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Sorting, Grading and Packaging of Fruits and Vegetables

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INTRODUCTION

Fruits and vegetables are among the most important horticultural commodities because they are rich sources of vitamins, minerals, dietary fibre, antioxidants, and other essential nutrients required for maintaining human health. Due to increasing awareness of nutrition and health benefits, the demand for fresh fruits and vegetables has been rising continuously throughout the world. However, these commodities are highly perishable in nature because they contain a high percentage of water and continue their metabolic activities even after harvest.

After harvesting, fruits and vegetables remain living tissues and continue to respire, transpire, and undergo various physiological and biochemical changes. These processes lead to moisture loss, softening, ripening, senescence, and deterioration of quality. In addition, improper handling, mechanical injuries, microbial infections, and inadequate storage and transportation facilities contribute significantly to post-harvest losses. In developing countries, post-harvest losses of fruits and vegetables are estimated to range from 20 to 40 percent, causing substantial economic losses to farmers and reducing the availability of nutritious food for consumers.

To minimize these losses and maintain quality, several post-harvest operations are carried out immediately after harvesting. Among these operations, sorting, grading, and packaging play a crucial role in preserving the quality and marketability of fresh produce. Sorting involves the removal of damaged, diseased, immature, or defective produce and the separation of produce based on physical characteristics. Grading is the classification of produce into different quality groups according to predetermined standards such as size, shape, colour,

maturity, and freedom from defects. Packaging involves placing produce in suitable containers that protect it from physical damage, moisture loss, contamination, and spoilage during handling, storage, transportation, and marketing.

Proper sorting, grading, and packaging improve the appearance, uniformity, and consumer acceptability of fruits and vegetables. These operations facilitate handling and transportation, extend shelf life, reduce post-harvest losses, and increase market value and profitability. They are also essential for meeting quality standards in domestic and international markets and play a vital role in ensuring food security and sustainable horticultural production.

1. Sorting of Fruits and Vegetables

Definition

Sorting is the process of separating fruits and vegetables based on their physical condition and removing damaged, diseased, overripe, undersized, or defective produce from the healthy produce.

Objectives of Sorting

- Remove damaged and diseased produce.
- Separate produce according to maturity and quality.
- Reduce the spread of spoilage organisms.
- Improve the appearance and market acceptability of produce.
- Facilitate grading and packaging operations.

Basis of Sorting

- Size
- Shape
- Colour
- Maturity
- Degree of ripeness
- Freedom from defects and diseases

Advantages of Sorting

- Reduces post-harvest losses.
- Improves product quality and uniformity.
- Increases market price and consumer satisfaction.
- Makes packaging and transportation more efficient.

2. Grading of Fruits and Vegetables

Definition

Grading is the process of classifying fruits and vegetables into different groups or grades according to predetermined standards such as size, colour, shape, maturity, and quality.

Objectives of Grading

- Obtain uniform lots of produce.
- Improve market value and consumer preference.
- Facilitate pricing and trade.
- Reduce handling and marketing difficulties.
- Promote domestic and export marketing.

Types of Grading

a) Manual Grading

Produce is graded by hand according to visual characteristics such as size, colour, and appearance.

b) Mechanical Grading

Machines are used to grade produce based on size, weight, and other physical characteristics.

Factors Considered in Grading

- Size and weight
- Shape and colour
- Maturity and ripeness
- Freshness and firmness

- Freedom from defects, diseases, and mechanical injuries

Advantages of Grading

- Enhances market appeal.
- Ensures uniform quality.
- Increases consumer confidence.
- Helps in obtaining premium prices.
- Facilitates export and processing operations.

3. Packaging of Fruits and Vegetables

Definition

Packaging is the process of enclosing fruits and vegetables in suitable containers to protect them from physical damage, moisture loss, contamination, and spoilage during handling, storage, transportation, and marketing.

Objectives of Packaging

- Protect produce from mechanical injuries.
- Reduce moisture loss and deterioration.
- Facilitate handling and transportation.
- Maintain quality and freshness.
- Provide information regarding the product.

Functions of Packaging

- Protection
- Preservation
- Containment
- Convenience in handling
- Marketing and product identification

Characteristics of Good Packaging Material

- Strong and durable
- Lightweight and economical
- Clean and non-toxic
- Proper ventilation
- Resistant to moisture and damage
- Easy to handle and stack

Common Packaging Materials

- Plastic crates
- Corrugated fibreboard boxes
- Wooden boxes
- Bamboo baskets
- Plastic bags and punnets
- Paper cartons and trays

Advantages of Proper Packaging

- Reduces post-harvest losses.
- Maintains quality and appearance.
- Extends shelf life.
- Improves transport efficiency.
- Increases marketability and profitability.

CONCLUSION

Sorting, grading, and packaging are essential post-harvest operations in the fruit and vegetable supply chain. Sorting removes defective produce, grading ensures uniform quality, and packaging protects produce during storage and transportation. Adoption of these practices significantly reduces post-harvest losses, improves product quality, increases shelf life, and enhances the income of farmers and traders.

"Proper sorting, grading, and packaging transform harvested produce into high-quality marketable products with minimum losses and maximum returns."