

INCREASING QUALITY AND STANDARDS COMPLIANCE CAPACITY OF MANGO VALUE CHAIN IN MEKONG RIVER DELTA

01



SOP 1: Field practices for export quality management

02



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Mango Export Market Requirement Manuals

SOP 1: FIELD PRACTICES FOR EXPORT QUALITY MANAGEMENT

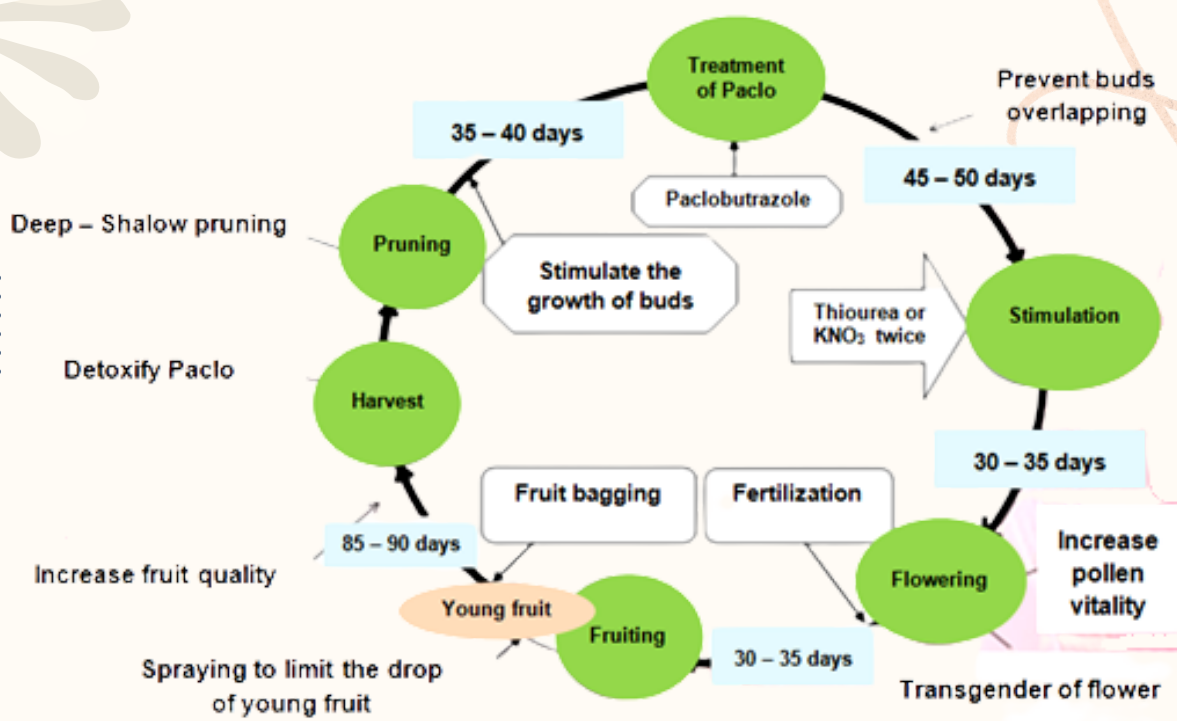
STANDARD OPERATING PROCEDURE

Plant Management

- **Preparing seedlings and planting:** The plant varieties are propagated asexually and using uniformly grafted rootstocks of the same variety and age.
- **Plant density and spacing:** The common planting distance for Cat Chu and Cat Hoa Loc mangoes is 7 x 7 m or 8 x 8 m.
- **Creating basic tree canopy structure:** Use a branch-holder tree at a 1st level branch angle of 35-40 degrees to create a frame for the main trunk, then continue this technique for the 2nd and 3rd branch levels to create a balanced tree frame.



Process of stimulating flowering mango



Nutrient Management

- Nutrition strongly affects the quality of mango fruit because mango trees derive nutrients from the soil and fertilizer. Therefore, it is essential to understand the soil's nutrient supply and the appropriate nutrient requirements for each stage of mango tree growth to apply fertilizer effectively.
- Each year, the orchard should conduct soil and leaf analysis to determine the accurate amount and type of fertilizer needed to achieve optimal results. There cannot be a general recommendation that is suitable for all orchards.

Post-harvest Management

- To meet export requirements, it is important to harvest mango at the appropriate stage of ripeness to ensure the best quality as follows:
- For Cat Hoa Loc mangoes, the main crop should be harvested at 85-90 days after the fruit set, and the off-season crop should be harvested at 80-85 days after the fruit set.

SOP 2: PACKHOUSE PROCEDURES FOR EXPORTING MANGOES

STANDARD OPERATING PROCEDURE

LOCATION OF PACKAGING HOUSE AND REQUIREMENTS FOR INFRASTRUCTURE

- Located far from tarnished areas. Close to major roads.
- Solid structure, clean water hygiene, adequate supply of electricity, according to current regulations, reliable communication system, good drainage system..., and must have a fire protection and prevention system according to regulations.
- Must have sufficient infrastructure for receiving, sorting, pre-processing, processing, preserving, and packaging mangoes, with measures to control harmful organisms and prevent recontamination.
- Arranged according to one-way principle to avoid cross-contamination.

EXPORT PROCESSING ACTIVITIES FOR MANGOES

- Destemming
- Washing
- Disease control
- Drying
- Grading/Sizing
- Ripening
- Packing
- Palletising
- Pre-cooling
- Irradiation treatment
- VHT treatment
- Cooling
- Palletising
- Temporary storage

QUALITY ASSURANCE SYSTEM

- The packaging house needs to establish a quality control system based on HACCP principles. Identify and control potential hazards at each stage of processing to ensure food safety and maintain product quality stability according to technical standards.
- Implement effective isolation measures to ensure product stability and quality. Isolation helps prevent cross-contamination, pollution, and ensure compliance with import inspection requirements."

COMPLIANCE WITH REQUIREMENTS

- Legal requirements: register to obtain a packaging house code, register for export and comply with quarantine processing at the importing country's approved facility.
- Comply with regulations including: requirements for plant quarantine, quality, chemical residue, packaging... Comply with international trade requirements.
- Customer-specific requirements. Requirements for training, traceability, occupational health and safety, environmental management.

SOP 3: DISEASE MANAGEMENT FOR EXPORT QUALITY

STANDARD OPERATING PROCEDURE

Reduce the use of chemical

- The best way to control disease is to prevent it from entering the orchard.
- Remove the infected parts of the trees and dispose of them to prevent the spread of disease within the orchard.
- Disinfect all pruning and other equipment used in the fruit orchard.
- Farmers need to be trained in understanding mango pests and diseases and management measures to minimize disease outbreaks.

Inhibition of disease development.

- Heat treatment with hot water
- Heat treatment with hot water is a method of heating fruits using air saturated with water vapor.
- Hot water immersion treatment
- Mangoes after harvest can be treated with hot water (HWT) to prevent the development of certain diseases such as stem-end rot, anthracnose, and Alternaria fruit rot.
- Chemical treatment after harvest
- The effectiveness of hot water treatment can be significant enhanced by adding fungicides.

Storage and transportation management

Temperature management

- Temperature plays an important role in the development of diseases on exported fruits.

Long-term storage

- Long-term storage will only be effective if fruits are properly treated to prevent before and after harvest, including post-harvest fungicide treatment.

Crop Protection

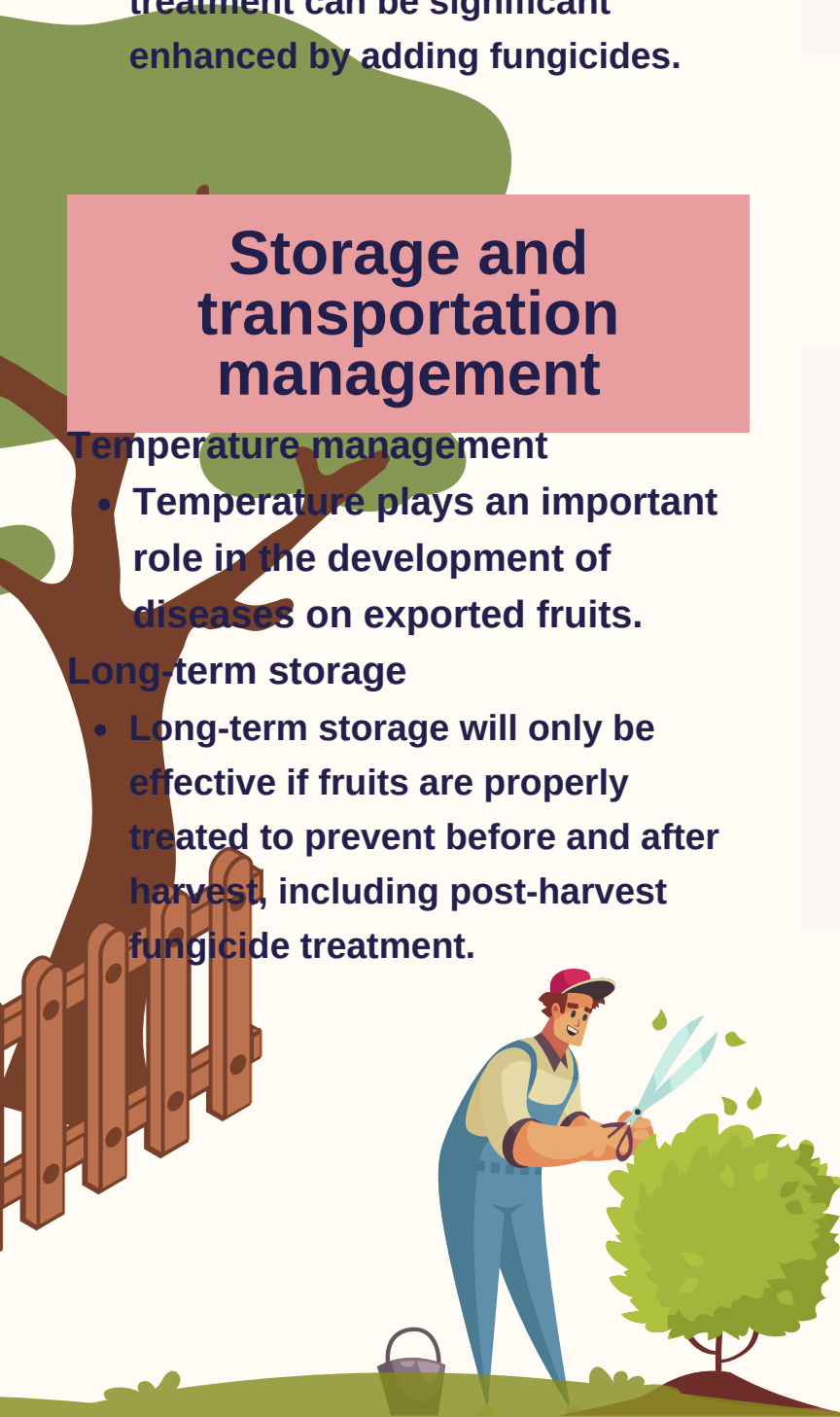
Identifying the correct disease is crucial because management measures will vary depending on which disease is predominant. Fungicides will prevent the disease from developing on the surface of the tree, leaves, or fruit. Their effectiveness will depend on the application method, so a well-calibrated sprayer is necessary. Fruit wrapping: Ensure that the product has high quality, no defects, and is protected from insect pests and diseases.

Chemical management

- Only use registered chemicals provided by licensed suppliers on the list of plant protection products allowed for use in Vietnam.
- Always use chemicals according to the instructions on the label or guidance from authorized government agencies.

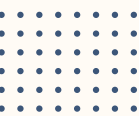
Ripening management

- The ripening process is carried out in a room with controlled temperature, and ethylene is introduced through a gas pump or ethylene generator catalyst.
- After transferrin the mangoes out of the ripening room, randomly collect some mangoes for testing and record the data in the mango evaluation and ripening process log.



SOP 4: COOL CHAIN MANAGEMENT FOR EXPORT MANGOES

STANDARD OPERATING PROCEDURE



01 MANGOES HARVESTING

- Harvest during cool times of the day.
- Plastic baskets must have air holes.
- Keep the baskets in a shaded area, avoiding direct sunlight.
- Do not store on the fruit orchard for more than 6 hours.

02 TRANSPORTATION TO PACKAGING FACILITY

- The basket containing mangoes should be well-ventilated and not overfilled.
- The transportation vehicle should have a roof to provide shade.
- The fruits should be transported during cool periods of the day. The fruits should be unloaded immediately upon arrival.

03 PROCESSING AT THE PACKING HOUSE

- The fruit should be processed within 12 hours.
- Maintain the fruit at ambient temperature before packaging.
- Do not store the fruit below 18-22oC.
- The fruit should be chilled to the storage temperature as soon as possible.
- Do not interrupt the cooling process. The fruit should be stored in a cool room at a temperature between 12oC to 15oC after packaging.

04 PLANT QUARANTINE TREATMENT AND INSPECTION.

Handling hot water treatment:

- Fruit should not be pre-cooled before undergoing VHT.
- The transportation temperature should not be below 18oC.
- The fruit needs to be cooled quickly after treatment and placed in the cold chain.

Radiation treatment:

- Cool the fruit before and place it in the cold chain after leaving the packaging facility to the radiation facility.
- Maintain cold temperatures before and after treatment.

05 REFRIGERATED TRANSPORT.

Cooling Room

Air velocity:

- 1-2m/s Arrange stacks and pallets to create space for better air circulation.

Forced air cooling system

- Airflow rate from 0.1 to 2.0 L/s/kg of product.
- Carton boxes must have ventilation holes covering at least 5% of the surface area. Do not cool by forced air below 12°C.

06 STORAGE AT THE IMPORTED DISTRIBUTION CENTER.

- Turn off the refrigeration equipment on the container and refrigerated truck when unloading.
- Store at a temperature of 12-15°C (Cat Chu, Cat Hoa Loc) or 5-8°C (Keo mango, Taiwan mango).

07 TRANSPORT TO THE EXPORT CENTER

Air freight

- Cool the fruits to 12-15°C before transportation. Choose flights during cool times of the day. Cargo at 2-5°C is only applicable for short flights when transporting ripe mangoes.

Sea freight

- Cool the fruits and the container to the set temperature before loading the cargo, temperature range of 8-12°C (depending on the mango variety), humidity level of 85-95%.

Road freight

- Cool the fruits and the truck to 12-15°C before loading the cargo. Ventilate to avoid excessive CO2 levels and maintain humidity at around 85-90%.



STANDARD OPERATING PROCEDURE

Packing and shipping management.

- This includes activities related to managing mango baskets in the orchard, general quality requirements and specifications for mango baskets.
- The process of arranging mangoes in baskets, packing baskets, and transporting mango baskets on different vehicles, from transportation at the orchard to the packing house, to the export center.
- The packaging specifications for mangoes in carton boxes, standards and specifications for carton boxes in different markets such as the United States, Europe, Japan, and South Korea. Pallet standards and specifications in different markets, the method of stacking carton boxes on pallets.

Temperature management

- Recommendations for using temperature to preserve mangoes throughout the mango transportation process, including from the orchard to the packing house, at the packing house, at the plant quarantine treatment sites such as VHT and Irradiation, and at the export center.
- At all points in the supply chain, temperature has an accumulative effect on the shelf life and the ability of mangoes to withstand long-distance transport. This is due to its impact on the ripening rate of the fruit, the development of diseases, the respiration process, and the water loss of the fruit.

Exporting system

- Each export transportation system by air, land, and sea has specific requirements and processes that must be followed to maximize the quality of exported mangoes in the target markets.
- Specific requirements for air transport, specific requirements for sea transport, specific requirements for controlling the atmosphere during sea transport, specific requirements for land transport, and specific requirements for managing delivery at the port of destination.

Compliance and record keeping

- Registration includes licenses/export permits, plant quarantine inspection and treatment documents, pallet labels and carton box labeling. Carton box labeling is a legal requirement in most countries.
- Each box or crate must display the following information visible from the outside: Product name, country of origin, exporter's address, weight, packing date, and traceability to the farm of origin.
- Information necessary to complete the documentation includes: Details of the number of trays or boxes contained in the container, total weight of the shipment including container weight, number of containers, seal numbers used to seal the container, vessel name, voyage number, departure date, and more.

SOP 6: TRACEABILITY FOR HORTICULTURE OPERATORS

STANDARD OPERATING PROCEDURE

ROLES AND ACTIVITIES OF PARTIES IN THE TRACEABILITY SYSTEM:

ROLE		ACTIVITIES
Farm		Planting, harvesting, storage, sales, transportation
Packhouse/ repackaging facility		Gathering, packaging, sales, transportation
Distributor/wholesaler		Storage, sales, transportation
Retailer		Storage, sales to end consumers
Food service business		Storage, processing, sales to end consumers
Third-party logistics service provider		Transportation, storage
Supplier of seeds, seedlings, input materials, packaging materials		Sales to farms
Government regulatory agency		Inspection

6 PRINCIPLES TO ENSURE TRACEABILITY OF ORIGIN

- Principle 1: Identify the parties involved in the chain
- Principle 2: Identify the product
- Principle 3: Maintain the integrity and data of the product batch
- Principle 4: Create and maintain relevant compliance data
- Principle 5: Product recall and withdrawal procedures
- Principle 6: Use international traceability data standards

MANGO EXPORT MARKET REQUIREMENTS MANUALS

STANDARD OPERATING PROCEDURE



USA

To import a shipment, an import license is required. Each box or carton must have the following information visible on the outside: Planting Unit Code (PUC), Treatment Facility Code (TFC), Packing House Code (PHC), Packing Date, Lot Number, a label with the words "Treated by irradiation" or "Treated with radiation," and the international radura symbol.

EUROPE

Each carton in the batch must comply with food labeling laws, including identification, variety, origin, commercial specifications, and official control labels. Product traceability is mandatory.

JAPAN

Only one variety of Vietnamese Cat Chu mango is allowed to be imported as fresh into Japan, meeting the standards established by the Minister of Agriculture, Forestry and Fisheries as regulated in phytosanitary inspection certificates for national export.

KOREA

South Korea requires VHT treatment for imported fruits, and checks for residues of pesticides, aflatoxin, and other plant pollutants. This includes testing for fruit types related to pesticide residue. Samples are collected and compliance is confirmed by the National Institute of Food and Drug Safety Evaluation (NIFDS) - MFDS.

AUSTRALIA AND NEW ZEALAND

The requirements for importing mangoes from Vietnam are as follows: No import permit from the Department of Agriculture, Water and the Environment is required; Mangoes must be produced in Vietnam and have a phytosanitary certificate with the content: "The fruit in this consignment has been produced in Viet Nam in accordance with the conditions governing entry of fresh mango fruit to Australia and in accordance with the Work Plan 'Export of Irradiated Fresh Fruit from Viet Nam to Australia.'"; No pests or diseases; Consignments must be packed securely prior to treatment; Packaging must be synthetic or treated if of plant origin.

CHINA

Mango exports to the Chinese market must comply with regulations on plant quarantine, food safety, and traceability, and must have a packaging facility code and planting area code. The product packaging must clearly state basic information such as the product name, origin, quantity, weight, planting area code, packaging facility code (for fruits), destination, etc. in Chinese or English.