Newsletter No. 39

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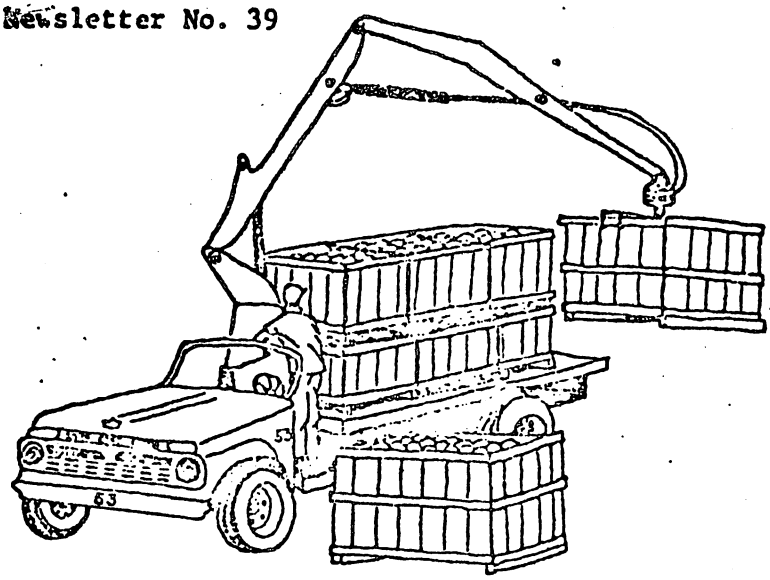
AREC-LA-71-41
September 24, 1971
1000-WFW-Lake Alfred, Florida



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Packinghouse Newsletter

UNIVERSITY OF FLORIDA INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES

and

STATE OF FLORIDA, DEPARTMENT OF CITRUS

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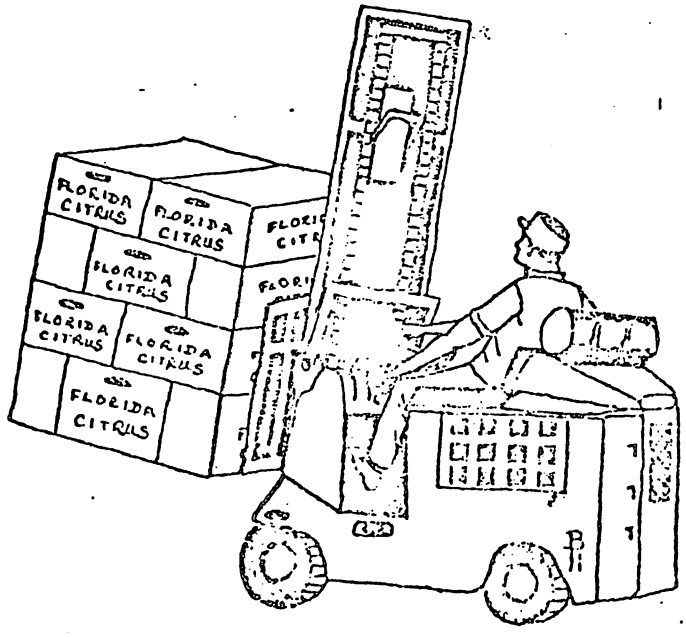

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Harvesting and Handling Section

PACKINGHOUSE NEWSLETTER

TRASH ELIMINATION

Even though a number of packinghouses were severely hampered by trash accumulation in the last two seasons, the general attitude seems to be to ignore the problem in the hope that it will go away. It won't. In the last several months, we have gone over plans for several proposed new packinghouses or revisions of old ones. None included what we consider adequate provision for prompt removal of trash brought in with the fruit due to sloppy picking. We in the Harvesting & Handling Section can do nothing about the pickers; we can, however, help cope with the resulting trash.

Sloping Belt Trash Eliminator

The demonstration of the sloping belt trash eliminator at our recent Packinghouse Day caused so much interest that a brief description seems to be in order. Figure 1 illustrates the principle for the removal of loose trash and sand. The surface of the belt is arranged to engage with leaves, twigs, sand, etc. as it moves sideways across the direction of fruit flow. The slope of the belt is sufficient for fruit that is not encumbered by long stems and leaves to roll across it. This is an old principle and familiar to anybody who has watched a potato digger working.

Figure 2 illustrates what we believe to be a new principle. A pintle rubber roller engages with the ridged surface of the belt so that the two just touch. The peripheral speed of the roller should be approximately equal to the linear speed of the belt. At the point of contact, the pintle rubber and the belt are moving in the same direction. Long stems attached to fruit are engaged between the pintle rubber and the belt and pulled through forcefully. A roller of approximately 2-1/2 inches diameter rotates in the opposite direction to the pintle rubber roller thrusting the attached fruit away from the stem. Fruit that engage this device tend to be picked cleanly from the long stems. All long stems and trash are deposited in one place and can be accumulated in a pallet box or conveyed to a disposal bin or waiting truck.

So far, this has only been operated on our small packinghouse line. It is conceivable that on a large line, it might be necessary to have several belts working in opposite directions with rollers on each side of the conveyor as shown in Figure 3.

We are anxious to find a cooperator with a trash problem who is willing to work with us to set up such a device in his packing line. We have to work under quite anomalous conditions even to specially requesting loads with trash in them! A short time in a commercial packinghouse line will do far more to "work the bugs out" than a season in our little pilot plant.

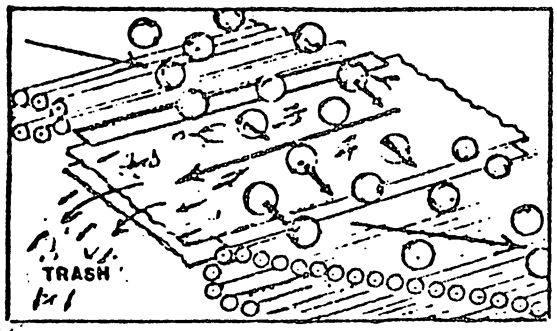

Fig. 1. Principle of sloping belt trash eliminator.

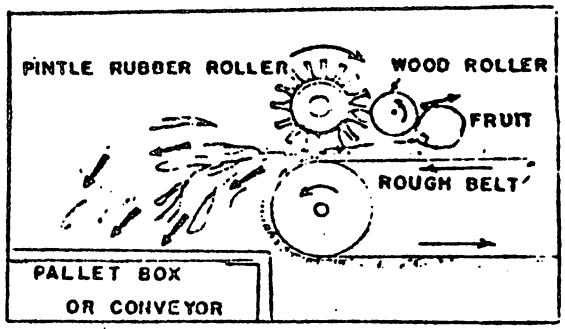

Fig. 2. Principle of the "in-house fruit picker."

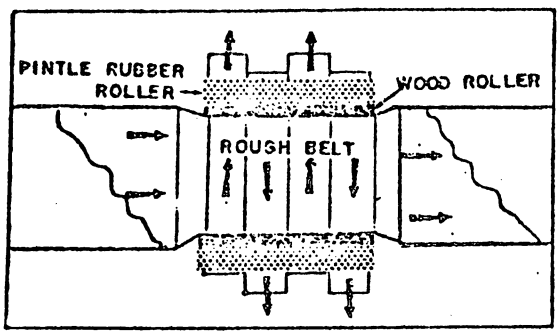

Fig. 3. Possible multiple belt arrangement for a sloping belt trash remover in a high volume packinghouse line.

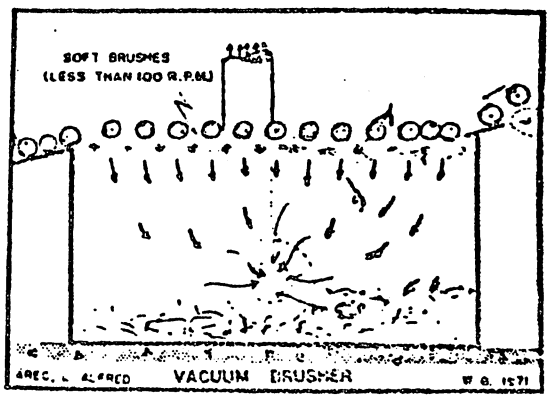

Fig. 4. Vacuum brusher for removal of dust, dirt, scale insects, etc. from citrus fruit prior to the washer.

Vacuum Brusher

This is not a new device. To the best of my knowledge, the first one was built by Cecil Chapman's shop staff at Haines City Growers' Association at least a dozen years ago. Its purpose then was to keep dust and light trash out of the bulk bins. Another was installed at Adam's Fresh Fruit Division to keep trash out of the pre-grade system. Figure 4 shows a diagrammatic representation of a vacuum brusher. The fruit goes over a bed of soft (horsehair or horsehair-grade synthetic) brushes turning slowly (not over 100 rpm). The area under the brushes is completely enclosed with a large fan (about 5,000 cfm), pulling air down through the brushes.

This is obviously an excellent device for reducing the proportion of organic matter such as dust, scale insects, mold spores, leaf and twig fragments, etc. before they have a chance to get into the wash water. Such trash contributes to high B.O.D. levels unacceptable under the new Air & Water Pollution Control Act.

If anybody contemplates building or installing such equipment, we urge them to contact us as we see several fairly obvious improvements which we would like to have incorporated. In particular, we wish to minimize the blowing of particulate matter into the air and also believe that it should be possible to design a vacuum brusher in which removal of the accumulated trash is mechanized.

W. Grierson
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DEGREENING CITRUS FRUIT

The degreening season is beginning, and a reminder of some points could help you avoid an expensive problem. Degreening is necessary because the edible portion of early season fruit usually matures before the peel attains the characteristic varietal color. However, ethylene increases stem-end rot, to degreening time should be as short as possible.

Temperature: 85°F is recommended for degreening. Higher or lower temperatures tend to slow degreening. Florida Department of Citrus regulations prohibit exceeding "85°F by the application of heat, except when the added heat comes from steam released into the atmosphere to increase humidity."

Ethylene: One to 5 ppm gives adequate degreening. Concentration of ethylene in degreening rooms can be easily measured by a portable ethylene analyzer which every packinghouse should have. Ethylene should be accurately metered into the room using the bubble system for smaller rooms (1 bubble for every 10 field-box-capacity of the room) or a flowmeter with integral needle valve for large rooms. See Table 1.

Humidity: 88 to 96% R.H. is recommended and can be maintained by steam later in the season. When room temperatures tend to exceed 85°F, pneumatic water spray nozzles may be necessary. The next Newsletter will have more details on this subject.

Ventilation: One air change per hour with fresh air will prevent an accumulation of carbon dioxide which is given off by the fruit.

Air movement: This should be a minimum of 7.5 cubic feet per box per minute. This is necessary to maintain uniform temperature, ethylene concentration, and humidity and to move the air mixture past each fruit in the degreening room.

Some specific degreening problems are:

Stem-End Rind Breakdown (SERB) is the most common peel injury problem encountered in the degreening season. SERB is caused by low humidity between harvest and waxing, particularly in the degreening room. The fruit dries out causing a dark area around the stem end. Decay, particularly green mold, enters the fruit through this injured peel. Avoid delays between harvest and waxing, and do not expose fruit to the sun or other drying conditions. Additional information on SERB can be found in the Available Publications list in "Practical Measures for Control of Stem-End Rind Breakdown of Oranges" by A. A. McCornack and W. Grierson.

Oleocellosis (oil spotting) can be expected to be severe when wet fruit are roughly handled. The oil cells are prominent on wet, turgid fruit and, hence, easily broken. Not only does this cause the blemish known as oil spotting (oleocellosis), but the broken oil cells are a common point for entry of green mold and other decay organisms. In wet weather, every effort should be made to enforce gentle handling by the pickers. Boxes should not be over-filled, and handling wet fruit should be kept to a minimum. Degreening at lower than recommended humidity makes oil spotting blemishes more prominent.

'Robinson' tangerines: A special word of warning is offered with regard to this valuable fruit. It is very susceptible to several fungi, including anthracnose, which does not usually cause fruit decay in other varieties. 'Robinsons' should

never be held in the degreening room for longer than 36 hours. They should not be picked until showing a definite orange color break. Samples should be picked and degreened to make sure that large quantities are not picked until 36-hour degreening is possible. After packing, they should be refrigerated promptly where possible. These comments also apply to other early season mandarin fruits.

'Temples': 'Temples' are the only citrus fruit known to show a true ethylene burn in serious amounts. A dark colored peel injury may appear any time up to 2 weeks after degreening. When this occurs (all 'Temples' are not susceptible), the amount of the damage is proportional to both time in the degreening room and the amount of ethylene used. Degreening of 'Temples' is not recommended. However, if they are being degreened, ethylene should be kept to the minimum; and the degreening period should be as short as possible.

Zebra skin occurs when tangerines under drought stress receive a heavy rain or irrigation and are then harvested within 2 to 4 days. The loss can be 100%, but the susceptibility slowly declines after the combination of a drought broken by heavy rain or irrigation. For more details on Zebra skin, request "Tangerine Handling" by W. Grierson, A. A, McCornack, and F. W. Hayward from the Available Publication list.

Table 1. Flow rates for ethylene to establish a degreening atmosphere of 1 to 5 ppm ethylene and minimum CO_2.[a]

Size of room[b]			Ethylene flow rate as		
Field boxes	Pallet boxes	Bubbles/ min[c]	cc or ml/ min	liters/ hour	cu ft/ hour
500	50	50	12.5	0.75	0.025
1,000	100	100	25	1.5	0.05
2,000	200	200	50	3.0	0.1
5,000	500	500	125	7.5	0.25
10,000	1,000	1,000	250	15.0	0.5

[a]To be combined with continuous ventilation to keep CO_2 below 0.1% in the room atmosphere.

[b]Ethylene delivery should be proportional to the size of the room but not to the load in the room.

[c]Bubbles from 1/4-inch line in a standard FMC trickle unit.

W. F. Wardowski
Extension Service
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AVAILABLE PUBLICATIONS

Available from Harvesting & Handling Section, Agricultural Research and Education Center, P. O. Box 1088, Lake Alfred, Florida 33850.

"Program and Abstracts for Tenth Annual Packinghouse Day", Mimeo Report AREC-LA 71-32. September 8, 1971.

"Citrus Plant Modernization--A Leap Into the Present" by W. F. Wardowski, C. D. Atkins, and R. D. Carter. Citrus World 8(2):10-12 & 17. July, 1971.

"Status of Postharvest Fungicides for Citrus Fruit," by A. A. McCornack. Proc. Fla. State Hort. Soc. 83:229-232. 1970.

"Peel Injury of Florida Navel Oranges," by A. A. McCornack. Proc. Fla. State Hort. Soc. 83:267-270. 1970.

"A Method of Determining Machinery Operating Costs and Costs of Production Practices in Producing Florida Citrus," by C. L. Anderson and D. L. Deason. Ag. Econ. Report 27, July, 1971. 22 pages.

"Tangerine Handling," by W. Grierson, A. A. McCornack, and F. W. Hayward. Extension Circular 285. May, 1965.

"Practical Measures for Control of Rind Breakdown of Oranges," by A. A. McCornack and W. Grierson. Circular 286. May, 1965.

"A Step Toward Development of a Better Export Citrus Box," talk by Philip W. Hale and R. H. Hinds at Tenth Annual Packinghouse Day, September 8, 1971.

Application for Permit to Operate Air Pollution Sources. 1-D -- 8-D. Department of Air and Water Pollution Control.

Application for Permit to Operate Water Pollution Sources. 1-B --12-B. Department of Air and Water Pollution Control.

Available from CRD, ARS, USDA, 2120 Camden Road, Orlando, Florida 32804.

"Abscission Chemicals in Relation to Citrus Fruit Harvest," by W. C. Cooper and W. H. Henry. J. Agr. and Food Chemistry 19(3):559-563. May/June, 1971.

"Relation of Ethanol Content of Citrus Fruits to Maturity and to Storage Conditions," by Paul L. Davis. Proc. Fla. State Hort. Soc. 83:294-298. 1970.

"Decay Control of Florida Citrus Fruits with Packinghouse Applications of Thiabendazole," by J. J. Smoot and C. F. Melvin. Proc. Fla. State Hort. Soc. 83:225-228. 1970.

"Effects of Washing Sequence on the Degreening Response and Decay of Some Citrus Fruits," by O. L. Jahn, R. H. Cubbedge, and J. J. Smoot. Proc. Fla. State Hort. Soc. 83:217-221. 1970.

Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402 Price: 10 cents.

"Biphenyl Absorption of Citrus Fruits: The Effect of Variety, Color Class, and Injury by Freezing, Peeling, and Lack of Oxygen," by Shirley Norman, C. C. Craft, and D. C. Fouse. ARS, USDA, MRR No. 896. March, 1971.