

Post-Harvest Handling of Mango: Best Practices for Quality and Export

Prasad Patil

Assistant Professor (C)
Department of Post Harvest
Management, College of
Agriculture, Kerala Agriculture
University, Thrissur, Kerala,
India.



*Corresponding Author
Prasad Patil*

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INTRODUCTION

Mango (*Mangifera indica* L.), popularly known as the "King of Fruits," is one of the most important tropical fruits cultivated in India and many other countries. It is highly valued for its attractive color, pleasant aroma, delicious taste, and nutritional richness. India is the world's largest producer of mangoes, contributing significantly to domestic consumption and export earnings.

Despite high production, postharvest losses in mangoes range from 20–30% due to improper handling, poor storage facilities, mechanical injuries, and microbial spoilage. Efficient post-harvest management is therefore essential to maintain fruit quality, extend shelf life, reduce losses, and meet export standards.

Importance of Post-Harvest Handling

- Post-harvest handling aims to:
- Reduce quantitative and qualitative losses.
- Maintain freshness and nutritional quality.
- Increase storage life and marketability.
- Ensure food safety and consumer satisfaction.
- Meet international quality standards for export.
- Improve farmers' income and export competitiveness.

Maturity and Harvesting

Optimum Maturity Indices

Harvesting mangoes at proper maturity is essential because immature fruits fail to ripen properly, while over-mature fruits deteriorate rapidly.

Common maturity indicators include:

- Full development of fruit shoulders above the stem end.
- Change in peel color from dark green to light green.
- Characteristic shape and size of the variety.
- Development of yellow coloration near the stalk end.
- Specific gravity greater than one (mature fruits sink in water).
- Number of days from fruit set to maturity (90–150 days depending on variety).

Harvesting Methods

Mangoes should be harvested carefully to minimize injuries.

Recommended practices:

- Harvest during cool hours of the day.
- Use sharp secateurs or mango harvesters.
- Retain a short pedicel (1–2 cm).
- Avoid shaking trees or allowing fruits to fall.
- Place harvested fruits gently in padded field crates.

De-sapping (Removal of Latex)

Freshly harvested mangoes exude latex from the stem end. The latex contains resinous substances that cause sap burn and black spots on the peel.

Procedure

- Keep harvested fruits in an inverted position.
- Allow sap to drain for 20–30 minutes.
- Wash fruits with clean water if necessary.

Benefits

- Prevents sap injury.
- Improves fruit appearance.
- Reduces microbial contamination.
- Enhances export quality.

Cleaning and Washing

Mangoes should be cleaned to remove dirt, dust, and latex residues.

Recommended Procedure

- Wash fruits in clean chlorinated water.
- Use food-grade detergents if required.
- Rinse thoroughly and dry before packing.

Advantages

- Improves appearance.
- Reduces microbial load.
- Enhances shelf life.

Sorting and Grading

Sorting

- Remove fruits that are:
 - Damaged or bruised.
 - Diseased or insect-infested.
 - Misshapen or undersized.
 - Overripe or immature.

Grading

Fruits are graded based on:

- Size and weight
- Shape and uniformity
- Peel color
- Freedom from defects
- Variety characteristics

Benefits

- Uniform ripening.
- Better market value.
- Improved consumer acceptance.
- Compliance with export standards.

Pre-Cooling

Pre-cooling removes field heat immediately after harvest.

Methods

- Forced-air cooling
- Room cooling
- Hydro-cooling

Benefits

- Reduces respiration rate.
- Delays ripening.
- Maintains firmness.
- Increases storage life.

Post-Harvest Treatments

Hot Water Treatment (HWT)

Fruits are immersed in hot water at prescribed temperatures and durations.

Benefits:

- Controls fungal pathogens.
- Reduces fruit fly infestation.
- Improves quarantine compliance.

Fungicidal Treatment

Approved fungicides may be applied where permitted.

Benefits:

- Reduces anthracnose and stem-end rot.
- Improves storage stability.

Edible Coatings

Natural coatings such as aloe vera gel, chitosan, and waxes may be used.

Benefits:

- Reduce moisture loss.
- Delay ripening.
- Extend shelf life.

Ripening Management

Mangoes are climacteric fruits and continue ripening after harvest.

Recommended Practices

- Ripen fruits in controlled ripening chambers.
- Use ethylene at recommended concentrations.
- Maintain proper temperature and humidity.

Avoid

- Ripening with harmful chemicals such as calcium carbide.
- Excessive temperatures that cause uneven ripening.

Packaging of Mangoes

Characteristics of Good Packaging

- Strong and durable.
- Well ventilated.
- Lightweight and economical.
- Protect fruits from mechanical damage.

Packaging Materials

- Corrugated fiberboard (CFB) boxes
- Plastic crates
- Cushioning materials such as paper shreds and foam nets

Advantages

- Reduces bruising and compression injury.
- Facilitates transportation and handling.

- Maintains fruit quality.

Storage Conditions

Recommended Storage Conditions

- Temperature: 12–13°C
- Relative Humidity: 85–90%
- Good ventilation and sanitation.

Benefits

- Slows respiration and ripening.
- Reduces water loss.
- Minimizes disease development.
- Maintains quality for longer periods.

Transportation

Transportation is a critical component of the postharvest chain.

Best Practices

- Use clean and ventilated vehicles.
- Avoid overloading.
- Handle cartons carefully.
- Maintain cold chain whenever possible.

Benefits

- Reduces mechanical damage.
- Preserves quality.
- Improves marketability.

Major Post-Harvest Diseases of Mango

Anthracnose (Colletotrichum gloeosporioides)

Symptoms: Black sunken lesions on fruits.

Management:

- Hot water treatment
- Proper sanitation
- Careful handling and storage

Stem-End Rot (Lasiodiplodia theobromae)

Symptoms: Decay beginning at the stem end.

Management:

- De-sapping
- Removal of infected fruits
- Appropriate postharvest treatments

Export Quality Requirements for Mango

Physical Requirements

- Uniform size and maturity.
- Attractive color and shape.
- Freedom from defects and injuries.
- Proper firmness.

Sanitary and Phytosanitary Requirements

- Freedom from pests and diseases.
- Compliance with quarantine regulations.
- Traceability and proper documentation.
- Residue levels within permissible limits.

Packaging Requirements

- Export-grade corrugated boxes.
- Proper labeling and traceability information.
- Adequate ventilation and cushioning.

Best Practices for Export of Mango

1. Harvest fruits at optimum maturity.
2. Perform proper de-sapping immediately after harvest.
3. Wash and sanitize fruits carefully.
4. Sort and grade according to export standards.
5. Apply hot water and approved postharvest treatments.

6. Use pre-cooling and maintain the cold chain.
7. Pack fruits in export-grade ventilated cartons.
8. Store under recommended temperature and humidity.
9. Ensure compliance with phytosanitary and food safety regulations.
10. Transport fruits carefully to avoid mechanical damage.

CONCLUSION

Post-harvest handling plays a crucial role in preserving the quality and market value of mangoes. Proper harvesting, de-sapping, cleaning, grading, pre-cooling, packaging, storage, and transportation significantly reduce postharvest losses and improve shelf life. Adoption of scientific post-harvest practices and compliance with export standards enable producers to supply high-quality mangoes to domestic and international markets, thereby increasing profitability and strengthening the mango export industry.