

## Plant Quarantine Import Requirements of Fresh Fruits of Mango from Vietnam

### 1. Items subject to the requirements

Fresh fruits of mango (*Mangifera indica* L.) commercially produced in Vietnam

### 2. Means of conveyance

Air cargo or ship cargo (except for hand luggage or parcel post)

### 3. Registration of export orchards and packinghouses (including Vapor Heat Treatment(VHT) facilities)

A. Orchards producing fresh mango fruits for export to Korea (hereinafter referred to as "export orchards") and packinghouses (hereinafter referred to as "export packinghouses") shall be located in the delta area of Mekong River and shall be registered with and be supervised by the NPPO of Vietnam (hereinafter referred to as "PPD") each year.

B. Export orchards shall be sanitized based on GAP(Good Agricultural Practices) and be managed and be supervised to ensure that low pest incursion status is maintained through monitoring and control against Korea's quarantine pests (Annex 2) including *Cytosphaera mangiferae*, *Xanthomonas campestris* pv. *mangiferaeindidae*, *Sternochetus frigidus*.

C. Export orchards shall be applied with chemicals more than once during fruiting period and fresh fruits of mango for export shall be bagged after chemical spray until harvest.

D. Packinghouses shall undergo, on a regular basis, be disinfected and inspected by PPD in order to prevent entry of pest and recontamination.

E. PPD must inform the Animal and Plant Quarantine Agency of Korea(hereinafter referred to as "QIA") of the list of registered orchards and packinghouses including vapor heat treatment facilities before commencement of mango exportation.

### 4. Sorting and packing

A. The fresh mango fruits for export to Korea shall be sorted and packed only in packinghouses registered with PPD.

B. When sorting fresh mango fruits for export to Korea, it must be ensured that fresh fruits of mango produced from unregistered orchards or fresh fruits of other kinds are not sorted together.

C. PPD shall oversee, when sorting fresh mango fruits, to ensure that Korea's quarantine pests (Annex 1) are not contaminated and that any contaminants such as infected fruits with other, pests, soil and plant debris are removed.

D. The sorting process of mango fruit for export must include brushing, washing with water and dipping in 200ppm solution of sodium hypochlorite at 52°C for 2 to 3 minutes.

### 5. Vapor Heat Treatment(VHT)

A. The fresh fruits of mango for export to Korea shall be vapor-heat-treated using saturated vapor

by raising the fruit core temperature up to 47°C or higher for 20 minutes (relative humidity over 90%).

B. The vapor heat treatment facilities shall be registered with PPD and PPD shall oversee and carry out regular inspection.

C. The vapor heat treatment shall be conducted on each consignment in registered facility in the supervision of plant quarantine inspectors of Korea and Vietnam.

D. Other details of vapor heat treatment shall comply with the 「Guidelines for Vapor Heat Treatment」 in Annex 1.

### 6. Export inspection and certification

A. The export inspection shall be carried out jointly by the Korean and Vietnamese plant quarantine inspectors, on over 2% sample of the entire carton.

B. The consignment shall be certified as free of pests through target inspection of *Cytosphaera mangiferae*, *Xanthomonas campestris* pv. *mangiferaeindidae*, *Sternochetus frigidus*, in particular and pests that attack inside of fruits.

C. In case a live fruit fly is detected as a result of the export inspection, the consignment shall be rejected and the export inspection shall be suspended until the cause is identified and remedial actions are taken. In case *Cytosphaera mangiferae*, *Xanthomonas campestris* pv. *mangiferaeindidae*, and *Sternochetus frigidus* are intercepted during the export inspection, the orchard that produced the infested cargo shall be suspended from export to Korea for that season and PPD shall inform such fact to Korea. Nevertheless, in case other live quarantine pests are found, the consignment can be exported after applying treatment.

D. For consignments that passed the export inspection, PPD shall issue a phytosanitary certificate which includes additional declaration including information as specified below:

(1) "This consignment complies with import requirements agreed between QIA and PPD, and is believed to be free from *Cytosphaera mangiferae*, *Xanthomonas campestris* pv. *mangiferaeindidae*, *Sternochetus frigidus*;

(2) The name (or the registration number) of a registered orchard and packinghouse; and the name of a vapor heat treatment facility, treatment date, temperature and duration, on the treatment section of the phytosanitary certificate;

(3) Date of inspection and signature of a Korean plant quarantine inspector

(4) In case of ship cargo, PPD shall seal the container and indicate the seal number.

E. Consignments that passed the export inspection shall be managed separately from those that were rejected or that were not inspected in order to prevent cross contamination of pests.

F. Consignments that passed the export inspection shall be stored and managed until their arrival in Korea in order to prevent recontamination by contaminants such as pests and soil.

### 7. Packing and labeling

A. Packinghouses for the fresh fruits of mango, which were vapor heat treated, shall be equipped with insect-proof facilities and be regularly undergone disinfection.

B. Each packing cartons of the fresh fruits of mango that have been passed by a export inspection shall be sealed, using the methods (including sticky tape, sticker or label) approved by PPD.

C. The label “For Korea” and “the names (or registration numbers) of orchards and packinghouses” shall be marked outside the export packing cartons or pallets of palletized cargo.

D. In case, there are any ventilation holes on packing cartons, all holes shall be covered with net screen with a mesh size of less than 1.6x1.6 mm 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 in order to prevent pest re-infestation during storage or conveyance.

#### 8. Import inspection

A. Upon arrival of consignments, plant quarantine officers shall check the seal and label of the packing. In case there are any problems with sealing and packing under Article 7B and 7D in the above or in case there are consignments in which the additional declaration or label under Article 7C and Article 6D is missing, the entire or parts of the consignment shall be destroyed or returned.

B. In case no problems are found as a result of checking under Section A of the above, import inspection in accordance with Korea’s Plant Protection Act and relevant regulations shall be carried out.

(1) In case a live fruit fly is found during the import inspection, the consignment shall be destroyed or returned, and the import inspection shall be suspended until the cause is identified and remedial actions are taken. In case *Cytosphaera mangiferae*, *Xanthomonas campestris* pv. *mangiferaeindidae*, *Sternochetus frigidus* are intercepted, the consignment shall be destroyed or returned and the import of fresh mango fruits from the relevant export orchard will not be permitted for that season.

(2) In case any live quarantine pest is detected during the import inspection, the consignment shall be treated and if no treatment is available, the consignment shall be destroyed or returned.

#### 9. Pre-clearance inspection

A. The PPD shall send QIA a letter requesting for pre-clearance inspection by Koran plant inspectors, 30 days before commencement of vapor heat treatment.

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

- (1) The required number of plant quarantine inspectors of Korea and inspection period;
- (2) Estimated volume of export; and
- (3) Vapor heat treatment sites

C. QIA’s plant quarantine inspector shall check the process of vapor heat treatment and perform joint export inspection in collaboration with PPD’s plant quarantine inspectors, and if necessary, check sanitary conditions of export orchards and export packinghouses.

D. On-site pre-clearance inspection shall be carried out for the first 3 years after market access has been permitted, and the results of the pre-clearance inspection shall be reviewed after 3 years to determine whether to continue the pre-clearance program.

E. QIA’s plant quarantine inspectors shall indicate the date of export inspection and sign on the back of the phytosanitary certificate.

F. All costs pertaining to pre-clearance inspection by QIA’s plant quarantine inspectors shall be borne by the Vietnamese side in accordance with the 「Guidelines for Overseas Travel Costs of QIA」 .

#### 10. Others

In case any pest which has not been assessed is intercepted or a quarantine pest of Korea is continuously intercepted, pest risk assessment shall be conducted and necessary measures can be determined based on the results of the assessment.



## ANNEXE 1: Guidelines for Vapor Heat Treatment

### 1. Procedure and process of VHT

- A. The temperature of the vapor heat treatment chamber shall be maintained at 48°C or higher during the treatment.
- B. After the fruit core temperature reaches 47°C, the treatment shall be held for more than 20 minutes and the relative humidity in the chamber shall be maintained at 90% during the treatment.
- C. The overall VHT time shall exceed at least 3 hours 30 minutes.
- D. After the vapor heat treatment, the fruits shall be allowed to hydro cool for 30 minutes and be subject to air cooling for 20 minutes. Before packing, the fruits shall be stored in a sanitized room at 19°C for 2 hours.

### 2. Standards for checking VHT facilities

- A. Through the visual and physical inspection of all facilities, inspectors shall check whether the facilities meet the requirements to prevent re-infection of fruits as well as other aspects that may affect the result of the treatment.
- B. The VHT chamber, circulation fan and heaters shall be cleaned and inspected every week.
- C. The temperature and humidity sensors shall be checked and calibrated every month.

### 3. Standards for sensor calibration test

- A. All sensors shall be calibrated before use and every month by dipping them in a standard water bath where a standard thermometer and hygrometer are installed.
- B. The allowed correction factor of  $\pm 0.3^{\circ}\text{C}$  shall be applied to all sensors.
- C. The result of the temperature measurement shall be printed out more than 3 times every 5 minutes.

### 4. Standards for VHT chamber test

- A. The VHT chamber test must be conducted at the commencement of each season and additional test may be carried out if necessary.
- B. Load empty crates to the maximum capacity inside the chamber.
- C. Place the permanent sensor at the center of each crate placed close to the vapor heat outlet.
- D. The chamber shall be heated until the temperature reaches 47°C or higher and shall be stabilized.
- E. Monitor the temperature of all sensors and check whether they conform to the fluctuation tolerance of  $\pm 0.3^{\circ}\text{C}$ . (Calculate the difference between the highest and the lowest temperature/2 =  $\pm 0.3^{\circ}\text{C}$ .)
- F. The temperature measurement shall be printed every 5 minutes.

### 5. Cold spot test

- A. The test shall be conducted at the beginning of every export season or whenever deemed necessary.

- B. Load the fruits to the maximum capacity inside the chamber, based on commercial export volume.
- C. Pick the largest and heaviest fruit for the temperature test and put it in each pallet.
- D. The test fruit shall be green and hard, and their weight must be within the same range.
- E. Place the temperature sensor in the crate located at the top, middle and bottom of each pallet.
- F. Apply the VH treatment in the same manner as it is done in the actual fruit export. (The test treated volume may be exported after the test.)
- G. The spot which reached the temperature of 46.5°C the latest shall be determined as the cold spot.
- H. According to the test results, the location of permanent sensors shall be determined.

### 6. Installation of thermometer and hygrometer

- A. In order to check from outside, the temperature and humidity inside the VHT chamber and temperature of the core of fresh fruits located at the top, middle and bottom of the loaded fruits (including the cold spot), automatic temperature and humidity recording equipment shall be installed (if necessary, the record shall be printed.)
- B. Install the temperature sensors into the cores of fresh fruits at more than 3 locations and at more than 2 locations of each VHT chamber. (At least more than 1 temperature sensor shall be installed at the cold spot identified through the cold spot test.)
- C. Insert the temperature sensor to ensure that fruit core temperatures can be recorded. (If necessary, connect several fruits together.)

### 7. Prevention of fruit re-infection after VHT

- A. All doors and openings to the chamber, packing houses and storage facilities shall be installed with proper insect-proof equipments.
- B. After VHT, the fruits shall be placed in crates, plastic pallets or on tables while relevant containers shall be washed everyday and the table shall be disinfected before packing.
- C. Fruits that are VHT applied shall be separated from other fresh fruits, and fruits that have not been VHT applied shall not come into contact with fruits that are VHT applied.
- C. All persons working on packing shall wash their hands and dry them before packing.
- E. Fruits that are VHT applied shall be packed in a sanitized room. (They shall not be packed in the same space with fruits that are not VHT applied.)
- F. Fruits that are packed shall be covered with an insect proof net.
- G. Fruits that are treated shall be loaded into a clean container or truck for transportation.

### 8. Standards for treatment rejection

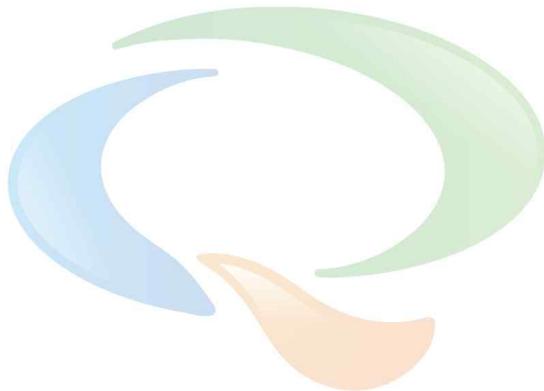
- A. In case the fruit core temperature is not raised to 47°C or higher and does not last for 20 minutes during the treatment;
- B. In case any live fruit fly is detected after VHT
- C. In case damaged fruits such as over-ripen fruits are found more than 30%, the lot shall be rejected and the VHT process should be checked.

D. In case damaged fruits such as over-ripen fruits are found less than 30%, only the damaged fruits shall be rejected and the rest will be approved.

E. In case a small sized fruit is used as a test sample among fruits mixed with different sizes

F. In case the temperature sensor is not inserted into the testing sample

G. In case there are factors that affect the result of the treatment



## ANNEXE 2: Quarantine pests of fresh mango fruit from Vietnam

### □ Pathogens

*Cytosphaera mangiferae*

*Ceratocystis paradoxa*

*Oidium mangiferae*

*Pestalotiopsis mangiferae*

*Capnodium mangiferae*

*Elsinoe mangiferae*

*Macrophoma mangiferae*

*Xanthomonas campestris* pv. *mangiferaeindicae*

### □ Pests

*Bactrocera carambolae*

*B. correcta*

*B. cucurbitae*

*B. dorsalis*

*B. dorsalis* species complex

*B. tau*

*B. zonata*

*Sternonchus frigidus*

*Coccus viridis*

*Aonidiella aurantii*

*Aspidiotus nerii*

*Aulacaspis tubercularis*

*Lepidosaphes beckii*

*Pseudaonidia trilobitiformis*

*Brevepalpus phoenicis*

