



POSTHARVEST HANDLING OF FRUITS AND VEGETABLES

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1. Introduction

Postharvest handling of fruits and vegetables encompasses all the practices and processes involved from the time produce is harvested until it reaches the consumer. This critical phase plays a significant role in maintaining the quality, safety, and value of agricultural products. Proper postharvest handling ensures that fruits and vegetables remain fresh, nutritious, and appealing, while also reducing waste and maximizing market potential.

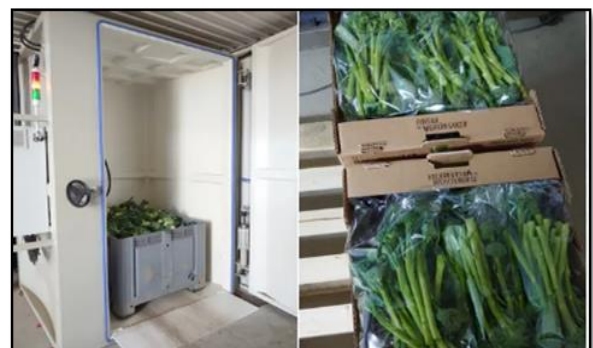
2. Harvesting

Harvesting is a critical stage in the agricultural production of fruits, vegetables, and other crops. Proper harvesting practices ensure that produce is collected at the right time and handled in a way that preserves its quality, nutritional value, and marketability. After reaching the maturity stage the crop should be harvested. Maturity stages vary from crop to crop. Indicators of maturity which include size, color, firmness, sugar content (Brix level) and sometimes even aroma.



3. Precooling

Pre cooling is a critical post-harvest practice used to quickly reduce the temperature of freshly harvested fruits, vegetables, and other perishable products before they are stored, transported, or processed. This rapid cooling process is essential for maintaining the quality, freshness, and shelf life of produce by slowing down respiration, delaying ripening, and reducing the growth of spoilage organisms. The importance of Pre cooling was slows down the respiratory and metabolism activities, Reduces Water Loss, delaying ripening process and minimizes the growth of microorganisms. It consists of different precooling methods such as Room cooling, hydro cooling, forced air cooling, vacuum cooling and ice cooling. Choosing the appropriate precooling method depends on the type of produce, operational scale and specific requirements of the post-harvest process. Implementing effective precooling practices is essential for minimizing losses and delivering high-quality produce to the market.





4. Cleaning/ washing

This treatment is applied to eliminate dust, dirt, extraneous materials, and pathogenic organisms from the surface of produce. The primary goal of cleaning is to sanitize the product, preventing any undesirable substances from entering the packaging and storage processes. Cleaning encompasses various techniques, including dry methods like dusting and wet methods like washing. In packhouses, washing is typically conducted using automated systems equipped with overhead sprayers and soft rotating brushes to thoroughly clean and wash the vegetables.

Washing with clean water mixed with a neutral detergent at a concentration of 0.1% (1 ml per liter of water) is an effective method for cleaning. The cleaning and washing process typically lasts 3-5 minutes. The water should be at room temperature, around 37°C, to ensure optimal cleaning efficiency.



5. Sorting/ Grading

Sorting and grading are essential processes used to remove undesirable vegetables, such as those that are diseased, damaged, or deformed. These processes help prevent the spread of infection to other vegetables. During grading, fruits and vegetables

are categorized based on attributes like weight, size, color, and maturity. This categorization not only ensures the quality of the produce but also helps achieve better market prices.



6. Packaging






Packaging is an important operation in the post-harvest handling of fruits, vegetables, and other products. It involves preparing products for transportation, storage, and sale by enclosing them in containers or materials that protect and preserve their quality. Effective packaging ensures that products remain fresh, safe, and appealing to consumers while also facilitating efficient handling, distribution, and marketing.

In many developing countries, fresh fruits and vegetables are often packaged using bamboo baskets, plastic crates, plastic bags, or nylon sacks. Different types of packaging materials are available for ease of packing such as Plastic, Paper and Cardboard, metals, glass, biodegradable and compostable materials. MAP and CAS recently developed method of packing which will enhance the shelf life of the horticultural commodities.

The role of Packaging is very precious in protecting fresh produce,

- ✓ It provides protection from dust.
- ✓ It reduces microbial contamination from the surrounding environment and from consumer contact
- ✓ It helps in maintaining the freshness of produce
- ✓ It enhances the postharvest shelf life
- ✓ It helps to increase the sale of fresh produce.
- ✓ It helps to reduce the transport loss.

It provides protection, preservation and convenience while also serving as a key element in marketing and compliance. By choosing the right packaging materials and methods, producers and retailers can enhance the quality and appeal of their products, optimize handling and distribution and meet consumer and regulatory expectations. Effective packaging is essential for maintaining the integrity of the product and ensuring a positive consumer experience.

		
<p align="center">a. Crate packing</p>	<p align="center">b. CFB packing</p>	<p align="center">c. Punnet Packing</p>
		
<p align="center">d. Foam net packing</p>	<p align="center">e. Mesh bag</p>	
<p align="center">Different types of packing materials used to pack the fruits and vegetables</p>		

7. Storage

Temperature is a critical factor influencing the rate at which products deteriorate. To extend the shelf life of fresh produce, managing temperature is essential. It significantly affects the germination of spores and the growth of pathogens. If the temperature deviates from its optimal range, it can cause two main types of injuries to crops, chilling injuries and heat injuries.

Storage temperature, humidity varies from the product specific. The importance of storage is preservation of quality, shelf life extension, reduction of spoilage, prevention of pest and disease infection.

Effective storage practices also contribute to efficient inventory management, cost savings and compliance with food safety regulations.



8. Transportation

During transportation, produce must be handled carefully to avoid damage. Proper loading, securing, and temperature control are crucial for maintaining quality. Efficient logistics and transportation management ensure timely delivery and minimize the risk of spoilage or loss.



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