

## Reducing Food Waste Through Post-Harvest Technology: Enhancing Storage and Logistics for Improved Marketability

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### Abstract: -

Post-harvest losses account for a significant portion of food waste in India, reducing farmer income and overall food availability. Advanced post-harvest technologies, including improved storage, cold chain logistics, and smart packaging, can minimize losses, maintain quality, and improve marketability of produce. This article examines the role of post-harvest technology in reducing food waste, highlights current challenges, explores innovations, and outlines future strategies for sustainable supply chain management.

**Keywords:** Post-harvest technology, food waste reduction, cold chain, storage solutions, supply chain management, marketability etc.

### Introduction:

Food losses after harvest are a critical challenge for agricultural sustainability and food security. In India, perishable commodities such as fruits, vegetables, and dairy often suffer from poor storage, inadequate transportation, and insufficient market infrastructure, leading to significant wastage. and smart packaging technologies enable farmers to deliver produce to markets efficiently, reduce losses, and enhance profitability. By integrating these technologies, the agricultural supply chain can become more resilient, sustainable, and economically beneficial.

Post-harvest technology aims to bridge these gaps by providing solutions that extend shelf life, preserve quality, and streamline logistics. Effective storage, cold chain systems

### Current Challenges in Post-Harvest Management

1. Inadequate Storage Facilities  
Traditional storage structures often

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lack temperature and humidity control, resulting in spoilage and reduced quality.

2. Limited Cold Chain Infrastructure Insufficient cold storage and refrigerated transport facilities impede timely distribution, particularly in remote regions.
3. Poor Packaging Practices Use of non-standardized or inadequate packaging can lead to physical damage, moisture loss, and microbial contamination.
4. Transportation Bottlenecks Inefficient logistics, long transit times, and uncoordinated supply chains increase vulnerability to spoilage.
5. Awareness and Training Gaps Farmers and traders may lack knowledge of proper handling, storage protocols, and adoption of modern technologies.

## Technological Innovations in Post-Harvest Management

1. Cold Storage and Refrigeration Advanced cold storage systems, including modular and mobile units, maintain optimal temperature and humidity, extending shelf life.
2. Controlled Atmosphere Storage Manipulating oxygen, carbon dioxide, and nitrogen levels reduces respiration rates and delays ripening in perishable commodities.

3. Smart Packaging Solutions Modified atmosphere packaging, biodegradable films, and sensor-enabled packages improve product protection and monitor quality.

4. IoT and Sensor Integration Temperature, humidity, and gas sensors provide real-time monitoring of storage and transportation conditions, enabling timely corrective actions.

5. Automated Logistics and Cold Chain Management Digital platforms and AI-driven systems optimize routing, inventory management, and real-time tracking, minimizing delays and losses during transit.

## Conclusion and Future Perspectives

Post-harvest technology is pivotal in reducing food waste, maintaining produce quality, and enhancing market access for farmers. Despite challenges such as limited infrastructure, cost barriers, and knowledge gaps, technological innovations in storage, packaging, and logistics are improving efficiency and sustainability.

### Future strategies include:

1. Expanding Cold Chain Networks: Establishing more accessible, cost-effective cold storage and transportation solutions.

2. Farmer Training Programs: Educating stakeholders on best practices in handling, storage, and packaging.
3. Policy Support and Incentives: Encouraging private investment, subsidies, and technology adoption for post-harvest management.
4. Integration with Digital Platforms: Utilizing IoT and AI for predictive monitoring, quality assurance, and supply chain optimization.
5. Sustainable Packaging: Promoting eco-friendly and smart packaging materials that reduce spoilage and environmental impact.
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## Conclusion

Integrating post-harvest technologies into the agricultural supply chain can significantly reduce food waste, increase farmer income, and support sustainable food systems. Continued innovation, policy support, and stakeholder engagement are essential to maximize the benefits of these technologies.

## References

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