

Plant Quarantine Import Requirements of Fresh Mango fruits from Thailand into the Republic of Korea

11 December 2020

1. Areas and plants of application

Fresh fruits of mango (*Mangifera indica* L, Nang klamngwan·Nam Dokmai·Rad·Mahachanok varieties) produced commercially from Thailand.

2. Means of conveyance

The fresh fruits of mango shall be imported by ship-cargo or air-cargo (hand-carry luggage, mail and express cargo are excluded) from Thailand.

3. Export orchards

- 3.1 The orchards that produce fresh mango fruits for export to Korea (hereinafter referred to as "export orchards") shall be registered to and supervised by the National Plant Protection Organization of Thailand (hereinafter referred to as "DOA") each year.
- 3.2 The Export orchards shall be applied with the insecticides for weevils (*Sternochetus* spp.) during fruiting period and the mango fruits for export to Korea shall be cultivated with bagged until harvest period.
- 3.3 DOA shall manage and supervise the export orchards via integrated pest management (IPM) to prevent the occurrence of quarantine pests of Korea listed in [Annex 1].
- 3.4 DOA Inspector should conduct the field inspection of each export orchard during the cultivation period. DOA Inspector can exclude the export orchard from the registered list when the pests listed in [Annex 1] are found to occur severely in the orchards.
- 3.5 DOA shall provide the field inspection results and pest control records upon request by the Animal and Plant Quarantine Agency (hereinafter referred to as "APQA").

4. Export packing houses

- 4.1 The packing houses that treat fresh mango fruits for export to Korea (hereinafter referred to as "export packinghouse") shall be registered to and supervised by DOA each year.
- 4.2 Packing houses where handle with mango fruits for export to Korea shall have the facilities and equipments for fruit washing, disinfection, sorting, vapor heat treatment, cold storage, and inspection.
- 4.3 Appropriate equipments (ex. Insect-proof net, air curtain, rubber curtains, or automatic doors) should be installed at the entrance of the packinghouse and any open spaces such as windows in the packinghouses to prevent recontamination or reinfection of pests in packinghouses.
- 4.4 The DOA should inform APQA the list on the registered orchards and packinghouses (including VHT facility) before the commencement of export season every year.

5. Sorting

5.1 DOA shall check sanitary conditions of export packinghouses (including vapor heat treatment facilities and storages) each year before exportation and shall supervise to ensure that the following is appropriate.

5.1.1 Maintaining cleanliness such as regularly disinfection packinghouses each year;

5.2.2 Ensuring fresh mango fruits for export to Korea are not sorted together, or mixed together or loaded together with non-export orchards or for export to other markets, or any other fruits;

5.2 DOA shall take appropriate measures to ensure that contaminants such as leaves, twigs, or soils are removed from the export consignments during the sorting process.

6. Vapor heat treatment

The fresh fruits of mango for export to Korea shall be treated with vapor heat in accordance with the guidelines in [Annex 2] under the supervision of plant quarantine inspectors of DOA.

7. Packing and Labeling

7.1 The packing carton to be used shall be a new one that has never been used.

7.2 In case, there are any ventilation holes on packing cartons, all holes shall be covered with a net screen with a mesh size of less than 1.6×1.6mm in diameter, or the whole carton or pallet should be rapped or packed with a net screen with a mesh of no more than 1.6mm in diameter during storage or conveyance.

7.3 Name (or registration number) of export orchards and packinghouses, and "For Korea" label shall be marked on each packing carton or pallet for export to Korea. The label size shall be at least 10cm x 3cm for a carton and 15cm X 5cm for a pallet.

8. Export Inspection and Certification

8.1 The DOA inspector should conduct the export inspection on at least 2% of total packed fruit cartons or 600 samples (450 for the consignment of which total quantity is 1,000 or less).

8.2 The DOA inspector shall inspect by cutting at least 50 fruits from the sample in order to verify the infection of internal feeding insects (weevils; *Sternochetus* spp.).

8.3 If any live quarantine pest listed in the [Annex 1] is detected during the inspection, the following measures shall be taken;

8.3.1 In case any live fruit fly is detected, the consignment shall be rejected and the export of fresh mango fruits to Korea shall be suspended until the cause is identified and remedial actions are implemented by DOA.

8.3.2 In case live weevil (*Sternochetus* spp.) is detected, the consignment shall be rejected and the relevant export orchards shall be excluded from the export for the rest season.

8.3.3 In case of detection of other living quarantine pests of [Annex 1], the consignment may be exported only after undergoing adequate disinfection treatment.

8.4 The DOA shall inform APQA of detection of quarantine pests immediately.

9. Sealing and Phytosanitary Certification

9.1 The consignments that pass the export inspection shall be sealed as below under the supervision of DOA inspector.

9.1.1 In case of consignment in a container, the container number, and its sealing number shall be marked in its phytosanitary certificate after they are sealed.

9.1.2 In case of consignment in pallet, each consignment shall be sealed and the “TREATED PQ-DOA-THAILAND”(15cm × 5cm or larger in size) shall be labeled on each box.

9.2 DOA shall issue a phytosanitary certificate for the fresh mango fruits that are not infected by the quarantine pests of Korea listed in [Annex 1] and for the consignment that fully satisfies the requirements agreed by the two countries. The certificate shall have the following additional declaration.

9.2.1 The name (or registration number) of export orchard, and packing house.

9.2.2 In case of container consignment, the container number and seal number.

9.2.3 Information of vapor heat treatment (date, temperature, and duration, etc.)

9.2.4 “The mango fruits in this consignment have been inspected and found to be free of *Sternochetus frigidus*, and *S. olivieri*.”

9.3 Consignments that passed the export inspection shall be stored and transported until their arrival in Korea in order to prevent recontamination by pests and soil.

10. Import Inspection

10.1. Upon the arrival of consignments at the port of Korea, the APQA inspector shall verify the following matters.

If any non-compliance is found, the entire or parts of the consignment shall be destroyed or returned.

10.1.1 The phytosanitary certificate with an appropriate additional declaration.

10.1.2 Labeling and sealing of packing cartons or pallets.

10.1.3 In case of consignment in a container, the container number, seal number, and the intact condition of the seal.

10.1.4 In case of consignment in pallet, the sealing condition of each box, and the label of “TREATED PQ-DOA-THAILAND”.

10.2 If there has no problem with the consignment verification, APQA inspector shall inspect in accordance with the Plant Protection Act of Korea and its relevant regulations.

10.3 If any live quarantine pest listed in the [Annex 1] is detected during the inspection, the following measures shall be taken;

10.3.1 In case any live fruit fly (*Bactrocera* spp.) is detected, the consignment shall be rejected. Also, the import of mango fruits shall be suspended until the cause is identified and remedial actions are implemented by DOA.

10.3.2 In case live weevil (*Sternochetus* spp.) is detected, the consignment shall be rejected and the relevant export orchards shall be excluded from the export for the rest season.

10.3.3 In case of detection of other live quarantine pests of [Annex 1], the consignment shall be treated, destroyed, or returned according to the related regulation of Korea.

11. On-site survey

11.1 APQA inspector will conduct an on-site survey every year during the export season to verify whether export orchards and packing houses of fresh mango fruits from Thailand have conducted the whole process from sorting, packing, VHT treatment, export inspection, and certification in a way to meet all the related requirements.

11.2 All costs pertaining to the on-site survey by APQA inspector shall be paid by the Thailand side in accordance with the related requirements of Korea.

11.3 DOA shall send APQA an official letter requesting for on-site survey 30 days before the APQA inspector's departure.

11.4 The invitation letter shall include the following information pertaining to export.

- The number of plant quarantine inspectors from Korea and required inspection period;
- The estimated volume of export

11.5 DOA shall provide convenience for APQA inspectors dispatched to Thailand for the on-site survey.

12. Others

In case where any new pest that has not been assessed by APQA is intercepted or where the quarantine pest listed in the attached Annex 1 is frequently detected, providing APQA legitimate reasoning to believe that it is highly likely for those pest to be introduced into Korea, APQA may conduct a pest risk assessment to determine whether to resume pre-clearance inspection or to take any other phytosanitary measures.

[Annex 1]

Quarantine Pests for Mango fruits from Thailand (38 Species)

Pathogen (5 Species)

Pestalotiopsis mangiferae
Capnodium mangiferae
Dothiorella dominicana
Neofusicoccum mangiferae
Phomopsis mangiferae

Pests (33 Species)

<p><i>Bactrocera correcta</i>*</p> <p><i>B. cucurbitae</i>(=<i>Zeugodacus cucurbitae</i>)*</p> <p><i>B. dorsalis</i>(=<i>B. papayae</i>)*</p> <p><i>B. latifrons</i>*</p> <p><i>B. tau</i>*</p> <p><i>B. tuberculata</i>*</p> <p><i>B. umbrosa</i>*</p> <p><i>B. zonata</i>*</p> <p><i>B. carambolae</i>*</p> <p><i>Batocera rubus</i></p> <p><i>B. rufomaculata</i></p> <p><i>Chionaspis vitis</i></p> <p><i>Chlumetia transversa</i></p> <p><i>Eriophyes mangiferae</i></p> <p><i>Oligonychus biharensis</i></p> <p><i>O. mangiferus</i></p> <p><i>Amrasca splendens</i></p>	<p><i>Apsylla cistellata</i></p> <p><i>Hypomeces squamosus</i></p> <p><i>Idioscopus atkinsoni</i></p> <p><i>I. clypealis</i></p> <p><i>I. niveosparsus</i></p> <p><i>Noorda albizonalis</i></p> <p><i>Oecophylla smaragdina</i></p> <p><i>Phenacoccus iceryoides</i></p> <p><i>P. mangiferae</i></p> <p><i>Platytrachelus paviei</i></p> <p><i>Pseudococcus longispinus</i></p> <p><i>Sternochetus olivieri</i>**</p> <p><i>Sternochetus frigidus</i>**</p> <p><i>Aulacaspis tubercularis</i></p> <p><i>Dysmicoccus neobrevipes</i></p> <p><i>Rastrococcus spinosus</i></p>
---	---

* Prohibited pests requiring vapor heat treatment.

** Requiring additional declaration about pest-free status in a phytosanitary certificate after a target inspection by cutting.

※ Any pest that is not prescribed above is intercepted in the quarantine process, the matters shall be coped with in accordance with Plant Protection Act of Korea.

[Annex 2]

Guidelines for Vapor Heat Treatment (VHT)

I . Vapor Heat Treatment Conditions

- The fruit shall be treated for the duration of at least 20 minutes after the fruit core temperature reaches 47°C. During the treatment, the relative humidity level of VHT chamber shall be kept at 90% or higher.
- Pest subject to vapor heat treatment : *Bactrocera correcta*, *B. cucurbitae*(=*Zeugodacus cucurbitae*), *B. dorsalis*(=*B. papayae*), *B. latifrons* , *B. tau*, *B. tuberculata*, *B. umbrosa*, *B. zonata*, *B. carambolae*

II . Facility Requirements and Inspection Standards

1. Inspection of VHT Facility and Equipment

- All the entrance doors and windows of packinghouses with VHT facilities shall be equipped with an appropriate insect-screening facility.
- The area where treated fruits are packed shall be sealed from the outside to prevent pest re-contamination.
- VHT facility and equipment shall be inspected in accordance with the manufacturer's manual on a regular basis. Other parts that may affect the VHT effect shall be inspected as well.
- More than 3 core temperature sensors, at least 2 space temperature sensors, and at least 1 humidity sensor shall be installed per VHT chamber.
- The number of temperature sensors installed in VHT chamber can be added in accordance with facility size.
- The temperature and humidity level of VHT chamber and fruit core temperature shall be possible to be checked from outside, and the record of treatment shall be saved and be possible to be printed out if necessary.
- VHT chamber shall be conducted a 'test run' before the commencement of each export season to check whether equipment operates accurately.

2. Sensor Calibration

- All sensors shall be calibrated before the commencement of every export season and every month by using a standard thermometer to check on the measurement error of a standard water tank set at 47°C.
- The gradation of the standard thermometer shall be 0.1°C and shall be approved by National Testing Agency.
- After the water temperature of standard water tank is stabilized at 47°C, the value resulted from three measurements at intervals of 5 minutes shall be used for calibration.
- All sensors whose error range of measured value is within $\pm 0.3^\circ\text{C}$, and the one that is out of the range shall be calibrated (zero adjustment) or replaced.
- The result of the calibrating the sensors shall be recorded.

3. Cold Spot Test

- The test shall be conducted at the beginning of every export season and the additional test may be carried out whenever deemed necessary.
- Load the fruits to the maximum capacity inside the chamber, based on commercial export volume.
- The fruits for cold spot test shall be hard and their weight must be within the same range. The temperature sensor shall be inserted in the largest and heaviest fruit.

- To identify the coldest spot, the fruit core temperature sensor shall be installed in the cartons located opposite from the heat outlet(vent).
- ex) In case hot air moves from below to above, the sensor shall be installed in the carton located in the top.
 - The location of temperature sensor can be adjusted depending on the location of heat outlet
- The VH treatment for the cold spot test shall be carried out in the same condition for the actual commercial export of mango.
 - The fruits for test treated could be exported after the test.
- The core temperature sensor shall be installed at the cold spot which reached the latest temperature of 47°C according to the cold spot test results.
- If the gap of each temperature sensor to reach the target temperature (47°C) is more than 2 hours, the chamber shall be calibrated.
 - Cold spot test of the chamber shall be re-conducted after the chamber calibration
- The result of the cold spot test shall be recorded.

III. Detail Procedures of VHT

1. Installation of thermometer and hygrometer

- The core temperature sensor shall be inserted in more than 3 fruits per VHT chamber (in case of small size fruits such as litchi, the sensor shall be inserted by connecting several fruits)
- At least more than 1 temperature sensor shall be installed at the cold spot identified through the cold spot test.

2. Vapor Heat Treatment

- The fruit shall be treated for the duration of at least 20 minutes after the fruit core temperature reaches 47°C. During the treatment, the relative humidity level of VHT chamber shall be kept at 90% or higher.
- After VHT, water or air cooling could be carried out. (optional)

3. Re-infection Preventive Measure after VHT

- The treated fruits shall be separated from other fresh fruits that were not treated.
- In the packing process, only the VHT treated fruits shall be packed together and shall be stored in a way to prevent re-infection by pests.
- The packed fruits shall be loaded and transported in a clean container and vehicle confirmed to be free from pest contamination.

IV. Standards for treatment Rejection

- In case that the fruit core temperature fails to be kept at 47°C or higher for the duration of 20 minutes and the relative humidity level of VHT chamber fails to be kept at 90% or higher.
- In case any live pest which was subject to treatment is detected after VHT;
- In case temperature sensors were not installed according to the condition of III.1
- In case the factor is founded that degraded the result of the VH treatment.

V. VHT Report Writing and Confirmation.

- Packing houses equipped with VHT facility shall record and keep the VHT report per case (see Attachment).
- The items and template of the VHT report may be modified in part in accordance with the characteristics of the system.

[Attachment]

VAPOR HEAT TREATMENT REPORT

Issue No. :

General Information of Treatment

Factory Name	:
Chamber No.	:
Date of Treatment	:
Commodity Name	:
Destination	:
No. of pallets	:
No. of crates	:
Total Volume(kg)	:

Operating Information

VHT Start Time	:
Holding Time Start	:
Holding Time End	:
Treatment Duration	:
Relative humidity maintenance	: Yes / No
Remarks	:

Name of Confirmed by :

Date : (Signature) :