss Research Plans for Years 1 and 2 (Baseline Funding)

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Note: The Objectives are taken from our previous proposal.

Objective 1: Assess current status of post-harvest loss of corn, wheat and oilseeds in India and Brazil.

Task A Compile and assess relevant literature on the severity of the post-harvest losses in the target countries and the costs of newer storage, handling technology, etc. as part of a team effort.

A comprehensive search for information will be made on the severity of post-harvest losses in the target countries through the use of on-line and library searches and through collaboration with selected researchers in Brazil and India. The data will be assimilated and checked for accuracy and completeness. A Wiki site will be set up to allow researchers to access the data base. A library of available storage, handling and processing technologies will be assembled and the technical utility and economic viability of the technologies will be assessed.

Anticipated Out-Come: The literature will form the basis of an Institute white paper on the status of postharvest loss in India and Brazil to be distributed in the fall of 2011.

Current Status: A MS graduate student in ABE and funded by , Ning Wang, is working with Institute and ACE personnel to collect, digest and assimilate the information into a cohesive understanding of the problem.

Task B. Validate findings from initial assessments with on-ground visits, utilizing faculty visits, student groups (e.g. Engineers Without Borders) and in-country partner institutions.

The first step in this task is to identify the most suitable in-country partner institutions. This can be accomplished by looking at the information gathered in Task A and seeing which organizations, trade groups, private companies and Universities are already doing something in regards to post-harvest loss. The selected organizations will be contacted and informed of the Institute's objectives. Faculty from ACE and ABE will go to Brazil and India to meet with

potential collaborators and to begin assessing the situation, onsite (travel to be funded by Institute).

In- country collaborators will continue to assess the situation in collaboration with ACE and ABE faculty via phone, Skipe, and internet communication.

Current Status: Potential partners are being identified. A travel grant proposal to NSF has been submitted to initiate the collaboration with universities and government agencies in Brazil.

Objective 2: Develop a plan for reducing post-harvest loss of cereal grains and oilseeds in India and Brazil including researching new and/or appropriate technology methods.

Task A. Determine potential reduction in quality loss from utilization of technologies and equipment beyond those currently used in specified regions. Engineering Responsibility: 100%.

ABE faculty in cooperation with other Institute faculty will make the assessment of potential equipment or processes which can have the greatest impact on reducing post-harvest loss in India and Brazil.

Current Status: Not started.

Task B. Research methods of evaluating handling damage through the market channel for corn and oilseeds.

In corn, breakage during handling is a major problem decreasing the storability of the corn. Broken corn and foreign material is a grade factor in US corn grading standards but it underrepresents the actual breakage that occurs because BCFM is defined as material that passes through a 12/64 sieve. There are a lot of kernels where damage may have occurred but the broken corn will not pass through the 12/64 inch sieve (0.1875 inch round hole). A representative corn kernel is 0.640 in. x 0.789 in. x 0.504 in. Any one of the dimensions can be split in half and the pieces will not fit though the sieve.

Increases in broken corn results from mechanical handling. The passage through elevators, transfer from bins to bins and drop from heights will increase damage. Improperly adjusted or maintained equipment can greatly increase damage. Such damage is often overlooked because the pinch points and impact areas are not easy to find.

Previous work on impact damage of fruit and vegetables used an apple size sphere containing force transducers that recorded impacts vs time as apples moved through a processing facility. Similarly, a golf ball sized transducer can be built which could be used to monitor impact through grain handling systems. Use of such a device would identify pinch points and areas that

need maintenance. It could also be used to identify the gentlest means of moving grain through a marketing system. Results of the test could be correlated to the rate of breakage generation and could be used to put an economic value on the breakage that occurs.

Other techniques and technologies are possible to be developed which will result in decreased loss of corn, wheat and oilseeds. The losses in some countries are due in part to bag handling procedures. Minimizing the exposure of the bags to weather and fluctuation in humidity will decrease mold deterioration.

The development of remote sensing CO₂ detectors the size of a ping-pong ball will be evaluated and well as NIR technology to assess the storability of the incoming grain.

Current Status: The participating students have been identified.

Objective 3: Implement plan in India and Brazil with help from in-country collaborators and government agencies.

Task A. Develop small scale process equipment and processes for corn and wheat using appropriate technology.

Home based processing or village size processing that is efficient and does not require extensive capital investment is one way to reduce the loss of corn, wheat and oilseeds. The use of appropriate technology will go a long way to improve the acceptance of the new processes and make them economically viable. To be appropriate, the engineers will need to visit the site to ascertain what local resources can be exploited.

Current Status: Not Started