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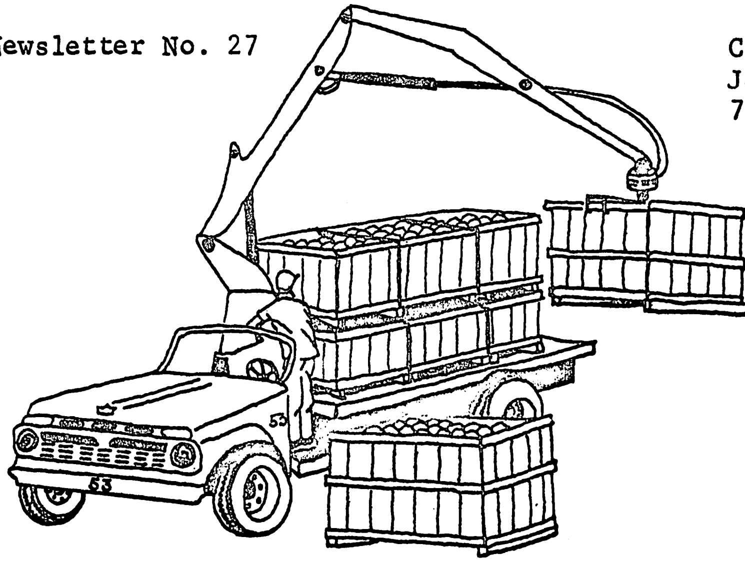
Newsletter No. 27



Citrus Station Mimeo Report CES 70-18
January 22, 1970
750-WFW-Lake Alfred, Florida 33850

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P. O. Box 1088
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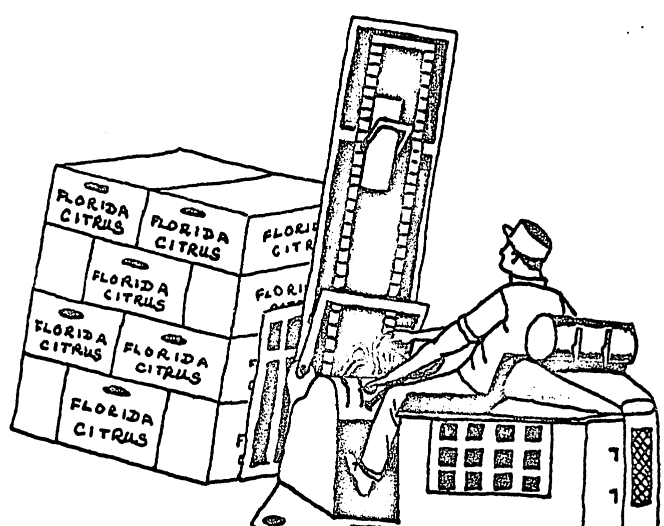
Packinghouse Newsletter

UNIVERSITY OF FLORIDA INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES

and

STATE OF FLORIDA, DEPARTMENT OF CITRUS

*Complimentary to members of the Florida Fresh Citrus Shippers Association. Others wishing to receive this newsletter may send a dozen stamped, preaddressed envelopes to the above address.



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Harvesting and Handling Section

P A C K I N G H O U S E   N E W S L E T T E R

FROZEN FRUIT IS NOT POISONOUS!

We are once again hearing the old wives' tale that frozen fruit are poisonous and, in particular, that the white hesperidin crystals that form between the segments are poisonous. This is simply not so.

Freezing damages the cell membranes to the extent that the moisture can evaporate from the frozen area. Immature fruit that remain on the tree may "heal" to a marked extend, the healthy segments compressing the dried out area into a very small space. Fruit that is mature at time of freezing cannot do this. It will be first mushy and later have hollow areas (but without shrivelling, because the membranes allow the water to escape freely), but it will not be unwholesome.

MECHANICAL SEPARATORS FOR COLD-DAMAGED ORANGES

Installation of Separators

An installation in which a mechanical separator (or separators) delivers fruit direct to the packing lines greatly decreases the out-put of the packinghouse by limiting it to the volume of sound fruit being separated at any given moment. This makes for a very expensive operation.

Packinghouses using fresh fruit bulk bins or pallet boxes should consider running the separators independently of the packing lines. A small crew, working long hours, can accumulate a pool of separated fruit. This "pre-separated fruit", when run through the packinghouse, will have a very high pack-out, ensuring a high volume of packed fruit per man-hour of operating time.

Efficiency of Frozen Fruit Separators

Three types of separators are in general use. These include two types of water separators; one in which the fruit drops in and separation depends upon both how deep the fruit sinks and how fast it rises; and a more common type of water separator which delivers the fruit underwater and separation depends only on how fast it rises. The third type of separator is the chemical or oil emulsion separator which uses an emulsion of oil and water whose specific gravity is adjusted to be between that of the good fruit and the frozen fruit. In all these, of course, separation is based on the fact that the specific gravity of the frozen fruit is typically less than that of the non-frozen fruit.

No marked differences were found in the efficiency of these three types of separators. Instead, the wide differences found were usually accounted for by one or more of these three factors:

1. Convenience and ease of operation of equipment.

2. An intelligent operator giving his full attention to sampling of fruit and adjustment of the machine.

3. A well-arranged sampling station convenient to both fresh and cannery fruit lines, with the controls of the separator convenient to this position for systematic and nearly continuous adjustment.

To make such adjustments effective, the controls should not only be accessible from the sampling position, but should have some form of marking (on mechanical controls) so that settings could be recorded and reused. A great deal of bad fruit separation resulted while operators were trying to readjust controls to a previously known position. Also, a continuous written record should be kept. This is not only useful for management, but also enables the operator to do a much more efficient job. For water-type separators, the control on the selector vane can be on an arc with numbered holes. For emulsion-type separators, the hydrometer reading substitutes for a mechanical setting position on the controls.

No one can keep accurate records without some special set-up. Fig. 1 shows a simple sampling station that is very inexpensive to make, and it will pay for itself in a very short time. Note that it is at a position at which both the cannery line and the packinghouse line can be sampled simultaneously. Fruit should be taken alternately from one line or the other until a sample (usually 10 fruit from each) has been taken. Then, when the fruit are cut for sampling, the "cap" cut off the stem end is set aside; and when the grade is known, it is put in the appropriate tray. Once the samples have been all cut, then the operator can dry his hands, count the caps, and record on his sheet. This device is very simple, but it is extremely helpful. We urge everybody running a separator to make such a sampling station.

A great deal of unnecessary mess, waste, and inefficiency has been observed in the operation of emulsion separators. These can be most efficient, but we advise the following measures. To eliminate excessive carry-over of emulsion (which is expensive as well as messy and may be a serious fire hazard in a wooden house after the water has evaporated out of the oil):

1. Chutes should be made of spaced rods with trays underneath to drain back and reclaim the emulsion.

2. Belts carrying fruit wet with emulsion should have wipers of neoprene or similar material on the underside to wipe emulsion into a reclamation system.

3. Water eliminator rolls can also be used for emulsion reclamation.

4. Reclaimed emulsion should be drained back through a strainer system, usually the strainer at the side of the machine can be used.

5. Fruit should be thoroughly rinsed before going into the house.

6. A special warning is offered against allowing this oil emulsion to get into any other solution, especially Dowicide A-hexamine or equivalent. This could result in excessive residues of fungicides and perhaps a fruit burn.

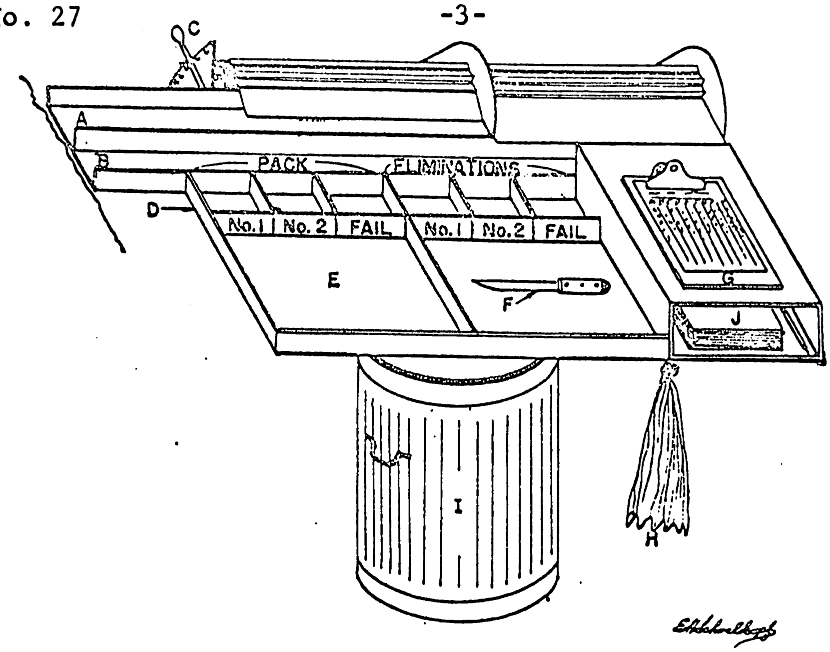


Fig. 1. Design for an efficient sampling and regulating station. "A" Packinghouse line. "B" Eliminations. "C" Remote control on selector vane with numbered settings. "D" Trays for tops off fruit kept as tally. "E" Cutting board for fruit from packinghouse line. "F" Cutting board for fruit from elimination line and sharp knife. "G" Clipboard with record sheets. "H" Towel for operator to wipe hands before recording data. "I" Garbage can (or cull chute) for cut fruit. "J" cupboard for supplies (record sheets, pencils, hone for knife, etc.).

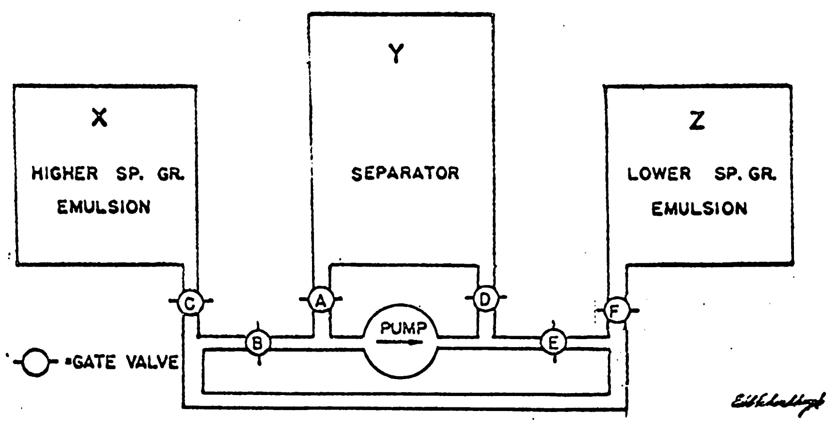


Fig. 2. An efficient apparatus for emulsion regulation.

To raise specific gravity:

1. Open only A, E, and F, pump emulsion from Y to Z.
2. Close A, E, and F, open only C, B, D, pump emulsion from X to Y.
3. Close B and C, open A and D and separator is then on recirculation.

To lower specific gravity:

1. Open only A, E, C, pump emulsion from Y to X.
2. Close A and C, open only F, B, D, pump emulsion from Z to Y.
3. Close F and B, open A and D and separator is then on recirculation.

Specific Gravity Control for Emulsion Systems

Probably because of the lower initial cost, oil emulsion systems are increasingly common, but can be a trial if not well organized. In particular, the system of pumping out into barrels and then pumping in emulsion or water is difficult to control, messy, wasteful, and inefficient. A very simple control system was devised consisting of a centrifugal pump, separate from that used for the circulation of the emulsion, and six valves. This is shown in Fig. 2. Note that two storage drums or two storage tanks are used, one of which starts partially filled with the concentrated emulsion and the other starts partially filled with water. Emulsion is pumped from Y to Z and then from X to Y to raise specific gravity. It is pumped from Y toX, then Z to Y to decrease specific gravity. This is done by the operator standing at the sampling station. This "switchboard" need not be in close proximity to the separator tank. We stress that it should be near the sampling station.

This type of set-up has been used very successfully to separate not only frozen fruit, but also granulated 'Valencias', sunburned 'Murcotts', etc., thus making it possible to run crops that would otherwise have been impossible to grade.

W. Grierson
Professor
Horticulturist
Citrus Experiment Station

The preceeding information is reprinted from Packinghouse Newsletter No. 20, December, 1968. Most of the observations and advice given are based on a study published after the 1957 freeze:

"Evaluation of Mechanical Separators for Cold-Damaged Oranges", Proceedings of the American Society of Horticultural Science. Volume 73, 1959. Pages 278-287. W. Grierson and F. W. Hayward.

Other publications relating to freezing of citrus may be found in Packinghouse Newsletter No. 20.

Editor

PRECOOLING OF FLORIDA CITRUS ON TRUCKS

What does a Virginia potato grower do in the winter time? If his name is Bob Morris of Townsend, Virginia, he is in Florida precooling semitrailers loaded with citrus. Bob Morris, owner and operator of Bayside Farms, has mobile facilities to simultaneously precool 10 trucks at present located near the intersection of I-4 and US-27 (Cross Country Truck Stop), 8 trucks at Leesburg (All State Truck Stop), and 4 trucks at St. Augustine (G & M Truck Broker). The original units were obtained to cool his own potatoes at Bayside Farms. They have precooled numerous perishable crops including peaches, cabbage, and melons. This is his first experience with precooling of citrus.

The 8-arm "octopus" truck illustrated below is capable of cooling 4 semi-trailers simultaneously. It delivers over 8,000 cubic feet of air per minute and has a cooling capacity of 106.5 tons, which is a powerful wind and a lot of ice. The cold air is blown through the top hoses over the load in the semi, and air is returned through the bottom hoses back into the truck. Air entering over the top of the fruit is maintained at 32° F for citrus. William Shepheard, engineering consultant for Bayside Farms, pointed out that they are able to deliver much colder air but cannot in this case because of possible chilling injury to the citrus.

With 2 hours of cooling, the fruit is reduced from slightly over 70° to slightly over 50° F. Mr. Morris claims that the secret of the operation is the large volume of air that they force into the truck. He mentioned that they plan to bring an additional unit to Florida this month which has the capability of the truck in the illustration but which would cool only one semi at a time. He emphasized that this is strictly an experimental approach and that their hopes are to obtain faster cooling.

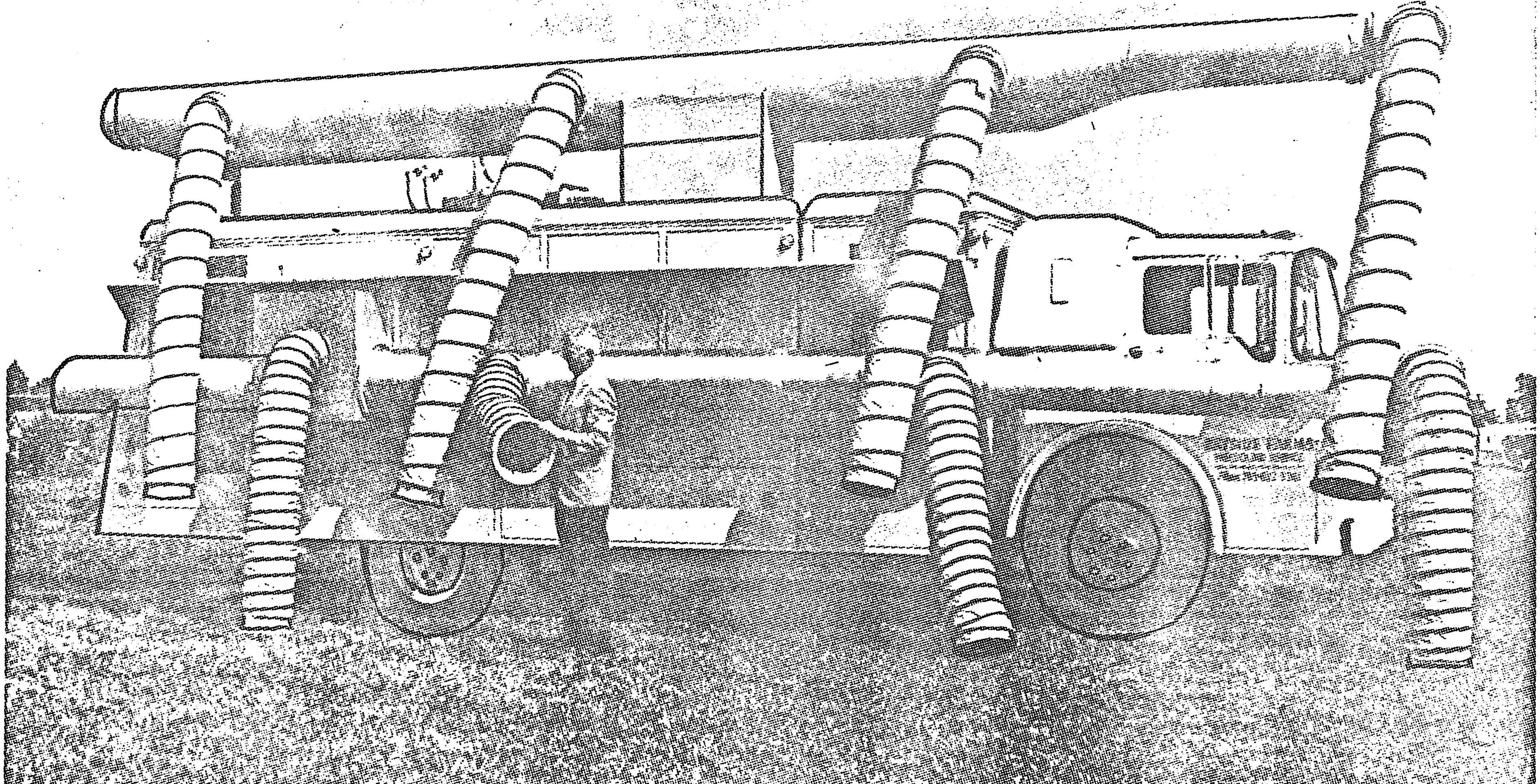
The temperature for optimum development of our major rots in citrus are: *Penicillium* and *Phomopsis*, 75°; *Diplodia*, 85°. As the temperature is reduced, growth of these fungi is slowed up. At 50° F, growth of the stem-end rots is retarded and that of *Penicillium* (blue and green molds) is down to about 25% of its maximum.

Precooling of Florida citrus has been tried many times before but never with equipment capable of such rapid cooling. Precooling of the fruit certainly could assist in reducing the incidence of decay and increasing the market quality. The performance of this equipment is of particular interest in that it corroborates results from experiments at Lake Alfred and Gainesville, a USDA bulletin on which should be available next month. Also, MRR 739 and MRR 845 listed on the last page of this Newsletter and based on University of Florida and USDA work is of direct interest to those interested in precooling and refrigeration.

Will Wardowski
Extension Service
Citrus Experiment Station

AGRICULTURAL PRODUCT PRECOOLING UNIT

DIESEL ENGINE POWERED



AIR-A-PLANE
Model 652D
Mfd. by
Air-A-Plane Corporation
Norfolk, Va., U.S.A.

Unit ready to cool 4 trailers simultaneously.

CAPACITY

Cooling	106.5 tons
Air Flow	8100 cfm
Air Pressure	24" to 52" W.G.

AVAILABLE PUBLICATIONS

Available from Information Office, Agricultural Research Service, U. S. Department of Agriculture, Washington, D. C.

"Tests of Overseas Shipments of California Citrus Fruit--Interrelations Between Fruit Condition, Biphenyl Content, Transit Temperature, Delayed Loading, and Biphenyl Pad Placement." October, 1969. G. L. Rygg. USDA. Agricultural Research Service. MRR 830 (15 cents).

"Overseas Shipping Tests of California Citrus on Pallets and in Containers--Interrelations Between Transit, Temperatures, Biphenyl Pad Placement, Biphenyl Content, and Fruit Condition." October, 1969. G. L. Rygg. USDA. Agricultural Research Service. MRR 857 (20 cents).

"Biphenyl Residues in Oranges: Effect of Biphenyl Dosage and Pad Placement." August, 1968. Shirley Norman, G. L. Rygg, and D. C. Fouse. USDA. Agricultural Research Service. ARS 51-26. ARS 51-26 does not appear to have a price.

"Biphenyl Residues, Decay and Soilage in Oranges: Effect of Carton Ventings, Barriers, and Biphenyl Dosages During Storage." November, 1969. Shirley Norman, C. C. Craft, D. C. Rouse, and G. L. Rygg. USDA. Agricultural Research Service. MRR 853 (20 cents).

"Experimental Forced-Air Precooling of Florida Citrus Fruit." May, 1969. James Soule, University of Florida and A. H. Bennett, TFRD, ARS, USDA. MRR 845 (25 cents). (We have a few free copies--first come, first served. Editor).

"Factors Affecting the Quality of Grapefruit Exported from Florida." March, 1966. W. G. Chace, Jr., P. L. Harding, J. J. Smoot, and R. H. Cubbedge. USDA, Agricultural Research Service. MRR 739. (15 cents).

Available from Harvesting and Handling Section, Citrus Experiment Station

"Four Years of Abscission Studies on Oranges." Florida Agricultural Experiment Stations Journal Series No. 3388. Vol. 82, 1969. A mimeograph of paper submitted.

"Changes in Produce Packaging in a Changing Marketing System." by Donald R. Stokes. USDA, ARS. This is one paper from a symposium on Produce Packaging sponsored by the American Society for Horticultural Science. August 20, 1969.