INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES
UNIVERSITY OF FLORIDA

FLORIDA COOPERATIVE EXTENSION SERVICE

PACKINGHOUSE NEWSLETTER

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Key Word Index Frozen Fruit Separators, Machinery

SEPARATION OF FREEZE DAMAGED DROPS

We had a small demonstration of cutting for freeze damage at the recent Freeze Damaged Fruit Seminar (see Packinghouse Newsletter No. 116). Joe Whigham, Training Office, Florida Division of Fruit & Vegetable Inspection cut and graded two lots of 20 Honey Tangerines. Joe did not know that one lot was harvested off the trees and the second lot was picked up off the ground under the same trees.

The grades for freeze damage were:

Tree Fruit			Drops		
No. 1	No. 2	Cannery	No. 1	No. 2	Cannery
14	2	4	5	2	13

It would pay this grower to disc ahead of the pickers rather than to pay picking and hauling costs for the drops which cannot be shipped as fresh fruit. A doubtful alternative would be to harvest the drops first for the cannery. The best packinghouse frozen fruit separators will eliminate one good fruit with every two frozen fruit so that no gain could be expected from running these drops through a separator.

Each grower can sample fruit from the ground and from the trees to determine what is best for that variety, picking costs, etc. In most cases, it will be most economical to destroy the drops (with less than normal juice) by running a disc or chopper ahead of the pickers.

Will Wardowski
Extension Service
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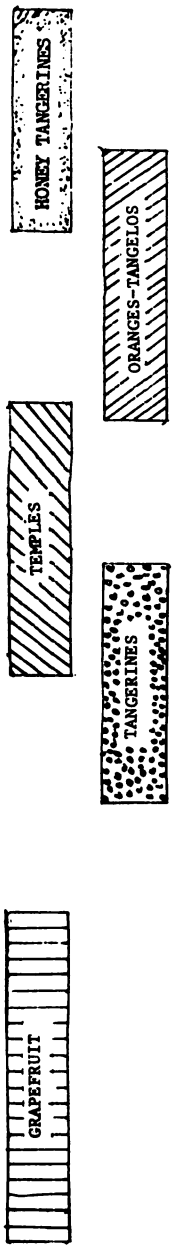
FROZEN FRUIT SEPARATION WITH OIL SEPARATORS

HYDROMETER CONVERSION TABLES

The API scale for determining thedensity of fluids was developed specifically for measuring oil based products. Since Frozen Fruit Separator fluids are composed mainly of light oils, it is best to use this scale for controling the density of the fluid in separators. If hydrometers with the proper API range are not available one with a scale for liquids lighter than water may be substituted. Their readings may be converted to API by the following table. NOTE: all conversions in this table are approximate and are rounded off to the point indicated on the table.

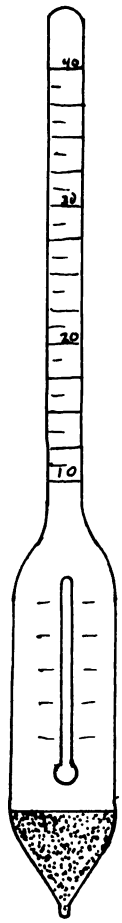


SOUND FRUIT RANGE	API	SPECIFIC GRAVITY	BAUME' °Be'	TRALLE	% ALCOHOL BY WT.
	10	1.000	10	0	0
	11	0.993	11.0	5	4
	12	0.986	12.0	10	9
	13	0.979	13.0	17	14
	14	0.972	14.0	24	20
	15	0.966	15.0	30	25
	16	0.959	16.0	35	29
	17	0.953	16:9	39	32
	18	0.946	17.9	44	37
	19	0.940	18.9	47	40
	20	0.933	19.9	50	42
	21	0.928	20.9	53	45
	22	0.922	21.9	56	48
	23	0.916	22.9	59	51
	24	0.910	23.9	61	54
	25	0.904	24.9	64	56
	26	0.898	25.9	67	59
	27	0.893	26.8	69	60
	28	0.887	27.8	71	64
	29	0.882	28.8	73	66
	30	0.876	29.8	75	68
	31	0.871	30.8	78	70
	32	0.865	31.8	79	72
	33	0.860	32.8	81	75
	34	0.854	33.8	84	78
	35	0.850	34.7	85	79
	36	0.845	35.7	87	82
	37	0.840	36.7	88	83
	38	0.835	37.7	90	85
	39	0.830	38.7	92	87
	40	0.825	39.7	93	89
	41	0.820	40.7	94	91
	42	0.816	41.6	95	92
	43	0.811	42.6	96	94
	44	0.806	43.6	98	97
	45	0.802	44.6	99	99
	46	0.797	45.6		
	47	0.793	46.6		
	48	0.788	47.5		
	49	0.784	48.5		
	50	0.780	49.5		
	51	0.775	50.5		
	52	0.771	51.5		
	53	0.767	52.5		
	54	0.763	53.5		
	55	0.759	54.5		

TEMPERATURE ADJUSTMENT

The density of fluids change with the temperature. Determine the calibration temperature of your hydrometer (Usually 60°F). Then for each 10 degrees F that the liquid is below this temperature add one degree API. For each 10 degrees that the liquid is above this temp. subtract one degree API.

For other scales, if no chart is available, convert to API then adjust.



A PROCEDURE FOR DETERMINING FLUID DENSITY TO USE:

A. Select, as near as possible, a representative sample of the lot to be separated. Place enough fruit to loosely cover the bottom of a container of 5 gallons or greater capacity. Add separator fluid, of a density that no fruit will float, to about 1/3 the capacity of the container.

B. Gradually add water with stirring until some fruit floats. Measure and record the density (API) of the fluid.

C. Cut floating fruit and inspect for freeze damage. If all are damaged beyond an acceptable level continue adding water as in B. When some fruit that is acceptable floats, cut the fruit remaining in the bottom of the container, if all are acceptable use this density for main tank.

NOTE: 1) Several samples should be tried in the small container until the optimum density is determined. 2) Each lot may vary as to the necessary density for best separation. 3) Fruit with air spaces inside are very difficult to separate efficiently.

DETERMINING DENSITY OF SEPARATOR FLUID:

Fill a cylinder with enough fluid that it will overflow when the hydrometer is inserted. Set cylinder on a level surface and gently lower hydrometer so that it does not violently strike bottom (fragile). When hydrometer has settled down and is not touching the side, read by sighting across the surface of the fluid.

Dave Hall
Agri-Chem, Inc., Orlando

Mineral spirits are actually used in most "oil" separators. Editor

API* RULE OF THUMB

Three companies shared their API separator guidelines with us at our Freeze Damaged Fruit Seminar. These values are not identical, but are in general agreement for each variety.

Variety	Agri-Chem	American Machinery	Fresh Mark**
		API	
Honey Tangerines	16-22	17-19	16-20
Oranges	20-28	23-26	22-27
Tangelos	20-28	23-27	22-28
Temples	28-36	27-33	28-34
Tangerines	33-40	35-39	34-40
Grapefruit	44-54	47-54	46-54

*American Petroleum Institute standard for measuring density of liquids lighter than water.

**Approximate measurements: each crop varies.

Will Wardowski
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AVAILABLE PUBLICATIONS

Available from Dr. W. Wardowski, AREC, P. O. Box 1088, Lake Alfred, FL 33850

"Separation and grading of freeze damaged citrus fruits" by W. F. Wardowski and W. Grierson. Fla. Coop. Ext. Serv. Circ. 372. April 1972.

"Grove heating: some thermodynamic considerations" by W. Grierson. Fla. State Hort. Soc. 77:87-93. 1964.

Available from Mr. A. F. G. Smith, Research & Technical Dept., South African Co-operative Citrus Exchange, Ltd., P. O. Box 1158, Pretoria 0002, South Africa.

"The picking, handling and packing of soft citrus cultivars" by A. F. G. Smith. 32 pages. May 1980.

This is an excellent publication borrowing from and expanding on information in "Packingline machinery for Florida citrus packinghouses," Bulletin 803, University of Florida. Editor.

Available from Mr. David Hall, Agri-Chem, Inc., Box 17477, Orlando, FL 32860

"Frozen fruit separation with oil separators" by D. Hall. 1981.

This information is in this issue of Packinghouse Newsletter and available on card stock. Editor.

Available from Suzanne Masson, University Extension, University of California, Davis, CA 95616.

Description and Registration Forms for Postharvest Technology Short Course, June 22-July 3, 1981. Five days of lecture and discussion plus a five-day field trip.

Available from Dr. Fred Davies, Fruit Crops Dept., HS&PP Building, University of Florida, Gainesville, FL 32611

"Factors associated with excessive fruit drop of Navel orange" by J. E. O. deLima, F. S. Davies and A. H. Krezdorn. Journal Amer. Soc. Hort. Sci. 105(6):902-906. 1980.

Available from USDA, Foreign Agricultural Service, Washington, D. C. 20250

"Fresh and processed citrus fruit. Slight decline forecast in Northern Hemisphere citrus production." FCF 1-81. 29 pages. January 1981.

"Fresh and processed citrus fruit. Southern Hemisphere citrus production up in 1980; Northern Hemisphere also rose in 1979/80." FCF 2-80. 21 pages. July 1980.

This newsletter is published at a cost of $90.68 or 8¢ cents per copy, to give the latest news to the packinghouse industry.

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