



**INSTITUTE OF FOOD AND
AGRICULTURAL SCIENCES**
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**FLORIDA
COOPERATIVE
EXTENSION SERVICE**

PACKINGHOUSE NEWSLETTER

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THIRTY-SECOND ANNUAL CITRUS PACKINGHOUSE DAY

**Thursday, September 2, 1993
Citrus Research and Education Center
700 Experiment Station Road
Lake Alfred, FL 33850**

**Will Wardowski
Citrus Research and Education Center
Lake Alfred**

Citrus fruit decay, peel injuries, the 1992-93 season and much more will be featured at the annual Citrus Packinghouse Day scheduled Thursday, September 2, 1993 with registration beginning at 8:30 AM and the program beginning at 9:30 AM. Tickets for lunch may be purchased at registration. There is no meeting registration fee and reservations are not required. **NOTE:** This date is one week earlier than in previous years. Mark your calendar.

Equipment displays will be in the afternoon. Exhibit space is limited to a first-come, first-serve basis. Interested exhibitors should send a letter to W. Miller or W. Wardowski. Telephone (813) 956-1151 for more information.

There is a much greater interest in fresh fruit during times of lower juice prices. Come to Citrus Packinghouse Day to hear the presentations, view the commercial exhibits and meet other packers.

DEGREENING ROOM CALCULATIONS

Will Wardowski
Citrus Research and Education Center
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Citrus degreening rooms in Florida have become fairly standard following the drawings and information in Packinghouse Newsletters No. 5, 45 and 141 (see Available Publications). Credit for the design and commercial adaptation of modern degreening rooms belongs to Dr. Bill Grierson, retired from this center, and Mr. Art Raynor, Bartow, Florida. We continue to have questions about degreening room design and ideal degreening conditions.

Although questions come from all over the citrus producing world, this information is for Florida. The Florida experience applies to the rest of the world, except for optimum temperature which varies with growing regions. Degreening conditions (Table 1) are for the horizontal air flow degreening rooms with the size pallet bin most commonly used for Florida fresh citrus (see Available Publications). These degreening conditions do not apply to lemons.

Table 1. Florida citrus (except lemons) degreening room conditions always calculated on the basis of a full room, even when the room is operated partially full.

Temperature ^z	82 to 85°F (27.8 to 29.4°C)		
Ethylene	5 parts per million (ppm)		
Relative Humidity	90 to 96%		
Ventilation ^y	1 fresh air change per hour		
	Units of Fruit		
	Pallet Box ^w	Ton	Metric Ton
Air Circulation ^x cubic feet/minute (cfm)	100	222.2	244.4
Heat (BTU/hr)	1200	2666.7	2933.3

^zFastest degreening and the legal Florida limit for added heat is 85°F.

^yFresh air ventilation in Israel has been reported to be adequate at 1/2 air change per hour. Most Florida rooms have too much, rather than too little ventilation.

^xAir circulation with a 1/2 inch static pressure must be through the fruit load, and not over or around the pallet bins. Pallet bin bottom vents (slots) are necessary for adequate air circulation.

^wThe 43,500 cubic inch pallet bin holds 10 Florida field boxes or 850 pounds of Florida grapefruit, 900 pounds of oranges or 950 pounds of tangerines.

Ethylene is metered into degreening rooms at a constant, low rate. For very small rooms (less than 50 pallet bins) the gas may be metered through a 1/4 inch tube in water and the rate monitored by counting one bubble per minute for each pallet bin capacity of the room. Larger rooms require more ethylene delivered through a flow meter at the rate of 25 cc or ml/minute, 1.5 liters/hours, or 0.05 cubic feet/hour (depending on the calibration of the meter) for each 100 pallet bin capacity of the room. Ethylene is measured within the room with a gas analyzer using low range disposable ethylene tubes, and the metering device is adjusted to maintain 5 ppm ethylene.

It is important that ethylene be kept at the recommended level. Increased ethylene increases decay, but does not speed degreening. Excessive degreening uses more time, ethylene, heat and humidity, plus increases the potential of more decay.

Gas heat exchange units are now common. When the heat source is by boilers, clean radiators are essential for efficient energy use. It is surprising how often the radiators are not clean in degreening rooms. Perhaps it is because they are frequently out-of-sight. A regular program of at least monthly inspections and semi-annual maintenance for such equipment would be a good idea in many packinghouses. Easy access and good lighting are essential for repairs and maintenance of equipment. A secure catwalk above the false ceiling to access the fans, radiators and humidity equipment is in the interest of the packinghouse employees and management.

High humidity during degreening is very important to the postharvest health of citrus fruits. High humidity is also the most difficult degreening condition to achieve. Citrus will be giving up moisture to the air around it. The lower the relative humidity in the air, the more moisture lost from the fruit. A good humidity system is well worth the investment in terms of market condition of citrus fruit.

Properly maintained high humidity often results in unsightly mildew growing on the walls of degreening rooms. People sometimes become concerned about the appearance of the rooms and the effect that mildew has on citrus fruit. Mildew does not infect citrus.

Sanitation is another issue. Currently, much of the citrus fruit degreened in Florida has been drenched with Thiabendazole (TBZ) fungicide. This treatment could lead to a selection of TBZ resistant mold. Spores of resistant mold may be blown around in the degreening room air, and infect fruit. For this reason, sanitation in degreening rooms is very important. Sanitation may be as simple as regularly sweeping the floor and removing any dropped fruit. Additional measures could include steam cleaning or spaying with an approved sanitizing agent.

The placement of degreening room controls is sometimes misunderstood. The thermostat needs to be in the air flow between the heat source and the fruit load, and shielded from a direct line of sight to the heat source. The humidistat should be placed in the return air between the fruit load and the humidity source. These locations protect the fruit from excessive heat and low humidity, respectively.

The legal limit for added heat to degreening rooms in Florida is 85°F. This is the temperature at which degreening is fastest. Warmer or cooler temperatures for Florida citrus require more degreening time and expense.

Florida citrus packers may meet with faculty members at Lake Alfred to discuss the design of degreening rooms, or any other aspect of their business. These meetings are custom designed to the needs of the individual citrus packer. Telephone us with your questions or with a request for a private conference.

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 and A. A. McCornack. 1979. Circular 389, University of Florida, IFAS, Florida Cooperative Extension Service.

Pallet Box Degreening Rooms, by W. Grierson. 1966. Packinghouse Newsletter No. 5. University of Florida, IFAS, Florida Cooperative Extension Service.

Continuous VS. Batch Degreening, by W. Grierson. 1972. Packinghouse Newsletter No. 45, University of Florida, IFAS, Florida Cooperative Extension Service.

Degreening, by W. Wardowski. 1985. Packinghouse Newsletter No. 141. University of Florida, IFAS, Florida Cooperative Extension Service.

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