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Post Harvest Losses Management of Horticultural Crops

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Post-harvest management of horticultural crops refers to the handling, storage, processing, and transportation of fruits, vegetables, flowers, and other horticultural produce after they are harvested. The main goal is to maintain quality, extend shelf life, and minimize losses until the products reach consumers. Horticultural crops are highly perishable due to their high moisture content, active metabolism, and susceptibility to microbial spoilage, mechanical damage, and physiological deterioration. Proper post-harvest practices involve harvesting at the right maturity stage, careful handling, temperature and humidity control, proper packaging, and use of preservation techniques. Effective post-harvest management not only ensures food security and availability throughout the year but also improves profitability for farmers and reduces wastage in the supply chain.

In essence, post-harvest management bridges the gap between the farm and the consumer, ensuring that horticultural produce retains its nutritional value, taste, appearance, and overall quality.

Fruits and vegetables, both fresh and processed are vital to improve the nutritive quality of our diet and provide maximum potential for generating employment in the country side. Because of higher productivity per unit area as compared with cereal crops, they provide much better economic returns if properly managed. All India Coordinated Vegetable and Fruits Improvement Project was started in 1970-71 by ICAR under Fourth Five Year Plan. Their broad objectives included improvement of fruits and vegetables cultivars for higher yields, disease and pest control and to some extent develop varieties with processing traits. In these research centres, established all over the country under the above projects, no provision was made to carry out work on the postharvest management. The study group recommended the setting up of a Coordinated Research Programme on the postharvest technology of fruits, vegetables and flowers in the country. All through this planning, India has achieved new heights in production of horticultural crops and minimizing postharvest losses, but still further more efforts are required to bring down losses of fruits and vegetables. India ranks second in production of fruits and vegetables after China, and if we subtract the postharvest losses from total production, our rank would be much lower. With this background following points underline the importance of postharvest technology.

Problem of Post Harvest Losses in India

- **Reduction of postharvest losses:** The losses occurs at several stages in postharvest Management chain viz. harvesting, sorting, grading, packing, loading-unloading, transportation, storage and marketing. However, cost of conservation is always much less than the cost of production.

- **Making fruits and vegetables available during off season:** Intervention of Innovative postharvest technologies has made it possible to ensure round the year supplies of fresh fruits and vegetables.
- **Protect the interest of growers and consumers:** Application of postharvest technologies viz. sorting, grading, trimming reduce cost of pre-cooling, packaging, transportation, storage, retailing and ensure higher value to money paid by consumers along with better income to farmers.
- **Tool for export earnings:** Successful application of postharvest technologies viz Hot water treatment (HWT), vapour heat treatment (VHT), irradiation and cold chain management, pre-cooling, reefer van, cold storage.
- **Employment generation**: Employment potential in postharvest and value addition sector is considered to be very high.
- **Nutritional security**: India has achieved food security but nutritional security still remains an unfinished uphill task for policy planners. Fruits and vegetables are considered as protective food by the virtue of their richness in vitamins, minerals, pigments and secondary metabolites.
- **Waste utilization**: Fruits and vegetables processing industry generate huge amount of processed waste in forms of kernel, seed, peel, rag, which cause environmental pollution if left unattended.
- **Speciality food**: Armed forces in difficult areas, astronauts on space mission. Infants, senior citizens, and sports persons have special requirements of ready to eat and high energy low volume food.

Reasons of Post Harvest Losses in India

- **Harsh chimate condition:** India is a country where most of the fruits Vegetables and flowers etc are available from throughout the year.
- **Lack of good agricultural practices**: In India, farmers do not know that who will be the ultimate buyer or consumer of his produce.
- **Inadequate storage facilities:** We do not have sufficient cold storage facility to Store our perishables during the glut period. The “cold chain” in which the commodity is handled at low temperatures from harvesting till consumption and which is often recommended for handling perishables is hardly followed in India.
- **Rough handling and transportation:** Harvesting in many crops is not proper and Handling during packaging and transportation is rough and non-scientific, thus causing a lot of bruising and impact damage to the commodity which cause decay during marketing and storage.
- **Inadequate processing facilities:** India processes about 2.2% of total fruits and Vegetables production as against 50-70% in some developed countries. The reason is inadequate processing facilities and under-utilization of installed capacity.
- **Inconsistent government policies:** This involves the political conditions under Which a technological solution for reducing postharvest losses fails to be effective or is implementable , e.g., lack of a clear policy for facilitating and encouraging utilization of fruits, vegetables etc.
- **Lack of skilled work force:** The human, economic and technical resources and Efforts for developing programs for prevention and reduction of postharvest losses of perishables are inadequate.
- **Poor transportation facilities:** Vehicles used for transporting fruits and vegetables in bulk, to the distant markets are not equipped with refrigeration systems. Fruits and vegetables when exposed to high (fluctuating) temperatures and humidity during transportation experience moisture loss, softening and bruising of tissues, inviting pathogens and causing rotting.

Management of Post Harvest Losses for Horticultural Crop's

Post-harvest management of horticultural crops is crucial because these crops (fruits, vegetables, flowers, and ornamental plants) are highly perishable. Effective post-harvest handling helps reduce losses, maintain quality, and extend shelf life. The main types of post-harvest management can be categorized as follows:

1. **Harvesting Practices**

- Proper timing of harvest: Fruits and vegetables should be harvested at the right stage of maturity to ensure quality and shelf life.
- Careful handling: Avoid bruising, cuts, or mechanical injuries that can accelerate spoilage.
- Tools and techniques: Use sharp knives, scissors, or mechanical harvesters designed for the crop to minimize damage.

2. **Cleaning and Sorting**

- Cleaning: Remove dirt, dust, and field contaminants from the crops using water or dry cleaning methods.
- Grading and sorting: Separate crops based on size, color, maturity, and quality. This ensures uniformity and better market value.

3. **Cooling and Temperature Management**

- Pre-cooling: Rapidly remove field heat from crops after harvest (e.g., using forced-air coolers, hydro-cooling, or cold water immersion).
- Cold storage: Store crops at recommended temperatures to slow down respiration and delay ripening. For example:
  - Apples: 0–4°C
  - Tomatoes: 12–15°C
- Controlled or modified atmosphere storage: Adjust oxygen and carbon dioxide levels to prolong storage life.

4. **Packaging**: Use suitable materials that protect crops from mechanical injury, moisture loss, and microbial infection. Examples: Corrugated boxes, crates, net bags, polyethylene films. Packaging also helps in transportation and marketing.

5. **Transportation**

- Careful handling during transit: Avoid overloading and mechanical damage.
- Refrigerated transport (cold chain): Maintains freshness, especially for long distances.
- Shock and vibration reduction: Use cushioning materials to prevent bruising.

6. **Ripening and Processing**

- Ripening management: Some fruits (like bananas and mangoes) are climacteric and need controlled ripening using ethylene or temperature regulation.
- Processing: Some crops are processed into juices, jams, pickles, or frozen products to extend shelf life.

7. **Storage and Preservation**

- Short-term storage: Use ventilated rooms, crates, or baskets for crops like tomatoes, cucumbers, and leafy vegetables.
- Long-term storage: Cold storage, controlled atmosphere storage, or use of preservatives for crops like apples, potatoes, or onions. Use of chemical treatments: Sometimes fungicides or wax coatings are applied to prevent spoilage.

8. **Pest and Disease Management Post-Harvest**: Inspect and remove infected or damaged produce. Use approved post-harvest treatments to prevent fungal or bacterial infections.

Summary

The post-harvest management process includes harvesting → cleaning → sorting → cooling → packaging → transportation → storage/processing → pest management. Each step is aimed at reducing losses and maintaining quality.