INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES
UNIVERSITY OF FLORIDA

FLORIDA COOPERATIVE EXTENSION SERVICE

PACKINGHOUSE NEWSLETTER

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Packinghouse Newsletter No. 158
April 28, 1989

Key Index Words: Chilling Injury, Cold Treatment, Conditioning, Sweating, Quarantine

COLD TREATMENT: A SUCCESSFUL QUARANTINE METHOD FOR FLORIDA GRAPEFRUIT SHIPPED TO JAPAN

Cold treatment of Florida grapefruit shipped to Japan is the primary procedure used to ensure quarantine security against transfer of the Caribbean fruitfly (Anastrepha suspensa loew). In 1987-88 season, more than 6 million cartons were shipped to Japan under the standard and shortened schedule cold treatment. Short schedule cold treatment requires fruit holding for 10 days at 33°F, 12 days at 34°F, 14 days at 35°F, or 17 days at 36°F. Standard cold treatment requires holding for 14 days at 33.0°F, 16 days at 33.5°F, 17 days at 34.0°F, 19 days at 34.5°F, 20 days at 35.0°F, 22 days at 35.5°F, or 24 days at 36.0°F. Application of either the short or standard cold treatment is regulated by Caribfly density in areas where grapefruit were grown.

Grapefruit is known to be susceptible to chilling injury when exposed to temperatures below 50°F for extended periods. Chilling injury usually appears as pitting and scald (bronze discoloration) and may lead to increased decay. Storage of grapefruit at 60°F for 7 days has been demonstrated to be effective in reducing chilling injury.

In order to ensure proper application and successful completion of cold treatment, tests are conducted on commercially packed Florida grapefruit under conditions of standard cold treatment, throughout the shipping season. Test results, along with pertinent recommendations, are reported to the exporters, warehouse operators and shipping companies.

Three cold treatment tests were conducted between October 1988 and March 1989. Conditioned and non conditioned samples of grapefruit were held at 34°F for 19 days. They were transferred 50° or 60°F and examined for pitting, scald, aging, and decay.

Conditioning grapefruit by holding for 7 days prior to cold treatment at 60°F pulp temperature reduced the incidence of chilling injury. Fruit held at 34°F for 19 days without conditioning had more pitting, scald and decay.

Results of these tests confirmed the importance of proper conditioning of grapefruit prior to cold treatment to Japan. In order to enhance the chances of successful completion of cold treatment, it is important to adhere to the following recommendations:

1. Use fruit from groves certified for the short schedule cold treatment. This allows conditioning to be carried out on board ship and shortens cold treatment by 4-7 days.

2. Use good quality fruit from irrigated and well maintained groves, especially in late season.

3. Minimize mechanical injury to fruit during harvesting, hauling and packing.

4. Avoid shipping fruit requiring more than 48 hours degreening and maintain 90 - 96% relative humidity in degreening rooms.

5. Ensure proper washing and fungicide and wax application. Check applicator nozzles several times daily. Avoid fruit pile-up on the packingline.

6. Ensure proper conditioning of fruit prior to cold treatment. A full 7 days holding at 60°F pulp temperature is important. Allow adequate time for conditioning in the warehouse prior to loading and standard cold treatment.

7. Avoid mixing fruit of different pulp temperatures in the same hold during ship-board conditioning.

8. Instruct your fruit buyer or receiver in Japan to provide warming of fruit to 50°F by placing pallets 8-12 inches (20-30cm) apart at 54°F (12°C).

9. If fruit must be fumigated in Japan with hydrogen cyanide, do not allow treatment until pulp temperature reaches at least 50°F (10°C) and when fruit is dry.

10. Avoid unnecessary delays in sending fruit to market.

Dr. Mohamed Ismail
Florida Department of Citrus

REMEMBER CITRUS PACKINGHOUSE DAY, THURSDAY SEPTEMBER 7, 1989 AT LAKE ALFRED.

CONDENSATION ("SWEATING") ON FRUIT LEAVING COLD STORAGE

Canada's excellent bulletin on storage of fruits and vegetables (see Available Publications) does not have anything on storing citrus. It does, however, have some excellent general advice. A good example is this item on "Sweating" which should be of interest to all those loading fruit out of a cooler of any kind. In particular, Charlie Eaves's nomograph showing how to determine the conditions at which sweating is likely to occur is the only such aid I have ever encountered.

Sweating

Cold produce exposed to a warm atmosphere usually become moist or even wet, which is referred to as sweating and is caused when the warm air loses moisture as it is cooled on contact with the produce. Figure 1 shows how the occurrence of condensation at a given temperature is related to the humidity and temperature of the atmosphere.

One way to avoid sweating when produce is removed from storage is to warm it gradually to a temperature at or above the dew point of the atmosphere to which it will be transferred. When condensation cannot be avoided, produce subject to decay should be marketed promptly after removal from cold storage.

Sweating may also occur in storages where relative humidity is maintained near saturation (90-100% RH). This phenomenon will result from fluctuations in storage air temperatures, which occur after a defrost cycle. Evaporator coil temperature should be reduced at least to product temperature before the circulation fans are engaged, which prevents surface water from forming on the produce and retards fungal infections. One further caution: very high humidity, over 96% can result in carton deterioration.

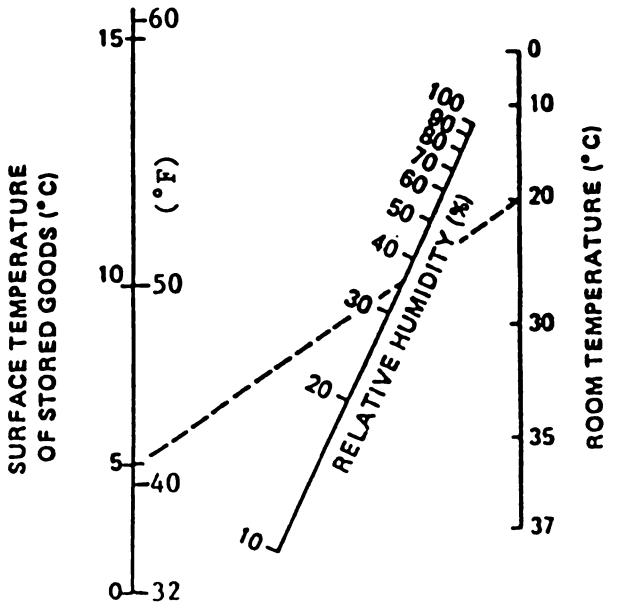

Figure 1. Relationship of room temperature, relative humidity, and surface temperature of the object to occurrence of condensation or sweating. In the illustration, room temperature is 20°C and relative humidity is 37%. An extension of a line through these points intersects the surface temperature scale at 5°C. Produce at this temperature or lower would be subject to sweating. (This material was provided by C. A. Eaves, Research Station, Kentville, N.S.)

Bill Grierson, Professor Emeritus
CREC, Lake Alfred

DR. AL KREZDORN

A sad note is that Dr. Al Krezdorn passed away on March 23, 1989. Al was a superb citrus research scientist, teacher and administrator. He was my first boss in Florida 20 years ago and was always a friend. Al was always in demand as an international citrus consultant. Dr. Al Krezdorn will be missed.

An endowment fund is being established at the University of Florida in Dr. Krezdorn's memory. This fund will be used to provide applied research grants and to assist graduate students. These are two areas that were very important to Al Krezdorn. If you would like to be a part of the effort please make your gift to UF Foundation - SHARE and note that the gift is for the Krezdorn Fund. Gifts should be sent to Dr. Larry Jackson, Fruit Crops Department, 1137 Fifield Hall, Gainesville, Florida 32611 USA.

Will Wardowski
Extension Service
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AVAILABLE PUBLICATIONS

Available from Dr. W. Wardowski, CREC, 700 Experiment Station Road, Lake Alfred, FL 33850

Pallet Boxes for Florida Citrus, by W. F. Wardowski and W. Grierson. IFAS Extension Service Circular 443. January 1989.

Recommendations for Degreening Florida Fresh Citrus Fruits, by W. F. Wardowski. IFAS Extension Service Circular 389. January 1989.

Treatment of Florida Grapefruit Shipped to Japan in Refrigerated Van Containers: Problems and Recommendations, by M. A. Ismail, T. T. Hatton, W. R. Miller and D. J. Dezman. Proc. Fla. State Hort. Soc. 99:117-121. 1986.

Effect of Temperature and Relative Humidity on the Egg and Larval Stages of Some Citrus Root Weevils, by C. A. Tarrant and C. W. McCoy. The Florida Entomologist. 72(1):117-123. March 1989.

Available from Communications Branch, Agriculture Canada, Ottawa K1A OC7, Canada

Commercial Storage of Fruits and Vegetables, by P. D. Lidster, P. D. Hildebrand, L. S. Berard, and S. W. Porritt. Canada Publication 1532/E. 1974. Revised 1988.

Available from S. R. Harris, Project Coordinator, FAO/UN, P. O. Box 631-C, Bridgetown, Barbados

Packaging for Fruits, Vegetables and Root Crops, by C. M. Schuur. AG:PFL/RLA/001/PFL Field Document. 1988. 22 pp. plus 34 pp. instruction sheets and annexes.