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## Post-harvest losses due to rodents vs food security in Bangladesh

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Agriculture Minister of Bangladesh Government Matia Chowdhury MP told the Parliament on June 22, 2015 that rats damaged food grains, including paddy, rice and wheat, worth around Tk723.72 core in the 2014-15 fiscal year.

**Post harvest losses due to Rodent:** In developing countries, rodents have an enormous economic impact on stored produce. In India, it was reported that 6-9% of the stored paddy rice is consumed by rodents. Recently, it was postulated that 280 million undernourished people could be fed if post-harvest losses by rodents were reduced by 5%. On top of these losses, rodents contaminate much more produce with their droppings which may harbour pathogens. Rodents also cause major damage to storage facilities, which in turn leads to losses by insects and moulds/mycotoxins. Remarkably, quantitative and qualitative losses caused by rodents are rarely taken into account within the food chain in developing countries. For many small-scale farmers, high levels of rodent damage to grain stocks severely limit the potential to sell surplus grain for family income. Medium to large scale farmers may sell significant proportions of their harvest through cooperatives or directly to local or regional market traders. The stockpiling of grain at the local market level is also exposed to high levels of rodent damage as small warehousing facilities are rarely rodent proof.

Bangladesh made significant progress towards poverty reduction over the past decade. During this period the proportion of people living in poverty fell by 9% and was accompanied by marked improvements in other economic and social outcomes. These changes ensued from the country's strong economic growth which averaged 5% per annum throughout the later part of the 20th century. However, as a result of population growth, Bangladesh entered the new millennium with the same absolute number of poor people in its population as ten years before. Bangladesh remains one of the poorest and most densely populated countries in the world, with 50% of its population of 150 million living in poverty, and with 85% of the poor living in rural areas. Some 30 million people currently live in extreme poverty as defined in terms of dietary consumption by caloric intake (less than 1,805 kcal per day). The extreme poor have generally not benefitted from national economic growth trends and, in fact, inequality increased with the extreme poor increasingly unable to move upwards out of poverty. By performing a project in this region of the world, the number of undernourished people benefiting from its results is maximised. An additional pay-off of effective rodent management is a reduction in rodent-borne diseases that can be catastrophic to the livelihoods of the poorest of the poor. Information that is acquired in this project will also be useful in other parts of Asia, a region that contains about two-thirds of the world's poor - 1.8 billion people who live on less than \$2 a day with 903 million struggling on less than \$1.25 a day (United Nations, 2010).

**Previous work on the issue in Bangladesh:** 1) During April 2002 -January 2006 a research project titled ecologically Based Rodent Management for Diversified Rice Systems in Bangladesh was carried out by Greenwich University-UK, CSIRO-Australia, Bangladesh Rice Research Institute (BRRI), AID-COMILLA a national level NGO with funding support from DFID/PETTRA/IRRI. All farmers under the project recognised that rodents were a problem for stored rice. Farmer estimates of post-harvest loss ranged from 5 to 40% with an average of 13% ( $\pm 0.02$  sem). Despite these remarks on loss, few people went to much trouble to protect their stored rice from rodent attack. 2) During July 2008 -June 2011 with funding support from DFID/UKaid Research in to Use (RIU) a consortium of research institute, NGOs, SMEs such as University of Greenwich-UK, BARI, AID-COMILLA, SUSILAN-Satkhira, MUKTI NARI-Kustia, ARBAN-Netrokona, MAWATS-Dhaka, BRMA etc. trained 25,000 farmers on Ecologically Based Rodent Management (EBRM) in Comilla, Kustia, Satkhira, Netrokona and Bogra. The agenda was to disseminate the knowledge to rural communities from research findings. 3) In 2008 there was a serious Rat Flood in Chittagong Hill Tract (CHTs) causing damage to household goods, rice field, vegetable, bamboo etc and with funding support from UNDP the Rodent Team in Bangladesh led by Professor Steven Belmain trained 2,500 people of CHTs (DAE staff, Karbari, Headman, NGO staff, school teacher, religious leaders, UNDP staff, student etc.) on Ecologically Based Rodent Management (EBRM) resulting CHTs people get relief from the Rat Flood.

**Current Research on the issue:** A research project titled Assessment of Rodenticide Use and Rodenticide Resistance is currently being implemented in Bangladesh in order to reduce post-harvest losses with the financial support from NWO/WOTRO Netherlands Organisation for Scientific Research. Storage of rice and other products in jute bags is not rodent-proof says Dr. Bastiaan Meerburg of Wageningen University in the Netherlands. Meerburg, who visited the country recently, is a renowned rodent expert and works jointly with NGO AID-Comilla in the Comilla region in this research project. Meerburg says, although it can be understood from economic reasons that Bangladesh wants to support its jute industry and therefore prescribes the use of jute bags to rice mills and other food processing industry, other types of bags would reduce the level of post-harvest losses far more significantly. He added

that the use of jute bags instead of other types (such as plastic bags) is in fact a step back in time as rats and mice will gnaw through the jute very easily and cause much more losses than with other types. In some storage facilities currently losses of over 15% are reported, so from every kg that enters a storage only 850 grammas will finally come out. Moreover, rodent excrements that are disposed on the jute bags may cause disease among the consumers. This is unacceptable and Meerburg urges to look for better solutions to reduce rodent problems. Changing the type of bags will be one measure, but there are many others: buildings have to be made more rodent proof to reduce the risk of entering of rodents and people should become more aware about the rodent issue. Common action of the Bangladesh government and entrepreneurs on this topic would be very useful, according Dr. Meerburg.

**Research questions of the scientist:** Direct loss to stored grain stocks in Bangladesh has been estimated to be 5-15% depending on granary size and proofing level, with much greater percentages of grain contaminated by rodent faeces, hairs and urine. Moreover, rodents form a specific health threat in terms of food safety: their excrements can present viruses that cause haemorrhagic fevers, several enteric bacterial species, helminthic eggs and protozoan cysts. Rodents living on harvested produce in or near human dwellings are also a source for vector-borne infections. Rodenticides in Bangladesh are often used inappropriately and have detrimental effects on non-target species, including humans, and can promote the development of resistance in target species. In order to understand rodent damage, it is necessary to understand the ecology and behaviour of the involved rodent species. We have to identify the rodent species causing qualitative and quantitative post-harvest losses in household level and small market trader storage facilities and their relative abundance. Currently we have only basic knowledge of inter-annual rodent dynamics and habitat use in Bangladesh. Therefore, we would like to determine rodent breeding and migration capacity across seasons (before, during and after harvest) and characterise post-harvest losses through quantifying rodent loss, damage and contamination rates for different traditional storage structures. Moreover, we like to improve rodent management and control strategies. Currently, there is little regional awareness and availability of “new” technologies such as innovative storage (e.g. IRRI superbag and grain cocoons), and trap designs that are more sensitive and versatile which increase efficacy and reduce development of avoidance behaviour. New storage technologies should be assessed under field conditions in Bangladesh to develop best practices for rodent management, trapping regimes and rodenticide application. Our last research question is how we can gain more attention for the emergence of post-harvest losses by rodents. Therefore, we have to ascertain human perceptions and attitudes in Bangladesh towards rodents, postharvest losses, the costs and benefits of their current rodent management methods and improvements trialled in this project. We have to carry out research to develop culturally appropriate communication pathways for knowledge on preventing post-harvest losses caused by rodents, provide research assistance to SMEs to develop their own promotion materials and monitor and analyse impact of publicity campaigns on knowledge uptake and behavioural changes.

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