

# **SNS COLLEGE OF TECHNOLOGY**

**Coimbatore-35 An Autonomous Institution** 

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# **DEPARTMENT OF FOOD TECHNOLOGY**

# **19FTT305-FRUIT AND VEGETABLE TECHNOLOGY**

# **UNIT 3 - MINIMAL PROCESSING AND CANNING**





# **Minimal Processing of Fruits and Vegetables**

It involves a series of operations aimed at making produce convenient and safe for immediate consumption, while preserving its natural characteristics such as flavor, texture, and nutritional value. The idea behind minimal processing is to preserve the fresh, raw quality of fruits and vegetables while providing convenience for the consumer, without the need for complex or heavy processing methods like canning or freezing.

Here's a detailed breakdown of **Minimal Processing**:

### **1. Preparation and Cleaning**

- The first step involves basic cleaning and sanitizing of the fruits and vegetables to remove dirt, soil, pesticides, and other contaminants.
- Washing: Fresh produce is washed using water, sometimes with mild sanitizing agents to reduce microbial contamination. This is crucial for products that will be consumed raw or only lightly processed.
- Brushes and Scrubbing: For produce with thick or rough skins, such as potatoes or carrots, mechanical brushes may be used.
- Peeling: Certain fruits and vegetables are peeled to remove skins that may be hard, bitter, or inedible, such as cucumbers, potatoes, or citrus fruits.





# **Sorting and Grading**

Fruits and vegetables are sorted based on size, color, and quality to ensure uniformity in the final product. The grading process helps remove any damaged or overripe items, ensuring only fresh produce reaches the packaging stage.

•Visual Inspection: Produce is manually or mechanically inspected to detect bruises, blemishes, or spoilage.

•Sorting by Size: Some products, such as tomatoes or apples, are sorted by size to make them more uniform for packaging and retail.

### **Cutting, Slicing, or Dicing**

This step involves shaping or portioning the produce into sizes or formats suitable for packaging, cooking, or eating. The cutting or slicing process is usually done with knives or specialized machines.

•Slicing: Common for fruits like melons or pineapples, or vegetables like cucumbers or zucchini.

•Dicing: Often used for vegetables that will be used in cooking, like onions or bell peppers.

•Shredding: For products like cabbage or carrots that will be sold as coleslaw or salad mixes.

•Segmenting: Used for citrus fruits, where the segments are separated and peeled.



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# **Blanching**

Blanching involves briefly submerging fruits or vegetables in hot water or steam for a short time, followed by rapid cooling. Blanching is particularly important for products that will be frozen, but some minimally processed items may be blanched for quality improvement or extended shelf life.

# •Purpose of Blanching:

- Enzyme Inactivation: Prevents browning, loss of flavor, and texture changes caused by enzymes like polyphenol oxidase.
- Microbial Control: Reduces the microbial load by partially killing bacteria, molds, and yeasts.
- Color and Texture Retention: Helps maintain the vibrant colors and crisp textures of vegetables, like broccoli or peas.
- •Common Blanching Methods:
  - Hot Water Blanching: Produce is immersed in water at 85-100°C for a few minutes and then rapidly cooled.
- Steam Blanching: Produce is exposed to steam at around 85-95°C for 2-4 minutes. Cooling

Cooling is essential to stop the cooking process after blanching and prevent spoilage. This step is typically done using **cold water** or **ice baths** to cool the produce quickly. For fresh-cut products, air cooling might also be used.

•Purpose: Prevents overcooking and preserves texture, color, and nutrients.





## Packaging

Packaging is a key step to protect the produce from external contaminants, moisture loss, or physical damage. It also helps extend shelf life by controlling the atmosphere surrounding the product.

•Modified Atmosphere Packaging (MAP): Involves adjusting the levels of oxygen, carbon dioxide, and humidity within the packaging to slow down the deterioration process. •Vacuum Packaging: Removes air to prevent the growth of aerobic bacteria and molds. •Protective Coatings: In some cases, a thin edible coating is applied to fruits like apples or

cucumbers to reduce moisture loss and protect from damage.

•Packaging Materials: Common materials include plastic films, trays, or bags designed for fresh-cut produce.

### Storage

After packaging, the produce is stored under conditions that help maintain its freshness. Depending on the produce, this could include refrigeration, cold storage, or other temperature-controlled environments.

•**Temperature Control**: Fruits and vegetables should be stored at the appropriate temperature to avoid spoilage. For example, leafy greens typically require refrigeration. •Shelf-Life Control: Techniques like MAP or controlled-atmosphere storage can extend the shelf life by slowing down respiration and reducing ethylene production.





Labeling

Proper labeling of the product is crucial, especially for safety, traceability, and marketing. Labels usually contain: •Product Name

- Storage Instructions
- •Expiration Date or Best Before Date
- •Nutritional Information
- •Allergens (if applicable)

# **Benefits of Minimal Processing**

**1.Preservation of Nutritional Value**: Compared to more aggressive processing methods like canning or freezing, minimal processing maintains more of the vitamins, minerals, and other nutrients present in fresh produce.

**2.Convenience**: Pre-cut, washed, and packaged fruits and vegetables save consumers time and effort. **3.Better Taste and Texture**: Minimal processing preserves the natural flavors, textures, and appearances of fresh produce.

**4.Extended Shelf Life**: When done correctly, minimal processing can extend the shelf life of fresh produce without compromising its quality.



### **Blanching Equipment**

The type of equipment used for blanching depends on the scale of operations and the type of produc being processed. Common blanching equipment includes:

#### **1.Batch Blanchers**:

**Hot Water Tanks**: Simple, large tanks where vegetables are immersed in hot water for the required time. **Steam Cabinets**: Chambers where vegetables are exposed to steam for blanching.

2.**Continuous Blanchers**:

**Conveyor Belt Blanchers**: A continuous belt system where produce moves through a series of hot water or steam tanks.

**Rotary Drum Blanchers**: A cylindrical drum where produce is rotated while being exposed to hot water or steam.

#### **3.Microwave Blanchers**:

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**Microwave Blanching Chambers**: These units use microwave energy to heat the produce evenly and quickly, ensuring efficiency





#### **4 Hydrostatic Pressure Blanchers:**

•Used in large-scale industrial operations, hydrostatic pressure blanchers involve moving the produce through pressurized chambers where water or steam can be applied evenly. **5** Air-Blanching Systems:

•In some cases, hot air can be used to achieve blanching, especially for delicate products like leafy greens.

#### **Considerations for Blanching Equipment:**

•Energy Efficiency: It's essential that blanching systems are energy-efficient to reduce operational costs. •Capacity: The equipment should match the volume of produce being processed. Batch systems are better for smaller quantities, while continuous systems are ideal for larger volumes. •Automation: Some modern blanching systems are fully automated, controlling temperatures, timing, and even cooling processes.







