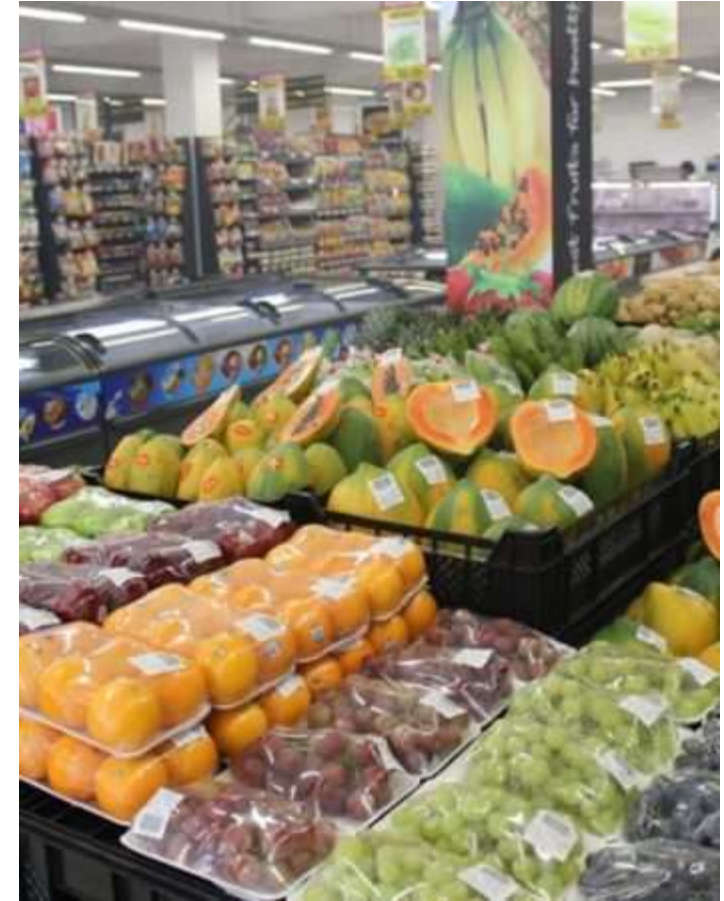


Post-Harvest Technology of Fruits, Vegetables & Grains



What is post-harvest technology?

- The treatment of agricultural produce after harvest to ensure its protection, conservation, processing, packaging, distribution, marketing and utilization to meet the food and nutritional requirements of the consuming population.



Why post-harvest technology is important?

- Increase agricultural production.
- Prevent extensive post-harvest losses.
- Advanced nutrition.
- Improve the quality of produce.
- Generate employment.
- Reduce poverty.
- Stimulate the growth of other related economic sectors.

- Fruits and vegetables are key components of the agriculture economies of South Asian countries.
- Only 2% of fruits and vegetables produced in this region are exported.
- Most farmers are small landholders conducting subsistence agriculture.
- Small scale production has prevented South Asian countries from adopting many post-harvest technologies.

- Post-harvest losses are a significant threat to small-scale farmers.
- Significant post-harvest losses in South Asian countries occur due to deficient post-harvest management (harvesting, packaging, transporting, storage and processing facilities), and complex and fragmented market system.



- Careful attention should be paid to reduce heavy post-harvest losses and to improve produce quality.
- This can be done by scientific innovations, technological creativity, commercial entrepreneurship and research and developing.

Post-harvest losses

- About 1/3 of the food produced in the world per year for human consumption is lost or wasted.
- The industrialized and developing countries are wasting approximately comparable amounts of food (670 and 630 million tons, respectively).

- Global quantitative food losses and wastes per year are around 30% for cereals; 40–50% for root crops and fruit and vegetables; 20% for oilseeds, meat, and dairy products; and 35% for fish.
- The entire amount of food lost or wasted annually is equivalent to more than half of the world's annual crop production (about 2.3 billion tons per year).

- Reducing the waste after harvest, especially in developing countries, can be a sustainable solution to increase food availability, reduce pressure on natural resources, eliminate hunger, and improve farmers' living conditions.

Estimated Levels of Postharvest Losses in the Asia Pacific Region

<u>COUNTRY</u>	<u>LEVEL OF LOSS (%)</u>
<u>India</u>	40
<u>Indonesia</u>	20 – 50
<u>Iran</u>	>35
<u>Korea</u>	20 – 50
<u>Philippines</u>	27 – 42
<u>Sri-Lanka</u>	16 – 41
<u>Thailand</u>	17 – 35
<u>Vietnam</u>	20 - 25

R.S. Rolle, Agr. Industries Officer, FAO, 2004

- Post-harvest loss can be defined as the loss from the stage of harvesting to the stage of consumption which occurs as a result of quantitative loss, qualitative loss, and the food waste.



- Quantity losses, are common in developing countries, occur as a result of weight loss, spillage of crops, attack by moulds and pests and uneconomic collection, loading and unloading.



- Quality losses, are common in developed countries, occur as a result of nutrient loss, undesirable change in taste, shape and texture, presence of excreta of birds and rodents and contamination by mycotoxins.



- Food waste is the rejection of food by the consumer or the intentional use of food not intended for consumption.



Factors affecting post-harvest losses

- Primary and secondary factors which affect the post-harvest loss of food products.

Primary Factors affecting post-harvest losses

- Mechanical loss
- Microbial action
- Environmental factors



Secondary Factors affecting post-harvest losses

- Inadequate harvesting methods.
- Incomplete drying before threshing.
- Inadequate storage facilities.
- Longer shipment.
- Longer distribution period.
- Lack of market access and policies.

Types of post-harvest losses

- Direct or indirect loss.
- Weight loss.
- Food loss.
- Seed viability loss.
- Commercial loss.
- Irreducible loss.

Direct and indirect loss

- Food loss which occurs by spillage of crops and consumption by the pests is called direct loss.
- Food waste which occurs at the consumer level is called indirect loss.

Weight loss

- Observable loss which can be measured by the reduction in the moisture content of the food.
- An abnormal increase in weight of food through moisture absorption which can occur due to rainfall on the food items that have been kept in the open area.



Food loss

- Food available for human consumption, but not consumed is called food loss.
- Occur quantitatively and qualitatively.

Seed viability loss

- Seed viability is the ability of an embryo to germinate and is affected by ability of the plant to produce viable seeds, predator and pathogen damage, and environmental conditions.
- Seed viability loss occurs due to poor storage and preservation methods.

Commercial loss

- Customer refusal to buy the product, rejection by the quality standard team and both qualitative and quantitative losses lead to economic and monetary loss.

Irreducible loss

- Occurs by the excessive respiration of the product, mechanical rubbing of the grains, shrinkage in the food product, mechanical injuries etc.
- The extra production should compensate for the loss.

Causes of post-harvest loss at harvesting

- Inappropriate harvesting methods lead to huge losses of fresh produce.
- Almost all South Asian countries harvest their produce manually.
- Harvesters cause injuries and cuts in fresh produce through the misuse of harvesting tools, damage from pressing produce with fingers and nails, and bruising by dumping or throwing the produce into field containers.

- Overfilling of containers.
- Rough picking by pulling, detaching, and cutting the peduncle.
- Harvesters often do not consider the maturity of fruits.
- Lack of information regarding best harvesting practices for avoiding damage.



Causes of post-harvest loss at packaging

- Process of making produce ready for transportation to market is called packaging.
- Proper packaging protects produce from pilferage, dirt, and physiological and pathological deterioration during handling.

- Packaging techniques are largely ignored in South Asian countries.
- Fruits and vegetables are generally packed in the field without any pre-treatment transported directly to the market.
- Rather than wooden or cardboard boxes, old gunny bags and polypropylene bags used for packaging and transportation.
- Most fruits and vegetables are not washed to remove dirt.



Causes of post-harvest loss at storage

- The available storage techniques and facilities in South Asia are poor.
- Traditional methods used are inadequate as they do not control temperature and air circulation.



- Cold rooms are non-existent in many rural areas.



- Pouring out of leaking sacks.
- Attack by insects, rodents and fungi.



Causes of post-harvest loss at transportation

- In South Asia, produce is often carried by manpower, animals, bicycles, motorcycles, cars, vans, boats, and finally trucks for long distance transportation.



- Overfilled trucks to transport the maximum amount of produce per truckload in order to minimize his transportation cost.
- Trucks is exposed to the direct sun and rain.



- Use of poly-sack bags and gunny bags for transportation.



Causes of post-harvest loss at drying

- Inadequate drying leads to mold growth.
- Natural drying is slow and depends on the weather.
- Grain lying in the open sun is eaten by birds and insects, as well as contaminated by mixing stones, dust, and other foreign materials.

Management of post-harvest loss

- Harvesting should be done at the correct maturity state.
- Fresh produce should be washed with sanitized water.
- Water which is used for the irrigation purpose must not be too cold, otherwise, there may occur spoilage.
- Mechanically injured products should be discarded to prevent the entry of pathogenic microorganisms.

- Harvesting should be done in cooler temperature.
- Threshing of grains should be handled properly.
- The grains should be dried completely before storage.
- The storage areas should be highly sanitized with proper ventilation and cleaning.
- The packaging of the product must obey the quality standards.
- Proper transportation to the market to avoid food spillage, and decay of the food product.