



Assessment of Pre and Post-Harvest Losses of Paddy and Wheat in Assam

Introduction

Crop loss in agriculture is a serious concern across the country. It occurs due to two types of factors *viz.*, abiotic and biotic. Crop losses due to abiotic factors include all the unfavorable agro-climatic conditions that hinder plant growth like flood, drought and other natural factors which are beyond the direct control of human endeavor. Crop losses due to biotic factors which include all infectious diseases such as pest, parasites, weeds, nematodes, protozoa, stray cattle, rodents, birds, etc. can be controlled to a great extent if proper measures are taken on time. There are more than 80,000 plant diseases known in the world (Handbook of Agriculture, ICAR, 2012).

Pre-harvest losses refer to the losses incurred during the growing period of the crops in the field while post-harvest losses relate to the losses sustained during the period from harvesting to disposal and human consumption. The crop losses at any stage of production and consumption even in micro scale cannot be ignored when we consider the total production and consumption of different crops *vis-à-vis* their actual requirements.

Post-harvest food loss is defined as measurable qualitative and quantitative food loss along the supply chain, starting at the time of harvest till its consumption or other end uses (Hodges *et al.*, 2011).

Every year, an estimated 1.3 billion ton, roughly one-third of the food produced for human consumption worldwide is lost or wasted. According to FAO's State of Food and Agriculture (2019) report, around 14 percent of the world's food (valued at \$ 400 billion per year) continues to be lost after it is harvested and before it reaches the shops; while UNEP's Food Waste Index Report shows that a further 17 per cent of our food ends up being wasted in retail and by consumers, particularly in households. According to FAO estimates, the food that is lost and wasted could feed 1.26 billion hungry people every year.

The Sustainable Development Goal (SDG) target (12.3) is to reduce half per capita global food waste at the retail and consumption levels and food losses along production and supply chain, including post-harvest losses.

"Indian farming suffers losses of up to Rs.1 lakh

crore from pest & diseases annually apart from natural calamities." (The Times of India, September 10, 2012, P. Chengal Reddy, Secretary General, Consortium of Indian Farmers Association).

As per article "Post-harvest Situation and Losses in India" (2016) published by Hegazy Rashad, Kafreisheikh University, the post-harvest losses are estimated to be 10 to 25 per cent in durables crops and 30 to 40 per cent in fruits and vegetables.

On the basis of production and wholesale market price in India, the Associated Chambers of Commerce and Industry of India (ASSOCHAM) found that fruits and vegetables post-harvest losses reached an amount of \$ 33,745 million in 2011-12. Among the major producing states, West Bengal incurred highest loss of \$ 2,163 million followed by Gujarat \$ 1,805 million, Bihar \$ 1,702 million and Uttar Pradesh \$ 1,633 million (ASSOCHAM, 2013). Inadequate number of cold storages in India is just one of the major reasons for these losses, since operating costs for Indian cold storage units are a whopping over \$ 60 per cubic metre per year compared to less than \$ 30 in the western countries. Energy expenses make up about 28 per cent of the total expenses for Indian cold storages compared to 10% in the West. These factors make setting up of cold storages difficult, unviable and uneconomical (Maheshwar and Chanakwa, 2006).

In all India basis, total post-harvest losses in pigeon pea, chick pea, black gram and green gram was found to be 6.63, 8.41, 7.07 and 6.60 per cent, respectively (Jha *et al.*, 2015).

In a country with vast population like India, crop loss at any stage is a serious matter which needs proper intervention to reduce such losses on priority basis.

The situation in Assam is no different from the national scenario. While assessing the wastage and losses carried out in a study on 'Impact of Green Revolution in Assam with special reference to management of marketable surplus', it was observed that losses were highest (up to 45%) in fruits and vegetables, followed by spices like ginger (up to 37%) and on the lower side for cereals, pulses and oilseeds (up to 16%). It was estimated that

approximately Rs.1,200 crores worth of food-grains, spices, fruits and vegetables are lost by Assam every year.

In this backdrop, the present study was undertaken by AERC for NE India aiming to estimate the physical and financial losses caused by pests and diseases; to examine the measures of pest and disease management; to reduce the crop loss due to pests and diseases at farm level; to arrive at post-harvest losses in different agro-climatic conditions and suggest ways and means to reduce the extent of losses.

In this study, two crops were selected- paddy as a first crop and wheat as the second crop. Paddy is the principal crop of Assam and wheat occupies the second position next to paddy in the food dish of the people of Assam. In case of paddy, the losses were computed for both local and HYV separately and for wheat, the estimation was done only for HYV wheat as all the sample farmers used HYV seed only.

Major Findings

➤ Crop damage by pests and diseases in the farmer's field during pre-harvest period was detected by the farmers on visual observation only and the farmers rarely could identify the symptoms of pests and diseases in the early stage of attack. The resistive power of local variety crops against pest and disease was found to be more than that of HYV crops; but yield rate of HYV paddy (38.20 quintal/ha.) was significantly higher than that of local variety paddy (27.79 quintal/ha.).

- Pre-harvest losses in local paddy recorded at 2.00 quintal per hectare while in case of HYV paddy, it occurred around 2.98 quintal per hectare. The farmers used to seek technical advice from different sources only when severity of attack went beyond certain level. They mostly depended upon the village level extension workers or other technical officers of the concerned district from Agriculture Department or KVK. It was found that nearly 74.17 per cent of paddy growers and 60.83 per cent of wheat growers sought for technical advice from those extension agencies for pest and disease management.
- Paddy stem borer, Gandhi bug, Rice hispa, Green leaf hopper, Brown spot, *Echinochloa crus galli*, *Ludwigia linifolia*, *Sacciolepis interrupta* and *Monochoria vaginalis* were the major pests & diseases and weed causing pre harvest losses in paddy (Table-1).
- In case of wheat, Stem borer, Loose smut, Leaf blight, *Cynodondactylon*, *Chenopodium album* and *Polygonum viscosum* were the major pests and diseases and weed which caused pre-harvest losses (Table- 2).
- The quantum of pre-harvest losses due to pest, diseases and weed stood at 2.49 quintal/ha in paddy and 2.96 quintal/ha in wheat (Table-3).
- Pre-harvest losses per hectare in terms of percentage were worked out at 7.56 per cent for paddy and 15.98 per cent for wheat.

Table- 1 : Incidence of Major Pest and Disease- Crop-I (Paddy)

Name of the pest/disease/weed	Average Rating of Severity of Attack*	Average Rating of Production Loss**
Major Pests – Local variety		
Stem borer	1.57	2.28
Gandhi bug	1.73	2.27
Rice hispa	1.74	2.48
Green leaf hopper	2.28	2.07
Major Pests - HYV variety		
Stem borer	1.53	2.52
Gandhi bug	1.64	2.97
Rice hispa	1.52	2.83
Green leaf hopper (Grass hopper)	2.54	1.25
Major Diseases – Local variety		
Brown spot	2.13	2.32
Major Diseases – HYV variety		
Brown spot	2.20	2.16
Major Weeds – Local variety		
<i>Echinochloa crus galli</i>	2.10	2.07
<i>Ludwigia linifolia</i>	2.32	1.96
<i>Sacciolepis interrupta</i>	2.53	2.27
Major Weeds – HYV variety		
<i>Echnochloa crus galli</i>	2.03	2.36
<i>Ludwigia linifolia</i>	1.73	2.27
<i>Sacciolepis interrupta</i>	2.06	1.89
<i>Monochoria vaginalis</i>	1.96	2.07

Note: Rank * High=1, Moderate=2 and low=3 in respect of severity of attack

Rank ** <5% =1, (5-10)%=2, (10-25)%=3, (25-50)%=4 and >50% =5 in respect of production loss

Table- 2 : Incidence of Major Pest and Disease- Crop-II (HYV Wheat)

Name of the pest/disease/weed	Average Rating of Severity of Attack*	Average Rating of Production Loss**
Major Pests - HYV variety		
Stem borer	2.05	2.46
Major Diseases – HYV variety		
Lose smart	1.94	2.26
Leaf blight	1.87	2.52
Major Weeds – HYV variety		
<i>Cynodondactylon</i>	2.31	2.31
<i>Chenopodium album</i>	2.14	2.04
<i>Polygonum viscosum</i>	2.09	2.23

Note: Rank * High=1, Moderate=2 and low=3 in respect of severity of attack
 Rank ** <5%=1, (5-10)%=2, (10-25)%=3, (25-50)%=4 and >50%=5 in Respect of production loss

- Post-harvest losses were found both in paddy and wheat during winnowing; transporting & handling and also due to attack of insect and rodent in storage place.
- On an average, post-harvest losses stood at 2.55 quintal/ha in paddy and 2.14 quintal/ha in wheat.

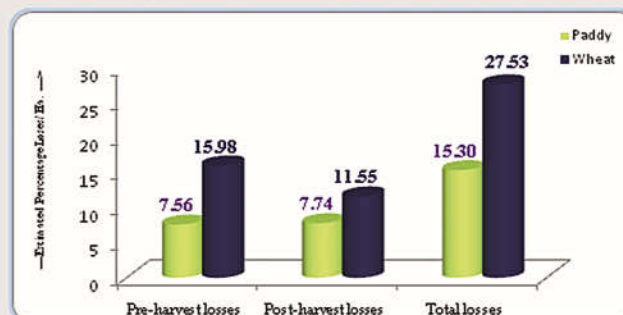
Table- 3 : Estimates of the losses of the crops under study

Crop	No. of Sample HHs	Total Area (In ha.)	Total production (In quintal)	Estimated Losses over actual production (In quintal)	Estimated Losses/Ha quintal in grain	Estimated Losses/Ha. (In Rs.)	Estimated Percentage of losses/ Ha.
Pre-harvest losses							
Paddy	120	225.94	7,442.18	562.59	2.49	2,986.11	7.56
Wheat	120	50.05	927.20	148.15	2.96	3,924.96	15.98
Post-harvest losses							
Paddy	120	225.94	7,442.18	576.15	2.55	3,058.06	7.74
Wheat	120	50.05	927.20	107.11	2.14	2,837.64	11.55
Total losses							
Paddy	120	225.94	7,442.18	1138.74	5.04	6,044.17	15.30
Wheat	120	50.05	927.20	255.26	5.10	6,762.60	27.53

Source: Primary Data

- The post-harvest losses per hectare were estimated at 7.74 per cent for paddy and 11.55 per cent for wheat.
- Thus, the total crop losses were recorded at whopping 15.30 per cent for paddy and 27.53 per cent for wheat per hectare (Figure-1).

Fig-1 : Estimated Percentage Losses of Paddy and Wheat Per Hectare at Farm Level



Policy Recommendations

- Delay in diagnosis of the attack of pests and diseases often increases pre harvest losses to a great extent. Most of the times, the farmers are to look for external agency sources for mitigation of pests & diseases.
- Long waiting time results in more pre-harvest losses; therefore timely diagnosis of the problem & quick action thereon deemed necessary.
- Recommended insecticides or pesticides are not always available in the market to take timely action.

- Field visit by the officials of the line department at regular interval should be ensured and necessary networking should be done for ensuring availability of required insecticides or pesticides well on time.
- High input cost stands as an impediment for adoption of full package of technology for pest & disease management. The Govt, may either go for containing the price, or may provide for relief to the poor farmers.
 - The prices of the producers are not always remunerative. Therefore the farmers cannot spend adequately to prevent crop losses due to pest & diseases. Prices may therefore, be fixed on the basis of cost of production along with a reasonable margin. It is a happy augury that with the initiative of MoA, the farmers of the state have started selling paddy at MSP in the recent time.
 - It was reported that most of the pests and diseases in crops come from the soil first. As such, soil testing before planting/sowing is always recommended so that all the precautionary measures can be taken up well on time. With the introduction of Soil Health Card (SHC), the situation is gradually improving in recent years.
 - Only a section of farmers are aware of IPM/IDM module. But they need adequate training by the competent professionals. The line Department may come forward to train them up through massive capacity building programme.
 - It is said, “Delay is the enemy of efficiency and waiting is the enemy of utilization.”As such, whenever there is a report of pest & disease infestation, one should immediately resort to protective measure without any time lag.
 - Common threshing floor in the vicinity of the crop field may reduce the transportation/ carrying losses, for which the farmers are to be encouraged to organize themselves.

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- The present storage structures available with the sample households are not free from pests and rodent attack. The roof made of thatch is very much prone to leakage of rain water & pests. Agriculture Department may promote suitable schemes to support the farmers for construction of grain storage.
- Specific programme may be thought of for threshing & storage, on cooperative basis covering 100 to 200 hectares of operational area in each district. NGO may play an important role in this regard and private investors may also be encouraged to participate.
- Management of crop losses can also be well addressed systematically, at the behest of FPO/FPCs which are emerging in a big way in recent time with the involvement of educated youth and farm women.
- In case of wheat, pre and post-harvest losses were much higher than that of paddy. Therefore, more attention is deemed necessary to get rid of the losses.
- There are large numbers of programmes and schemes launched by the Government and other agencies for the benefit of the farmers. There lies enough scope of convergence of a number of programmes to bring in more efficiency in to the system.

Conclusion

Result of the study clearly indicates that agriculture in Assam is marked by huge crop losses (both pre and post-harvest losses) in different stages of production and marketing up to retail point which otherwise could fetch additional earnings to those poor farmers and could make their livelihood better and comfortable. As such area specific strategies as outlined above, need to be tried to aid and assist the farmers to come out of this depressing situation.

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Dr. Jotin Bordoloi & Prof. Anup K. Das

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