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## Post-Harvest Management and Its Impact on Horticultural Marketing Efficiency: Loss Reduction, Grading, Packaging, and Cold Chain

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India is one of the world's leading producers of horticultural crops such as fruits, vegetables, spices, and flowers. Despite this impressive production base, the horticulture sector continues to suffer from substantial post-harvest losses, primarily due to inadequate handling, storage, packaging, and transportation facilities. Studies indicate that 20–40% of fruits and vegetables in India are lost after harvest, resulting in enormous economic losses and reduced availability of quality produce to consumers. Post-harvest management (PHM) refers to the set of practices and technologies applied from the time of harvest until the produce reaches the final consumer. Efficient post-harvest management is essential not only for loss reduction but also for improving the overall efficiency of horticultural marketing systems.

### Importance and Benefits of Post-Harvest Management

**1. Reduction in Post-Harvest Losses:** Horticultural crops are highly perishable. Improper handling and storage result in heavy losses at various stages of the supply chain. Losses of **20–28% in banana, 25–40% in onion, and up to 27% in grapes** have been reported under poor post-harvest conditions. Adoption of scientific post-harvest practices significantly reduces these losses.

**2. Improved Price Realization:** Graded, properly packaged, and well-stored produce fetches higher prices in the market. Quality maintenance enables farmers to access organized markets, supermarkets, and export channels, leading to better income.

**3. Extended Shelf Life and Market Reach:** Cold storage and cold chain facilities slow down physiological and microbial deterioration. This allows produce to be transported over long distances and sold in distant or premium markets without quality loss.

**4. Enhanced Consumer Satisfaction:** Consumers receive fresh, nutritious, and uniform quality produce, which increases trust in horticultural markets and strengthens demand.

### Key Components of Post-Harvest Management

**1. Harvesting and Handling:** Harvesting at the correct maturity stage and using proper tools minimizes mechanical damage. Gentle handling, use of plastic crates instead of gunny bags, and reduced handling operations significantly decrease spoilage.

**2. Grading and Sorting:** Grading involves separation of produce based on size, shape, colour, and quality. Graded produce ensures uniformity, reduces rejection, and commands premium prices in domestic and export markets.

**3. Packaging:** Scientific packaging protects produce from physical injury, moisture loss, and microbial contamination. Ventilated crates, corrugated fiberboard boxes, and modified atmosphere packaging are widely used to enhance shelf life and quality.

**4. Cold Chain and Storage:** The cold chain includes pre-cooling, cold storage, refrigerated transport, and ripening chambers. Efficient cold chain infrastructure is crucial for maintaining quality, reducing losses, and stabilizing supply throughout the year.



## Impact on Horticultural Marketing Efficiency

Improved post-harvest management increases marketing efficiency by:

- Increasing the proportion of marketable produce
- Reducing wastage and distress sales
- Stabilizing prices by preventing glut situations
- Improving access to organized retail and export markets

These improvements lead to higher returns for farmers and more efficient supply chains.



## Approximate Post-Harvest Losses in Major Horticultural Crops

Crop	Post-Harvest Loss (%)
Banana	20–28
Onion	25–40
Grapes	27
Papaya	40–100
Tomato	5–30
Citrus	20–95
Apple	14

## Conclusion

Post-harvest management is a critical determinant of marketing efficiency in the horticulture sector. Reduction of post-harvest losses through scientific harvesting, grading, packaging, and cold chain development directly enhances farmer income, reduces waste, and improves food and nutrition security. Investments in post-harvest infrastructure, capacity building of farmers, and strong extension support are essential for strengthening horticultural marketing systems. With improved post-harvest management, India can significantly enhance the competitiveness and sustainability of its horticulture sector.