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PACKINGHOUSE NEWSLETTER

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NEW ADDRESS, SAME PLACE

Some time ago our name was changed from Citrus Experiment Station to Agricultural Research & Education Center (AREC), Lake Alfred. Recently our P. O. Box number was traded for: 700 Experiment Station Road. All this new address means is that our mail is delivered rather than picked up. We are still here to serve the Florida citrus industry.

Editor

PACKERS' CORNER

AUTOMATIC ORANGE SAMPLING BY CITRUS PACKERS

Three types of automatic orange sampling systems are in use in *two Florida* packinghouses, Golden Gem Growers at Umatilla and Waverly Growers Cooperative at Waverly. Certification of the solids, ratio, acid and pounds juice is issued by the Florida Division of Fruit and Vegetable Inspection at Golden Gem, whereas this test is completed by the employees at Waverly. The grower members are paid on a pounds solids basis for fresh oranges for this test, and at Golden Gem there are certain incentives to offset the cost of growing oranges for the fresh market. The Florida Division of Fruit and Vegetable Inspection completes an additional bin certification (on fruit at packing) as they do in all commercial Florida fresh citrus packinghouses.

One sampler is a flat metal plate that moves across a belt, pushing fruit off at timed intervals. This fruit is then resampled with a second similar sampler at Waverly or with a singulator (described below) at Golden Gem.

Another type of sampling device is located in a large metal chute and consists of a trap door and triangular fruit diverter recessed in front of the trap door. An electrical timing device triggers a pneumatic valve which opens the trap door allowing the fruit immediately above the door to drop into a chute and roll into a basket. As the approximately 12" square trap door opens, a second pneumatic device is activated and drives a triangular diverter upward, blocking any further fruit from entering the open door. The sampler is on an incline which allows the fruit to be gravity fed across the sampler.

A third sampler was created by removing one slat from a slat conveyor. The slat was replaced by a 4" deep rubber flap which is hinged to the preceding slat. The flap runs the length of the slat and is hinged to open in one direction. The fruit which rides on the flap is dropped onto a conveyor belt and taken to a singulator very similar to those used in canning plants for accumulation of fruit for state test samplers. The flap is prevented from opening prematurely by a series of metal rods approximately 1/4" in diameter running lengthwise to the drop area located near the end of the conveyor.

Once the fruit is on the singulator, the operation is very similar to that used in a cannery test house. A divertor blade located at the end of the singulator is triggered by a fruit activated micro-switch, that can be set to deliver at a specified frequency (i.e. counter set at 10 will send 10 fruit back to the packingline and the eleventh to the test room).

All three sampling devices are located between the dumper and presizer in order to select a sample from the total crop sent to the packinghouse. The samples are collected in wire baskets at Waverly, and are hand carried to the test house (room) for analyses. At Golden Gem the fruit are conveyed to the test house on a series of overhead conveyors and are washed in route. The timing devices are adjusted to obtain the desired sample size from small and large lots, with the timing controls being in the test house at Golden Gem and near the samplers at Waverly.

Other citrus packers may be using or considering automatic sampling of fresh fruit. This relatively new development for fresh citrus fruit in Florida is another innovation shared in Packers' Corner.

Sandy Barros
Florida Department of Citrus

Will Wardowski
Extension Service
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CITRUS PACKINGHOUSE DAY
Wednesday, September 9, 1981
Agricultural Research & Education Center
Lake Alfred

DRYER AIR RECYCLING

For surface drying citrus, recycling air is a logical technique to conserve energy. However, recycled air can increase the heated air's humidity level and reduce drying rates which could limit the overall packing-line capacity. A control system, Figure 1, can be implemented to regulate the percentage of air recycled. The psychrometric process, Figure 2, for drying entails heating, drying (which is evaporative cooling for the air stream) and mixing with ambient air. The following table shows energy inputs when the drier airstream is kept at a typical 145°F (63°C) and ambient air is 90°F under three different humidity conditions.

90°F (32°C) dry-bulb Ambient condition	Air distribution makeup	recycle	Required input energy, no recycle - 100%
50% RH	5.3%	94.7%	11.3%
80% RH	11.1	88.9	16.7
100% RH	41.4	58.6	45.1
No recycle 50% RH	100.0	0.0	100.0

The energy reduction by recycling is significant with ambient conditions as severe as 90°F (32°C) and 100% RH. However, the need for humidity control is evident as the percentage of fresh air needed to maintain drying becomes greater with increases in ambient relative humidity. This analysis does not incorporate any thermal losses, heat gains from fans or moisture reductions via mechanical operations. Benefits of air recycling are still evident though, even in the worst case of 90°F (32°C) and 100% RH, where the *required* energy input is reduced to less than one-half that of a traditional dryer with a single air-pass.

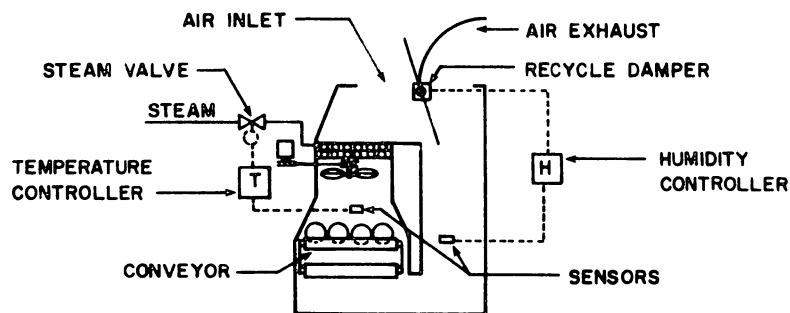


Figure 1. Controls for fresh citrus dryer with recycled air.

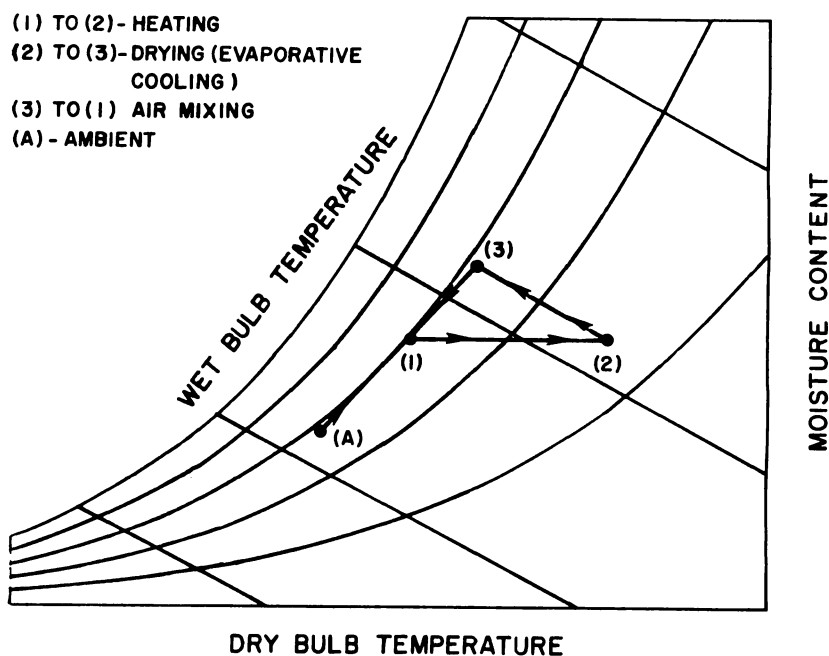


Figure 2. Psychrometric process for air heating plus recycle.

Bill Miller
 AREC, Lake Alfred

AVAILABLE PUBLICATIONS

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

"Influence of canopy depth on susceptibility of 'Marsh' grapefruit to chilling injury" by A. C. Purvis. HortScience 15(6):731-733. 1980.

Available from Dr. I. Eaks, Department of Biochemistry, University of California, Riverside, CA 92521

"Effect of chilling on respiration and volatiles of California lemon fruit" by I. L. Eaks. J. Amer. Soc. Hort. Sci. 105(6):865-869. 1980

Available from Dr. Ronald Ward, Food & Resource Economics Department, 1099 McCarty Hall, University of Florida, Gainesville, FL 32611

"The United States citrus subsector: organization, behavior, and performance" by R. W. Ward and R. L. Kilmer. North Central Regional Research Publication 263, N. C. Project 117, Monograph 8, December 1980. 143 pages.

This newsletter is published at a cost of \$110.67 or 9per copy, to give the latest news to the packinghouse industry.

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