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PACKINGHOUSE NEWSLETTER

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HARVESTING, PACKING, AND SHIPPING QUALITY ORANGES TO OVERSEAS MARKETS

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Florida oranges are well known for their excellent internal qualities. Because of Florida's hot and wet summers, and warm winters, citrus fruit reach higher total soluble solids (sugars) and lower acid levels (and therefore higher Brix/acid ratio) *sooner* than the same varieties grown in Mediterranean or desert-type climates. These same climatic conditions which favor the development of good internal qualities will also delay the development of attractive peel color and make fruit subject to attack by numerous pests and disease causing organisms. Oranges grown in humid climates are also more subject to peel injury, particularly stem-end rind breakdown which usually appears as brown discoloration and collapse of the rind near the stem end of the fruit.

In order for the Florida citrus industry to compete effectively in the world-wide citrus market, Florida growers, packers and shippers must place greater emphasis on those preharvest cultural practices and postharvest handling methods which will improve external fruit appearance and help extend its shelf life. New opportunities are becoming available for increased export of Florida oranges to Japan, Korea and other Pacific Rim countries, as trade liberalization agreements go into effect. It is extremely important for future growth that only the highest quality fruit reach the consumer.

The following is a listing of some of the factors that are important to the preservation of quality of oranges shipped to overseas markets:

Grove Selection

Select well irrigated and maintained groves as source of export fruit.

Fruit in selected groves should be medium to large in size, with well developed color and few scars and blemishes. Large fruit are less vulnerable to stem-end rind breakdown, but more likely to develop internal drying.

Harvesting and Handling

Avoid picking after heavy rains or on wet foggy mornings to reduce the incidence of oleocellosis. Select the best among your harvesting crews to pick export fruit. Give them good monetary incentives to do a good job. Instruct them not to pick fruit off the ground. Pickers must use picking bags and gently dump fruit into clean, disinfected pallet boxes. Long stems and other trash should be excluded in the field and not removed in the packinghouse.

Avoid long hauls on unpaved roads. Avoid prolonged exposure to the sun. Keep harvested fruit in shaded areas. Once the fruit is harvested, move it as quickly as possible to the packinghouse.

Degreening

Regreened late season fruit will usually not be effectively degreened. Avoid degreening, unless necessary to improve fruit color. Keep degreening time to a minimum. Make sure that temperature in degreening room does not exceed 85°F and the spread between wet and dry bulb thermometers does not exceed 2°F. It is preferable that it does not exceed 1°F. A 1°F spread at 82° - 85°F air temperature provides 96% relative humidity, a 2°F spread provides 92% relative humidity; while a 3°F spread provides only 88% relative humidity. Provide one fresh air exchange per hour and maintain ethylene concentration at 5 ppm. If fruit cannot be packed immediately after degreening, it should be maintained at 92-96% relative humidity, without ethylene or heat.

Packing

Avoid physical injury on the packingline. Test the effect of your packingline on fruit injury using the Triphenyl tetra-zolium chloride dye test. Injuries provide ports of entry for decay-causing organisms and allow greater moisture loss.

Ensure adequate washing, brushing and rinsing of fruit. Examine samples periodically before and after washing for effective washing and brush damage. Harsh, excessive or high speed brushes may cause fruit moisture loss and poor appearance. Avoid excessive drying and keep dryer temperature between 120° and 125°F.

Insure adequate coverage with fungicides and waxes. Inspect nozzles or drip lines periodically for clogging. Train your graders to eliminate plugged, dried or poor-looking fruit.

Storage and Shipping

'Valencia' oranges can be shipped or stored at 32-34°F. They will keep well for 8-12 weeks under 85-90% relative humidity. Quality of fruit as they go into storage will determine the condition at the end of storage and when fruit reach the consumer. Quality does not improve in storage, therefore, proper storage is vital to maintaining quality of fruit.

Oranges kept in storage must be examined periodically for pitting, drying and decay to determine how long they can be kept. Samples may be removed to higher temperatures and observed for peel quality and decay.

Stem-end Rind Breakdown

Stem-end rind breakdown is a physiological disorder manifested as dark irregular zone of dead tissue near the stem end of the fruit. Valencia and Hamlin oranges are particularly susceptible to stem-end rind breakdown.

The following list of measures to minimize or eliminate stem-end rind breakdown has been summarized from the University of Florida's Circular 326 by A. A. McCornack and W. Grierson. (See available publications.)

1. Avoid delay in handling, drying or unnecessary ventilation.
2. Keep fruit in shaded area after harvest.
3. Keep time between picking and waxing to a minimum.
4. Cover fruit loads with canvas during long hauls.
5. Maintain high humidity and adequate continuous ventilation in degreening rooms.
6. Maintain adequate air circulation and avoid excessive fan speeds in degreening rooms.
7. Pack oranges immediately after degreening. If packing is delayed, shut off the heat and ethylene supply. Keep the fans operating and room closed.
8. Fruit that do not need degreening should be kept in closed degreening rooms without heat or ethylene, but at 92-96% relative humidity.
9. Avoid excessive brushing, especially in polisher-driers when run too hot or with excessive brush speeds. Use automatic wipe-out devices.
10. Insure application of an adequate and even coat of wax to protect against continued drying, shipping and storage.

AVAILABLE PUBLICATIONS

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

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

Practical Measures for Control of Rind Breakdown of Oranges, by A. A. McCornack and W. Grierson. 1965. Agricultural Extension Service, University of Florida. Circular 286.

Oil Spotting (Oleocellosis) of Citrus Fruit, by W. F. Wardowski, A. A. McCornack, W. Grierson. 1976. Florida Cooperative Extension Service. Circular 410. (*Out of print, making xerox copies*)

Packingline Machinery for Florida Citrus Packinghouses, by W. F. Wardowski, W. M. Miller, and W. Grierson. 1987. Florida Cooperative Extension Service Bulletin 239.

Respiratory Rates and Glycosidase Activities of Juice Vesicles Associated with Section-drying in Citrus, by Jacqueline K. Burns. 1990. HortScience 25(5): 544-546.

Sucrose Breakdown in Relation to Fruit Growth of Acid Lime (*Citrus Aurantifolia*), by Ed Echeverri and Jacqueline K. Burns. 1990. Journal of Experiment Botany 41(227): 705-708.

Available from Dr. B. Wild, NSW Agriculture & Fisheries, Gosford Horticultural Postharvest Laboratory, Gosford, NSW 2250 AUSTRALIA

Influence of Fruit Temperature and Application Time on the Effectiveness of Fungicides in Controlling Citrus Green Mould, *Penicillium digitatum*, by B. L. Wild and L. J. Spohr. 1989. Australian Journal of Experimental Agriculture 29: 139-142.

Hot Dip Treatments Reduce Chilling Injury in Long-term Storage of 'Valencia' Oranges, by B. L. Wild and C. W. Hood. 1989. HortScience 24(1): 109-110.

A hot dip can keep the chill away, by B. L. Wild. 1989. Rural Newsletter No. 106: 10-12.

Editor's Note: Chilling injury of storage oranges (above two articles) is rare for Florida grown oranges, but occurs on grapefruit.

Ethylene Gas Burn of Washington Navel Oranges -- A Form of Anthracnose Induced by Degreening and Controlled by Brushing or Applying Fungicides, by B. L. Wild. 1990. Australian Journal of Experimental Agriculture 30: 565-568.

Editor's Note: This publication was nearly omitted from this Newsletter because of the unfortunate use of "ethylene gas burn" in the title. this article indicates that anthracnose, not ethylene is the cause of the problem.