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Vapour Heat Treatment Against Tephritid Fruit Flies: Approval of Egyptian Facility by Jordanian Phytosanitary Authority

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Vapour Heat Treatment

In VHT, the pulp temperature of the commodity is raised by the saturated water vapor to 46-48 °C during a ramp up time of 4 hours and then the fruits will be held at the required temperature for a period of 30 minutes.

During the process, the temperature and humidity are meticulously controlled so that the fruit is not damaged and freshness is naturally preserved.



Vapor Heat Treatment (VHT)

- A safe method for treatment of infested fruits
- The process complies with phytosanitary international standards.



Ministry of Agriculture in Jordan approved three facilities for **VHT** of **mango and guava** fruits in **Egypt and Yemen** to:

- ✓ Facilitate access of these fruits to Jordanian market.
- ✓ To open new resources of fruits.
- ✓ To ensure getting free fruit flies fruits.



Facility parts



Heating chamber



Boiler



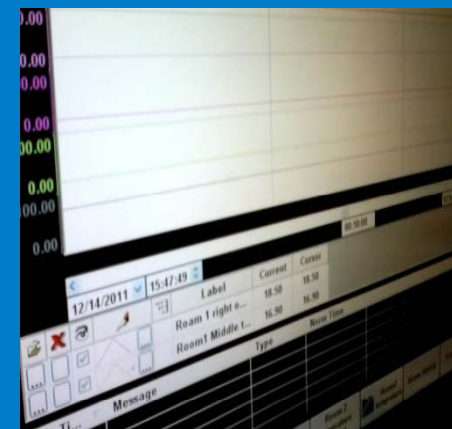
Diesel tank



Water source



Control panel



Computer -
Temperature records

Facility parts – cont.



Thermometers and
Hygrometers Sensors



Thermometer probes must be allocated as follows:

- In the centre of a largest fruit at different heights in the front, middle and rear of the chamber.**
- One probe for measuring the ambient temperature in heating chamber**

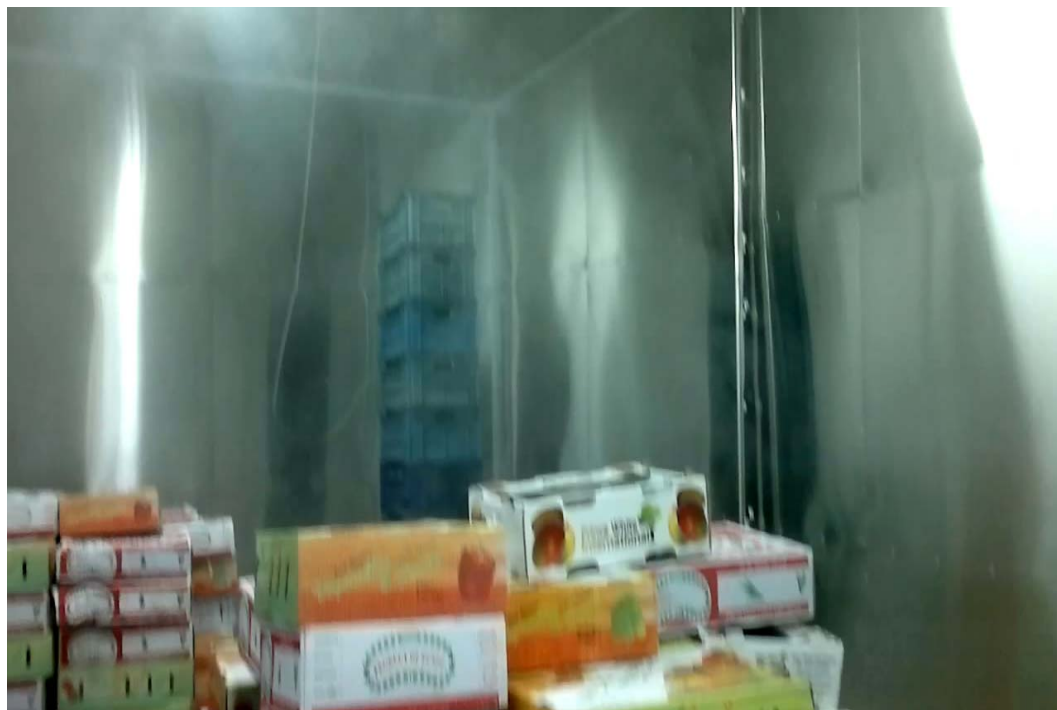


Location, Construction & Design of Facility

- The location, construction and design of the facility should be as per the **safety norms and standards**
- The treatment facilities should be located **in a secure area to prevent re-infestation of treated fruits.**
- The facility may be integrated with **package house** for easy of operations.
- **Insect-proof screening** of all openings to external area to prevent fruit fly entry

Fruits Infestation with *Bactrocera zonata*





Vapour Heat Treatment Process





Notes on the VHT Experiment

- Vapor pumping process took five hours and sixty three minutes until the lowest sensor temperature reached the desired degree (46 °C) and continued to maintain this temperature for half an hour.
- Inspection of infested fruits under the dissecting microscope indicated the death of eggs and all larval instars.
- The treated fruits were incubated for 3 weeks after the treatment.
- **Carton boxes couldn't tolerate the humid air during the sterilization process.**
- **Cracking of some mango fruits** (Green and firm fruits).
- Guava fruits **were not affected** by the treatment.



Jordanian Conditions



The process of VHT of fruits should be performed in plastic boxes to allow the passage of steam and withstand the process at a temperature (46-48) ° C for 30 minutes. Carton boxes are not suitable for VHT.

Plastic container should have **slots** (openings from all sides) in order to facilitate the entry of steam.



Pieces of paper have to be put under the fruits during the sterilization process. The paper should be thin, dry, new and without odor

The plastic boxes in the treatment room have to have distance not less than 10 cm between rows.



- The maximum high of the plastic boxes **should not exceed two meters.**

- The Jordanian phytosanitary authorities should be provided with the **names and signatures** of people authorized to sign phytosanitary certificate.

The consignments have to be transferred from the facility to the custom **directly by a sealed car** (by lead) by the authorized officer of Plant Protection at appropriate temperatures which will not affect the market value of fruits.

- The **sensors have to be calibrated annually** by the competent authority.
- The facility has to **be reassessed annually by a technical Jordanian committee.**

The Accompanied Documents

The consignment has to be accompanied by:

- ✓ **Original phytosanitary certificate** identifies the facility name.
- ✓ Additional declaration states that "that the mango or guava fruits are not infested with *Bactrocera* species and the consignment is treated with vapor heat treatment at 46-48 °C for 30 minutes"
- ✓ **Sterilization certificate** contains data in terms of weight and number of packages that have been treated by wet steam at a temperature (46-48 for 30 minutes). Signed by facility company
- ✓ **Temperature records.** Signed by facility company

All documents should be signed and sealed by the officer of the National Plant Protection Organizations.



Packing Requirement

Treated fruits are to be packed in **new carton boxes** with **mesh covering the ventilation** holes to prevent re-infestation by fruit flies and other quarantine pests. 2-5 boxes are to be linked with each other with plastic stickers. Treated commodities and their packaging must be



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Post Arrival Quarantine Inspection

At arrival, the concerned officer at the airport will carry out **visual inspection of 5%** or more of the total consignment to determine the absence of quarantine pests or diseases, especially fruit flies, then he will draw **a representative sample** from the consignment for phytosanitary laboratories inspection. **No release of the consignment until the issuance of the result.**



General Recommendation for Facilities Approval

- **VHT machines should be controlled precisely in order to prevent loss of water from treated commodity as well as to achieve sufficient mortality of fruit flies.**
- **Over mature or immature fruits are not desirable for VHT.**
- **After completion of the treatment, a check should be made of all recorded to ensure the treatment temperature, time and humidity.**
- **Adequate safeguards must be maintained to prevent re-infestation or contamination of the treated commodities or their containers.**
- **Treated fruit is discharged directly into insect proof and secure packing room away from untreated fruits.**



General Recommendation for Facilities Approval

- **The certified VHT facilities shall be officially verified at least once during the beginning of fruiting season each year to ensure proper functioning of essential equipments.**
- • **Thermometers, hygrometer and pressure equipment should be calibrated annually.**



- ✓ Commercial shipments started in 2009 then it stopped
- In 2012, *B. zonata* was intercepted in guava shipments and the importation was stopped.

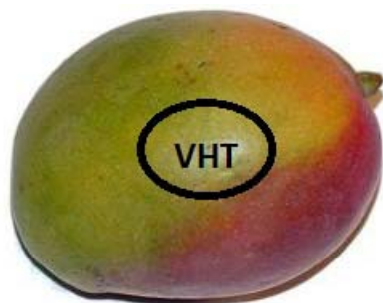


Conclusion

VHT + Honesty = Clean fruits



Thank you



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