UNIVERSITY OF FLORIDA | Cooperative Extension Service
Institute of Food and Agricultural Sciences

PACKINGHOUSE NEWSLETTER

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DEGREENING FLORIDA CITRUS

Mark Ritenour, Indian River REC, Ft. Pierce
Bill Miller and Will Wardowski, Citrus REC, Lake Alfred

Early season Florida citrus will meet maturity standards before it is of acceptable market color. Degreening uses ethylene (a natural plant growth regulator) to stimulate the breakdown of green chlorophyll which allows the natural yellow or orange pigments in the peel to predominate.

Room Design

The horizontal air movement room design was first suggested by Bill Grierson, University of Florida, CREC, and has become the predominate worldwide design. In the years since the first commercial horizontal rooms were built and operated, the design has been modified in cooperation with commercial packers to the current efficient design.

The rooms are gradually loaded so that under Florida conditions, added heat of 0.2 BTU per minute (12 BTU per hour) per cfm of inside air circulation is adequate for most of the degreening season. Wall ducts direct air to channels formed by the pallets and avoid wasted short circuited air between pallet bin stacks. Likewise air should be blocked from flowing over the top to the bin stack. Avoid air restrictions which create turbulence and waste energy. Typically, the air duct velocity should be less than 1500 linear feet per minute.

Keep radiator coils clean and fans properly serviced. Dirt on coils acts as an insulator reducing coil efficiency. Pulling air through a radiator uses less energy than pushing air through a radiator.

Insulation is the obvious means to conserve heat during cool weather, and avoid a greenhouse effect of overheating during hot weather. Outside metal walls and the underside of metal roofs need to be insulated. Cement block walls do not need additional insulation, but the inside should be painted with a latex paint to reduce moisture loss.

All equipment should have easy access. The area above the false ceiling and below the roof is most often neglected. A solid catwalk and good lighting is worth the cost to provide access to the fans, radiators and other equipment in that area. The false ceiling should have a slight pitch so that water does not accumulate overhead.

Standard Degreening Conditions

Temperature. Temperatures of 82 to 85°F are the most commonly used and provide the fastest degreening. Warmer or cooler temperatures slow degreening. The thermostat should be located in the air stream between the fan/radiator and the fruit. Some packers are reported to be using cooler temperatures and taking longer to degreen delicate crops, but we have no data to evaluate this practice. Gas heaters are usually placed outside of the room to reduce high humidity corrosion. Heat exchanger (e.g. gas) design is based on output BTUH, which is usually about 80% of the rated input BTUH.

Ethylene. Five parts per million (ppm) ethylene is adequate for maximum degreening. Some packers are successfully using three ppm. Ethylene is best continuously introduced via a flow meter designed for the size of the room. A table with flow rates for various meters and room sizes is available in Circular 1170 (see Available Publications). A portable ethylene analyzer is essential to measure the ethylene in the rooms and make adjustments accordingly.

Humidity. A high relative humidity (rh) of 90-96% is recommended to maintain the health of the fruit. Wet and dry bulb thermometers in a strong air flow should have a temperature split of 1 to 2°F. This measurement is frequently improperly done because of poor air flow, lack of clean water on the wet bulb, or the readings are simply not done. If an automatic humidification system is utilized, the humidistat should be in the return air stream to the fan, while moisture is added to the air stream between the fan and the fruit.

Ventilation. Enough fresh air should enter the degreening room so that its empty volume is exchanged every hour. Most Florida degreening rooms have a much higher air exchange, which can be expensive because of the loss of heat, humidity and ethylene. Some fresh air is necessary to prevent the accumulation of carbon dioxide (CO_2) which is given off by the fruit. CO_2 levels above 0.1% may show degreening.

Air Circulation. Air circulation within the degreening room should be with fan capacities of 10 cubic feet per minute (cfm) per field box room capacity, and typically against a ½ inch minimum static pressure. The air flow maintains uniform temperature, ethylene concentration and humidity around the fruit in the room.

POSTHARVEST BIOLOGY & TECHNOLOGY OF HORTICULTURAL CROPS
HOS 4932 - Fall 1999 at Indian River REC, Ft Pierce

The University of Florida, Indian River Research and Education Center will be offering a 3-credit course entitled, "Postharvest Biology & Technology of Horticultural Crops" this Fall on Thursday evenings between 5:30 and 8:30 p.m. Registration is August 19-20 and classes begin August 23rd and end on December 17th. This will be an introductory course covering basic postharvest concepts and practices used to maintain the quality of perishable horticultural commodities. In addition to instructor Dr. Mark Ritenour, noted researchers and extension specialists from the Indian River Research and Education Center, Citrus Research and Education Center, and the USDA will guest lecture in their respective fields of expertise. Topics will include:

Impacts of respiration

Role of plant hormones (especially ethylene)

Food safety issues

Pathology & decay prevention

Factors affecting nutritional quality

Compositional changes

Principles of water loss

Maturity and quality standards

Harvesting and handling systems

Physiological disorders

Quarantine treatments

Temperature attainment and control

Modified atmospheres

Transportation

Labor issues

Distribution and trade

Marketing of fresh produce

Lectures covering different commodity groups

For more information, call the Indian River Research & Education Center at (561) 468-3922, visit our WebSite at http://irrec.ifas.ufl.edu/, or e-mail Dr. Mark Ritenour at mrit@gnv.ifas.ufl.edu.

IN MEMORIAM
ANDY McCORNACK, 1914 - 1999

Will Wardowski
CREC, Lake Alfred

I first met Andy McCornack, having moved from the midwest thirty years ago to the then Citrus Experiment Station. Andy was and remains a legend as the Florida Department of Citrus applied decay control expert. He was much more to our packinghouse industry and to those who knew him. We have missed Andy McCornack since his retirement in 1979. We will continue to miss him. His contributions to this Newsletter and to the Florida State Horticultural Society are important records of his untiring efforts.

Andy made a habit of visiting Florida citrus packinghouses every Thursday. His job was decay control, but his knowledge and valued advice included every aspect of fresh citrus fruit quality and handling. Packers were always happy to see Andy, and much of my citrus knowledge was gained from Andy.

Andy loved gardening, especially roses and orchids. I learned more about roses from Andy than from books. It is not easy to have healthy roses in Florida, but somehow roses at the McCornack house always produced a beautiful crop. Many of the rose plants at my home came from Andy's propagation bench. When we moved, he patiently started over so that we could have another rose garden. When I admire a rose, orchid and many other plants, I will remember and thank Andy McCornack.

AVAILABLE PUBLICATIONS

Available from Dr. W. F. Wardowski, Citrus REC, 700 Experiment Station Road, Lake Alfred, Florida 33850

Thirty-eighth Annual Citrus Packinghouse Day, by W. F. Wardowski. 1999. Citrus REC, Fla. Dept. of Citrus, Fla. Citrus Packers. Abstracts. 19 pp.

Postharvest Decay Control Recommendations for Florida Citrus, by Wilfred F. Wardowski, II and George E. Brown. 1993. Univ. of Florida, Coop. Ext. Serv. Circ. 359-A.

Recommendations for Degreening Florida Fresh Citrus Fruits, by W. F. Wardowski. 1996. Univ. of Florida, Coop. Ext. Serv. Circ. 1170.