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# A STUDY OF THE DEGREES BRIX AND BRIX-ACID RATIOS OF TANGERINES UTILIZED BY FLORIDA CITRUS PROCESSORS FOR THE SEASONS 1953-54 THROUGH 1956-57, AND 1958-59

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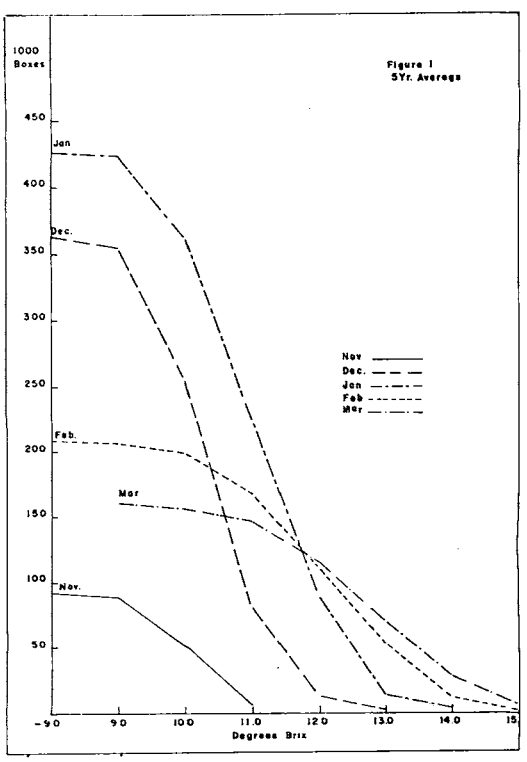
As a corollary to our report to the citrus industry on the study of the degrees Brix and the Brix-acid ratios of grapefruit (1), and on oranges (2), a similar study on the Brix and Brix-acid ratios of tangerines has been made at the request of several processors of tangerines and of other members of the industry. Very little detailed information of this nature has been available in the past, presumably because there has been little interest in designing quality standards for tangerines for processing, although occasional requests have been made to this Division for individual plant tabulations.

In addition to the fact that tangerines are a tender-skinned, highly-perishable fruit with a short marketing period, potential utilization of this fruit by processors is complicated by still other factors:

(1) The available tonnage is limited. The



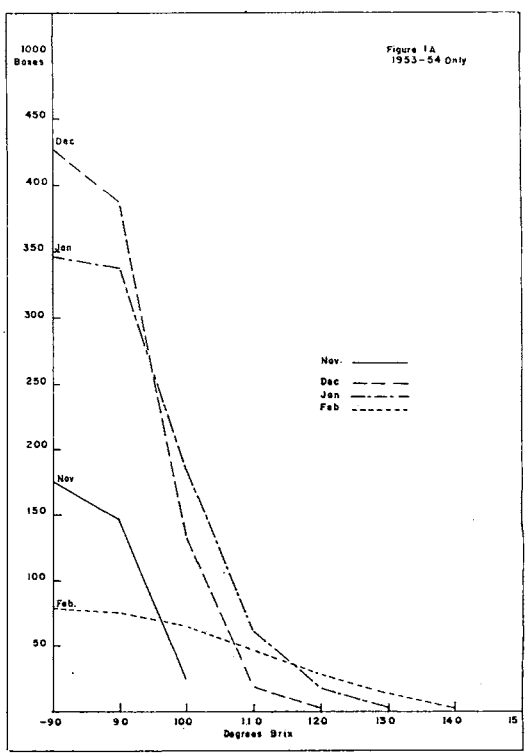



Table 1: Percent of Loads Meeting Various Degrees Brix-Ratio Combinations

NOVEMBER

1958-59: (99,000 Boxes)

| °Brix | RATIO -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | | 0.2% | | | | | | | | | 0.2% |
| 9 | 0.9 | 7.5 | 7.3 | 2.0 | 0.2 | | | | | | | | 17.9 |
| 10 | 10.1 | 27.9 | 20.6 | 5.5 | 0.7 | | | | | | | | 64.8 |
| 11 | 4.0 | 7.7 | 4.8 | 0.2 | | | 0.2 | | | | | | 16.9 |
| 12 | | | 0.2 | | | | | | | | | | 0.2 |
| 13 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 15 & Up | | | | | | | | | | | | | |
| Total | 15.0% | 43.1% | 32.9% | 7.9% | 0.9% | | 0.2% | | | | | | 100.0% |

1956-57: (106,209 Boxes)

| °Brix | RATIO -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | 0.4% | 0.2% | 0.7% | 0.4% | | | | | | | | 1.7% |
| 9 | | 8.2 | 20.1 | 13.7 | 6.8 | 2.9 | 1.1 | | | | | | 52.8 |
| 10 | 1.1 | 12.1 | 11.2 | 9.5 | 2.9 | 0.9 | 0.7 | 0.2 | | | | | 38.6 |
| 11 | 0.7 | 1.8 | 3.1 | 0.7 | | 0.2 | | | | | | | 6.5 |
| 12 | | | | | | | | | | | | | 0.4 |
| 13 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 15 & Up | | | | | | | | | | | | | |
| Total | 1.8% | 22.5% | 35.0% | 24.6% | 10.1% | 4.0% | 1.8% | 0.2% | | | | | 100.0% |

1955-56: (55,089 Boxes)

| °Brix | RATIO -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | | | | | | | | | | | |
| 9 | 1.0% | 18.2% | 13.6% | 6.6% | 1.0% | 0.5% | | | | | | | 40.9% |
| 10 | 1.5 | 20.7 | 26.3 | 7.6 | | 1.5 | | | | | | | 57.6 |
| 11 | | 1.0 | 0.5 | | | | | | | | | | 1.5 |
| 12 | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 15 & Up | | | | | | | | | | | | | |
| Total | 2.5% | 39.9% | 40.4% | 14.2% | 1.0% | 2.0% | | | | | | | 100.0% |

1954-55: (26,379 Boxes)

| °Brix | RATIO -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | | | | | | | | | | | |
| 9 | 1.1% | 6.7% | 11.1% | 4.4% | 1.1% | | | | | | | | 24.4% |
| 10 | 5.6 | 25.6 | 16.7 | 11.1 | 5.6 | | | | | | | | 64.6 |
| 11 | 4.4 | 4.4 | 2.2 | | | | | | | | | | 11.0 |
| 12 | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 15 & Up | | | | | | | | | | | | | |
| Total | 11.1% | 36.7% | 30.0% | 15.5% | 6.7% | | | | | | | | 100.0% |

1953-54: (175,087 Boxes)

| °Brix | RATIO -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | 0.9% | 2.6% | 3.7% | 4.2% | 3.4% | 1.2% | 0.3% | 0.3% | 0.1% | | 16.7% |
| 9 | | 1.7% | 13.5 | 18.9 | 16.2 | 9.3 | 6.5 | 1.2 | 0.8 | 0.1 | 0.1 | | 68.3 |
| 10 | 0.1% | 2.4 | 4.9 | 4.2 | 2.0 | 0.9 | 0.3 | | | | | | 14.8 |
| 11 | | | 0.1 | 0.1 | | | | | | | | | 0.2 |
| 12 | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 15 & Up | | | | | | | | | | | | | |
| Total | 0.1% | 4.1% | 19.4% | 25.8% | 21.9% | 14.4% | 10.2% | 2.4% | 1.1% | 0.4% | 0.2% | | 100.0% |

Table 2: Percent of Loads Meeting Various Degrees Brix-Ratio Combinations

DECEMBER

1958-59: (377,965 Boxes)

| °Brix | -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | 0.2% | | 0.1% | 0.1% | | | | | | | 0.4% |
| 9 | | 2.7% | 5.5 | 4.7% | 2.5 | 0.6 | 0.1% | | | | | | 16.1 |
| 10 | 0.9% | 9.6 | 17.0 | 15.3 | 6.8 | 2.2 | 0.1 | | | | | | 51.9 |
| 11 | 1.1 | 5.6 | 9.7 | 6.9 | 2.2 | 0.6 | 0.1 | | | | | | 26.2 |
| 12 | 0.3 | 1.0 | 1.4 | 0.6 | 0.5 | | | | | | | | 3.8 |
| 13 | 0.1 | 0.2 | 0.5 | 0.7 | | | | | | | | | 1.5 |
| 14 | | | | 0.1 | | | | | | | | | 0.1 |
| 15 & Up | | | | | | | | | | | | | |
| Total | 2.4% | 19.1% | 34.3% | 28.3% | 12.1% | 3.5% | 0.3% | | | | | | 100.0% |

1956-57: (395,167 Boxes)

| °Brix | -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | 0.1% | 0.1% | 0.2% | 0.2% | | 0.2% | 0.1% | | | | | | 0.9% |
| 9 | 0.2 | 2.1 | 5.9 | 7.4 | 6.4 | 3.5 | 1.5 | 0.3% | 0.1% | | | | 27.4 |
| 10 | 1.5 | 8.3 | 12.0 | 13.1 | 9.0 | 4.7 | 1.8 | 1.0 | 0.3 | | | | 51.7 |
| 11 | 1.0 | 3.9 | 5.4 | 4.0 | 1.9 | 1.0 | 0.1 | | | 0.1% | | | 17.4 |
| 12 | 0.3 | 0.5 | 0.6 | 0.8 | 0.2 | 0.2 | | | | | | | 2.6 |
| 13 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 15 & Up | | | | | | | | | | | | | |
| Total | 3.1% | 14.9% | 24.1% | 25.5% | 17.5% | 9.6% | 3.5% | 1.3% | 0.4% | 0.1% | | | 100.0% |

1955-56: (322,450 Boxes)

| °Brix | -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | 0.1% | | 0.1% | 0.2% | 0.1% | 0.1% | 0.2% | 0.1% | | | | | 0.9% |
| 9 | 0.3 | 4.5% | 8.5 | 5.5 | 2.8 | 1.3 | 0.3 | 0.3 | 0.2% | | | | 23.7 |
| 10 | 2.8 | 12.5 | 19.8 | 14.4 | 4.5 | 2.1 | 0.1 | 0.1 | | | | | 56.3 |
| 11 | 1.4 | 3.6 | 6.1 | 3.9 | 1.9 | 0.4 | 0.4 | 0.1 | | | | | 17.8 |
| 12 | 0.1 | 0.3 | 0.3 | 0.1 | | | 0.1 | | | | | | 0.9 |
| 13 | | 0.1 | 0.1 | 0.1 | | | | | | | | | 0.3 |
| 14 | | | | 0.1 | | | | | | | | | 0.1 |
| 15 & Up | | | | | | | | | | | | | |
| Total | 4.7% | 21.0% | 34.9% | 24.3% | 9.3% | 3.9% | 1.1% | 0.6% | 0.2% | | | | 100.0% |

1954-55: (290,315 Boxes)

| °Brix | -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | | | | | | | | | | | |
| 9 | 0.1% | 2.2% | 3.3% | 2.1% | 1.0% | 0.3% | | | | | | | 9.0% |
| 10 | 3.6 | 16.7 | 19.2 | 11.3 | 3.4 | 0.7 | 0.1% | | | | | | 55.0 |
| 11 | 2.2 | 10.0 | 9.1 | 4.0 | 2.3 | 0.4 | 0.2 | 0.1% | | | | | 28.3 |
| 12 | 1.0 | 2.7 | 2.2 | 0.7 | 0.1 | 0.3 | | | | | | | 7.0 |
| 13 | 0.5 | 0.1 | 0.1 | | | | | | | | | | 0.7 |
| 14 | | | | | | | | | | | | | |
| 15 & Up | | | | | | | | | | | | | |
| Total | 7.4% | 31.7% | 33.9% | 18.1% | 6.8% | 1.7% | 0.3% | 0.1% | | | | | 100.0% |

1953-54: (427,854 Boxes)

| °Brix | -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | | 0.1% | 0.1% | 0.7% | 2.3% | 2.2% | 2.3% | 0.8% | 0.6% | 0.3% | 9.4% |
| 9 | | 1.3% | 1.0% | 1.1 | 4.4 | 9.5 | 15.7 | 12.1 | 7.7 | 4.1 | 2.0 | 0.5 | 59.4 |
| 10 | | 0.2 | 1.1 | 3.0 | 5.1 | 6.1 | 5.1 | 3.8 | 1.7 | 0.5 | 0.2 | | 26.8 |
| 11 | | | 0.2 | 0.8 | 1.2 | 1.0 | 0.4 | 0.3 | | | | | 3.9 |
| 12 | | | | 0.2 | 0.1 | 0.1 | | | | 0.1 | | | 0.5 |
| 13 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 15 & Up | | | | | | | | | | | | | |
| Total | | 1.5% | 2.3% | 5.2% | 10.9% | 17.4% | 23.5% | 18.4% | 11.7% | 5.5% | 2.8% | 0.8% | 100.0% |

Table 3: Percent of Loads Meeting Various Degrees Brix-Ratio Combinations

JANUARY

1958-59: (806,151 Boxes)

| °Brix | RATIO -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | | 0.1% | | | 0.1% | | | | | | 0.2% |
| 9 | 0.1% | 0.3% | 0.8% | 1.8 | 1.7% | 1.1% | 0.6 | 0.2% | 0.1% | | | | 6.7 |
| 10 | 0.4 | 1.9 | 3.7 | 6.8 | 5.8 | 4.6 | 2.3 | 1.2 | 0.6 | 0.2% | 0.1% | 0.1% | 27.7 |
| 11 | 0.4 | 2.0 | 6.1 | 8.4 | 8.9 | 5.9 | 4.0 | 2.1 | 0.8 | 0.3 | 0.1 | | 39.0 |
| 12 | 0.2 | 1.0 | 2.3 | 4.3 | 4.3 | 3.3 | 2.0 | 1.0 | 0.4 | | 0.1 | | 18.9 |
| 13 | 0.1 | 0.2 | 0.4 | 1.7 | 1.2 | 0.9 | 0.8 | 0.3 | 0.1 | 0.1 | | | 5.8 |
| 14 | | 0.1 | 0.1 | 0.4 | 0.5 | 0.2 | 0.1 | 0.2 | | | | | 1.6 |
| 15 & Up | | | | | 0.1 | | | | | | | | 0.1 |
| Total | 1.2% | 5.5% | 13.4% | 23.5% | 22.5% | 16.0% | 9.9% | 5.0% | 2.0% | 0.6% | 0.3% | 0.1% | 100.0% |

1956-57: (361,034 Boxes)

| °Brix | RATIO -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | | | | | | | | | | | |
| 9 | | 0.1% | 0.5% | 0.6% | 0.8% | 0.3% | 0.4% | 0.3% | 0.1% | 0.1% | | | 3.2% |
| 10 | 0.1% | 1.3 | 2.2 | 5.5 | 6.9 | 5.7 | 3.9 | 2.5 | 1.5 | 0.6 | | | 30.2 |
| 11 | 0.8 | 2.4 | 3.3 | 5.2 | 8.1 | 7.2 | 4.9 | 3.9 | 1.8 | 0.7 | 0.1% | 0.1% | 38.5 |
| 12 | 0.4 | 1.0 | 3.6 | 5.2 | 3.8 | 3.8 | 1.6 | 1.2 | 1.2 | 0.1 | 0.1 | 0.1 | 22.1 |
| 13 | 0.1 | 0.5 | 0.4 | 0.9 | 0.9 | 0.5 | 0.9 | 0.4 | 0.4 | 0.1 | | | 5.1 |
| 14 | 0.1 | 0.1 | 0.1 | 0.1 | 0.4 | | 0.1 | | | | | | 0.9 |
| 15 & Up | | | | | | | | | | | | | |
| Total | 1.5% | 5.4% | 10.1% | 17.5% | 20.9% | 17.5% | 11.8% | 8.3% | 5.0% | 1.6% | 0.2% | 0.2% | 100.0% |

1955-56: (278,244 Boxes)

| °Brix | RATIO -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | 0.1% | 0.2% | 0.1% | | | | | | | | | | 0.4% |
| 9 | 0.1 | 0.6 | 2.6 | 3.4% | 3.1% | 2.3% | 0.3% | 0.2% | 0.2% | 0.1% | | | 12.9 |
| 10 | 0.3 | 1.6 | 5.3 | 11.5 | 8.9 | 4.6 | 1.4 | 0.9 | 0.2 | 0.1 | | 0.1% | 34.9 |
| 11 | 0.4 | 3.1 | 4.6 | 6.2 | 5.8 | 3.6 | 2.6 | 1.0 | 1.3 | 0.9 | 0.2% | 0.3 | 30.0 |
| 12 | 0.4 | 1.6 | 2.6 | 3.3 | 2.7 | 2.5 | 1.6 | 0.6 | 0.4 | 0.3 | 0.1 | 0.5 | 16.6 |
| 13 | | 0.4 | 0.6 | 0.9 | 0.6 | 0.7 | 0.8 | 0.2 | 0.1 | | | 0.1 | 4.4 |
| 14 | | 0.1 | | 0.1 | 0.2 | 0.1 | | 0.1 | | | | | 0.6 |
| 15 & Up | | | 0.1 | 0.1 | | | | | | | | | 0.2 |
| Total | 1.3% | 7.6% | 15.9% | 25.5% | 21.3% | 13.8% | 6.7% | 3.0% | 2.2% | 1.4% | 0.3% | 1.0% | 100.0% |

1954-55: (335,524 Boxes)

| °Brix | RATIO -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | | | | | | | | | | | |
| 9 | | 0.2% | 0.8% | 1.6% | 0.7% | 0.1% | 0.1% | 0.1% | | | | | 3.6% |
| 10 | 0.1% | 1.8 | 6.9 | 10.1 | 7.6 | 3.3 | 1.5 | 0.8 | 0.5% | | | | 32.6 |
| 11 | 0.5 | 1.4 | 8.3 | 10.5 | 9.4 | 5.8 | 3.1 | 1.1 | 0.5 | 0.3% | 0.2% | 0.1% | 41.2 |
| 12 | 0.3 | 1.7 | 3.9 | 5.2 | 3.1 | 3.1 | 1.2 | 0.3 | 0.1 | 0.1 | | | 19.0 |
| 13 | | 0.3 | 0.8 | 1.1 | 0.7 | 0.3 | 0.1 | | | | | | 3.3 |
| 14 | | 0.1 | 0.1 | 0.1 | | | | | | | | | 0.3 |
| 15 & Up | | | | | | | | | | | | | |
| Total | 0.9% | 5.5% | 20.8% | 28.6% | 21.5% | 12.6% | 6.0% | 2.3% | 1.1% | 0.4% | 0.2% | 0.1% | 100.0% |

1953-54: (347,086 Boxes)

| °Brix | RATIO -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | 0.1% | | | | 0.1% | 0.2% | 0.7% | 0.5% | 0.3% | 0.4% | 2.3% |
| 9 | | 0.2% | 1.5 | 5.1% | 3.0% | 2.6% | 2.8 | 3.1 | 4.3 | 8.2 | 6.4 | 6.7 | 43.9 |
| 10 | | | 0.2 | 1.9 | 1.5 | 2.1 | 2.5 | 3.6 | 6.0 | 6.1 | 4.2 | 7.7 | 35.8 |
| 11 | | | | 0.3 | 0.9 | 1.4 | 2.1 | 1.5 | 1.8 | 1.4 | 1.1 | 2.4 | 12.9 |
| 12 | | | | 0.1 | 0.5 | 0.5 | 0.8 | 0.7 | 0.4 | 0.7 | 0.3 | 0.5 | 4.5 |
| 13 | | | | | | 0.1 | 0.1 | | | 0.1 | 0.1 | 0.1 | 0.5 |
| 14 | | | | | | | | | | | | 0.1 | 0.1 |
| 15 & Up | | | | | | | | | | | | | |
| Total | | 0.2% | 1.8% | 7.4% | 5.9% | 6.7% | 8.4% | 9.1% | 13.2% | 17.0% | 12.4% | 17.9% | 100.0% |

Table 4: Percent of Loads Meeting Various Degrees Brix-Ratio Combinations

F E B R U A R Y

1958-59: (290,268 Boxes)

| °Brix | RATIO -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | 0.1% | | | | 0.1% | | | | | | 0.2% |
| 9 | | 0.1% | 0.2 | 0.6% | 0.2% | 0.3% | 0.7 | 0.4% | | 0.2% | | | 2.7 |
| 10 | | 0.1 | 0.3 | 2.1 | 3.1 | 3.9 | 3.4 | 3.6 | 2.9% | 0.8 | 0.4% | 0.2% | 20.8 |
| 11 | | 0.2 | 1.4 | 1.9 | 3.5 | 5.2 | 7.7 | 4.8 | 4.4 | 2.9 | 1.0 | 1.0 | 34.0 |
| 12 | | | 0.2 | 2.3 | 3.2 | 3.7 | 4.5 | 4.5 | 3.8 | 2.1 | 1.0 | 0.7 | 26.0 |
| 13 | | | 0.5 | 1.0 | 2.1 | 1.4 | 1.4 | 2.6 | 1.5 | 1.0 | 0.2 | 0.5 | 12.2 |
| 14 | | | 0.1 | 0.3 | 0.9 | 0.7 | 0.8 | 0.2 | 0.3 | 0.1 | | | 3.4 |
| 15 & Up | | | 0.1 | 0.2 | | 0.3 | 0.1 | | | | | | 0.7 |
| Total | | 0.4% | 2.9% | 8.4% | 13.0% | 15.5% | 18.7% | 16.1% | 12.9% | 7.1% | 2.6% | 2.4% | 100.0% |

1956-57: (202,367 Boxes)

| °Brix | RATIO -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | 0.1% | | | | | | | | | | 0.1% |
| 9 | | | 0.1 | | 0.1% | | 0.1% | 0.1% | 0.1% | 0.1% | | 0.1% | 0.7 |
| 10 | | | | 0.1% | 0.6 | 1.1% | 1.2 | 0.8 | 2.4 | 1.4 | 0.8% | 0.7 | 9.1 |
| 11 | | | 0.4 | 0.5 | 3.9 | 3.9 | 4.6 | 4.7 | 3.3 | 3.3 | 1.1 | 1.9 | 27.6 |
| 12 | | 0.1% | 0.2 | 1.4 | 2.9 | 4.3 | 5.0 | 4.5 | 5.0 | 2.8 | 1.6 | 2.1 | 29.9 |
| 13 | | | 0.4 | 1.2 | 2.3 | 3.4 | 4.5 | 5.5 | 2.6 | 3.2 | 0.8 | 0.7 | 24.6 |
| 14 | | 0.2 | 0.6 | 0.9 | 0.4 | 0.9 | 0.7 | 1.2 | 0.4 | 0.1 | 0.2 | | 5.6 |
| 15 & Up | | | 0.8 | 0.6 | 0.4 | 0.4 | 0.1 | 0.1 | | | | | 2.4 |
| Total | | 0.3% | 2.6% | 4.7% | 10.6% | 14.0% | 16.2% | 16.9% | 13.8% | 10.9% | 4.5% | 5.5% | 100.0% |

1955-56: (184,377 Boxes)

| °Brix | RATIO -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | | | | | 0.3% | | | | | | 0.3% |
| 9 | | | 0.1% | 0.3% | 0.3% | 0.3% | | 0.2% | | | 0.1% | 0.1% | 1.4 |
| 10 | | 0.2% | 0.1 | 1.2 | 1.9 | 1.5 | 1.0 | 0.6 | 1.0% | 1.0% | 0.9 | 0.8 | 10.2 |
| 11 | | | 0.3 | 1.3 | 2.2 | 3.6 | 2.7 | 2.3 | 3.3 | 1.9 | 2.0 | 2.2 | 21.8 |
| 12 | | 0.2 | 1.2 | 2.6 | 3.5 | 6.8 | 5.1 | 3.7 | 3.1 | 1.9 | 0.6 | 0.3 | 29.0 |
| 13 | | 0.2 | 1.2 | 2.6 | 3.5 | 6.6 | 5.7 | 4.6 | 2.0 | 0.9 | 0.7 | 0.1 | 28.1 |
| 14 | | 0.9 | 0.5 | 1.0 | 1.0 | 1.3 | 0.7 | 0.9 | 0.7 | 0.2 | 0.3 | 0.1 | 7.6 |
| 15 & Up | 0.1% | 0.1 | 0.3 | 0.4 | 0.3 | 0.4 | | | | | | | 1.6 |
| Total | 0.1% | 1.6% | 3.7% | 9.4% | 12.7% | 20.5% | 15.5% | 12.3% | 10.1% | 5.9% | 4.6% | 3.6% | 100.0% |

1954-55: (287,524 Boxes)

| °Brix | RATIO -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | 0.1% | | 0.1% | | | | | | | | | 0.2% |
| 9 | | | 0.1% | 0.4 | 0.1% | 0.4% | 0.1% | 0.4% | | | 0.1% | 0.1% | 1.7 |
| 10 | | | 0.4 | 1.4 | 3.2 | 2.8 | 1.7 | 1.0 | 1.4% | 0.4% | 0.3 | | 12.6 |
| 11 | | 0.1 | 0.8 | 2.9 | 5.9 | 4.7 | 3.4 | 2.8 | 2.6 | 2.1 | 1.6 | 1.4 | 28.3 |
| 12 | 0.1% | 0.3 | 0.6 | 3.2 | 6.1 | 6.6 | 5.4 | 3.0 | 1.6 | 1.9 | 1.6 | 1.9 | 32.3 |
| 13 | 0.1 | 0.1 | 0.4 | 2.4 | 3.9 | 3.4 | 3.2 | 2.7 | 2.1 | 0.4 | 0.2 | 0.6 | 19.5 |
| 14 | 0.1 | | 0.4 | 0.9 | 1.2 | 0.9 | 0.7 | 0.5 | 0.1 | 0.1 | 0.1 | | 5.0 |
| 15 & Up | | | | 0.2 | | | 0.1 | 0.1 | | | | | 0.4 |
| Total | 0.3% | 0.6% | 2.7% | 11.5% | 20.4% | 18.8% | 14.6% | 10.5% | 7.8% | 4.9% | 3.9% | 4.0% | 100.0% |

1953-54: (78,241 Boxes)

| °Brix | RATIO -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | | | | | | 0.3% | | 0.6% | 0.6% | 1.1% | 2.6% |
| 9 | | | | | 0.3% | | 0.3% | 0.8 | 3.7% | 1.4 | 2.3 | 4.5 | 13.3 |
| 10 | | | | | | | 0.3 | 1.4 | 3.1 | 2.3 | 1.7 | 13.7 | 22.5 |
| 11 | | | | 0.3% | | | 0.3 | 2.3 | 1.7 | 2.8 | 3.9 | 12.1 | 23.4 |
| 12 | | | | | | | | 1.4 | 1.1 | 2.0 | 2.5 | 13.8 | 20.8 |
| 13 | | | | | | | 0.6 | 0.8 | 1.4 | 0.8 | 3.4 | 7.0 | 14.0 |
| 14 | | | | | | | | 0.6 | 0.8 | 0.3 | | 1.4 | 3.1 |
| 15 & Up | | | | | | | | | 0.3 | | | | 0.3 |
| Total | | | | 0.3% | 0.3% | | 1.5% | 7.6% | 12.1% | 10.2% | 14.4% | 53.6% | 100.0% |

average production of tangerines in Florida is in the order of about 4½ million boxes annually, compared to grapefruit at 35 million and oranges at more than 90 million boxes. Most of this tonnage is shipped as fresh fruit, with processors utilizing only about one million boxes per season (3).

(2) The quality of the available tonnage is restricted. Tangerines are grown primarily for the fresh fruit market, and much of the fruit used by processors is made up of eliminations from the fresh fruit packing operations. In addition, most of the so-called "grove-run" tangerines utilized for concentrate purposes have usually been picked from blocks which have already been "spot-picked" for the fresh fruit market. Further, in many instances, tangerines, which may be of good processing quality, are abandoned on the tree after one or two "pickings", because they are not suitable for fresh operations. Hence, economics, as well as quality and size of fruit, exert a very great influence over that portion of the tangerine crop available to processors.

(3) Handling and processing techniques are not as routine for tangerines as for oranges and grapefruit. Due to the very nature of the fruit, picking, hauling, unloading, storage, and grading problems are both expensive and tedious. Conveying systems were not designed for

Table 5: Percent of Loads Meeting Various Degrees Brix-Ratio Combinations

MARCH

1956-57: (177,955 Boxes)

| °Brix | -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | | | | | | | | | | | |
| 9 | | 0.1% | | 0.2% | 0.1% | 0.2% | 0.3% | 0.5% | 0.2% | | | 0.2% | 1.8% |
| 10 | | 0.2 | 0.3% | 0.6 | 0.7 | 0.9 | 1.8 | 0.9 | 0.7 | 0.3% | 1.0% | 1.2 | 8.6 |
| 11 | | | 0.2 | 0.8 | 1.5 | 2.8 | 2.9 | 2.1 | 4.2 | 2.1 | 2.1 | 5.7 | 24.4 |
| 12 | | | 0.2 | 0.5 | 0.9 | 2.8 | 2.4 | 3.3 | 5.3 | 3.4 | 3.5 | 5.0 | 27.3 |
| 13 | | 0.2 | 0.2 | 0.3 | 2.6 | 3.5 | 4.0 | 2.6 | 3.0 | 1.8 | 1.1 | 1.8 | 21.1 |
| 14 | | 0.1 | 0.1 | 0.6 | 0.9 | 2.0 | 1.8 | 2.2 | 0.8 | 1.4 | 0.7 | 0.3 | 10.9 |
| 15 & Up | | | 0.1 | 0.4 | 1.4 | 0.9 | 1.4 | 0.7 | 0.7 | 0.3 | | | 5.9 |
| Total | | 0.6% | 1.1% | 3.4% | 8.1% | 13.1% | 14.6% | 12.3% | 14.9% | 9.3% | 8.4% | 14.2% | 100.0% |

1955-56: (137,626 Boxes)

| °Brix | -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | | | 0.2% | | | | | | | | 0.2% |
| 9 | | | | 0.3% | 0.2 | 0.5% | 0.2% | 0.3% | 0.3% | 0.3% | 0.3% | 0.5% | 2.9 |
| 10 | | | | | 0.2 | 0.6 | 0.7 | 0.2 | 1.0 | 0.9 | 0.3 | 1.5 | 5.4 |
| 11 | | | 0.2% | 0.9 | 0.9 | 0.7 | 1.9 | 1.6 | 1.9 | 2.2 | 2.7 | 5.0 | 18.0 |
| 12 | | | 0.2 | 0.3 | 0.2 | 3.0 | 3.7 | 4.6 | 4.4 | 3.7 | 3.7 | 4.7 | 28.5 |
| 13 | | | 0.2 | 0.3 | 0.3 | 1.2 | 4.3 | 4.9 | 6.1 | 5.2 | 2.0 | 3.9 | 28.4 |
| 14 | | | 0.2 | | 0.5 | 0.7 | 1.0 | 2.4 | 2.7 | 1.9 | 1.6 | 1.8 | 12.8 |
| 15 & Up | | | | 0.2 | | 0.7 | 1.0 | 0.6 | 0.3 | 0.5 | 0.2 | 0.3 | 3.8 |
| Total | | | 0.8% | 2.0% | 2.5% | 7.4% | 12.8% | 14.6% | 16.7% | 14.7% | 10.8% | 17.7% | 100.0% |

1954-55: (163,722 Boxes)

| °Brix | -8-1 | 8-1 | 9-1 | 10-1 | 11-1 | 12-1 | 13-1 | 14-1 | 15-1 | 16-1 | 17-1 | 18-1 & Up | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -9 | | | | | | | | | | | | | |
| 9 | | 0.1% | | | | | | | | | 0.1% | 0.1% | 0.3% |
| 10 | | 0.1 | | 0.1% | 0.2% | 0.7% | 0.4% | 0.9% | 1.1% | 0.2% | 0.7 | 0.6 | 5.0 |
| 11 | | | | 0.1 | 0.6 | 0.4 | 1.6 | 2.7 | 1.7 | 1.7 | 1.6 | 5.8 | 16.2 |
| 12 | | 0.1 | 0.1% | 0.5 | 1.2 | 1.8 | 2.8 | 2.8 | 4.4 | 4.9 | 3.8 | 7.5 | 29.9 |
| 13 | | | 0.1 | 0.5 | 1.8 | 1.5 | 3.6 | 4.7 | 4.4 | 2.9 | 2.3 | 7.5 | 29.3 |
| 14 | | | 0.4 | 0.7 | 1.1 | 1.5 | 1.2 | 1.7 | 2.1 | 1.8 | 0.8 | 4.3 | 15.6 |
| 15 & Up | | | 0.1 | | 0.6 | 0.7 | 1.2 | 0.2 | 0.5 | 0.2 | | 0.2 | 3.7 |
| Total | | 0.3% | 0.7% | 1.9% | 5.5% | 6.6% | 10.8% | 13.0% | 14.2% | 11.7% | 9.3% | 26.0% | 100.0% |

this type fruit. Special processing equipment is often required. All in all, the entire operation is not wholly satisfactory, and many processors avoid it by simply not utilizing any tangerines.

These complicating factors listed above must be taken into consideration in any study of the degrees Brix and the Brix-acid ratio relationships. For obvious reasons, then, the tables in this report may not be representative for all tangerines produced. Nevertheless, the tabular data presented here is factual for the tangerines received at processing plants for the months of November, December, January, February, and March of the seasons 1953-54 through 1958-59 (excluding the 1957-58 season, when a series of freezes practically knocked out the tangerine crop). Also, since more than 95 percent of all tangerines processed during these seasons is included, statistical sample variation has been eliminated.

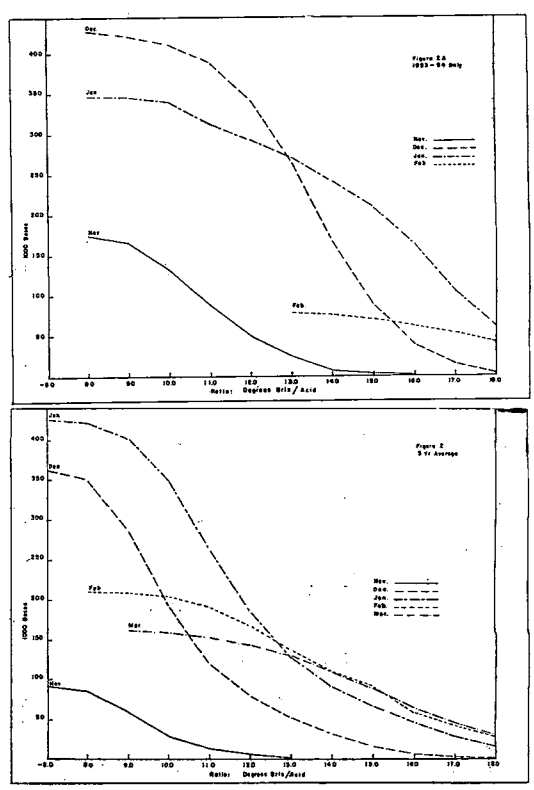
In the same manner as for the reports on grapefruit and oranges, the data listed in the tables herein were obtained from our inspectors' worksheets, the standard form used for recording analyses of loads of fruit received at processing plants. The analyses of the individual loads were extracted and grouped into respective Brix and ratio brackets as follows: Degrees Brix--less than 9, 9 to 9.9, 10 to 10.9, 11 to 11.9, 12 to 12.9, 13 to 13.9, 14 to 14.9, and 15 degrees and higher; and ratios--less than 8 to 1, 8 to 8.9 to 1, 9 to 9.9 to 1, 10 to 10.9 to 1, 11 to 11.9 to 1, 12 to 12.9 to 1, 13 to 13.9 to 1, 14 to 14.9 to 1, 15 to 15.9 to 1, 16 to 16.9 to 1, 17 to 17.9 to 1, and 18 to 1 and higher. The data for each month were tabulated separately, and the percentage of loads falling into each of the above categories was calculated.

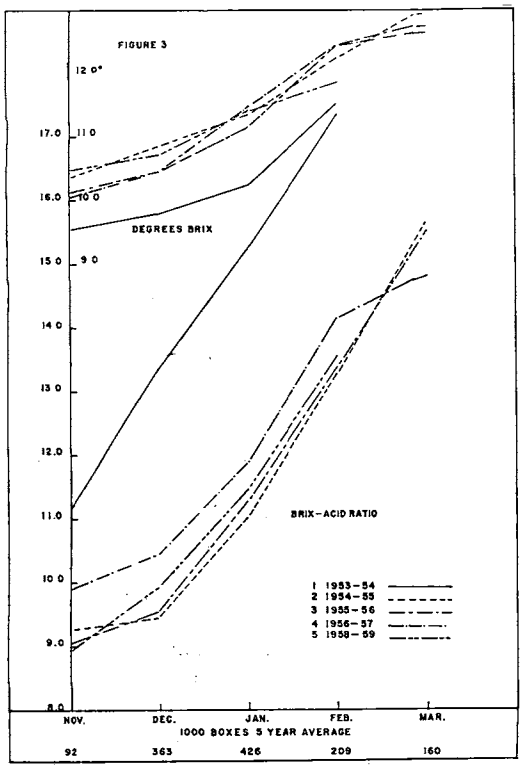
The results of this tabulation are shown on Tables 1 through 5. Since there is such a

**Table 6:**

Partial Summary of Tabulated Data Showing Percentages of Loads and Approximate Number of Boxes Which Meet Minimum Brix of 10 Degrees with a Minimum Ratio of 11 to 1

| | Percent | Approx. No. Boxes (x 1,000) | Total Boxes Utilized (x 1,000) |
|---|---|---|---|
| November: | | | |
| 1953-54 | 3.2 | 6 | 175 |
| 1954-55 | 5.6 | 1 | 26 |
| 1955-56 | 1.5 | 1 | 55 |
| 1956-57 | 4.7 | 5 | 106 |
| 1958-59 | 0.9 | 1 | 99 |
| Average | 3.2% | 3 | 92 |
| December: | | | |
| 1953-54 | 25.7 | 110 | 428 |
| 1954-55 | 7.6 | 22 | 290 |
| 1955-56 | 9.7 | 31 | 322 |
| 1956-57 | 20.3 | 80 | 395 |
| 1958-59 | 12.5 | 47 | 378 |
| Average | 15.2% | 58 | 363 |
| January: | | | |
| 1953-54 | 51.3 | 178 | 347 |
| 1954-55 | 43.2 | 145 | 336 |
| 1955-56 | 43.4 | 121 | 278 |
| 1956-57 | 63.6 | 230 | 361 |
| 1958-59 | 52.6 | 424 | 806 |
| Average | 50.8% | 220 | 426 |
| February: | | | |
| 1953-54 | 83.8 | 65 | 78 |
| 1954-55 | 83.7 | 241 | 288 |
| 1955-56 | 83.9 | 154 | 184 |
| 1956-57 | 91.8 | 185 | 202 |
| 1958-59 | 86.4 | 251 | 290 |
| Average | 85.9% | 179 | 209 |
| March: | | | |
| 1954-55 | 96.9 | 159 | 164 |
| 1955-56 | 94.4 | 130 | 138 |
| 1956-57 | 93.4 | 166 | 178 |
| Average | 94.9% | 152 | 160 |






tremendous number of possible combinations, it will not be feasible to discuss these tables in detail. However, two examples of how the tables may be employed are given:

(1) The percentage of loads which met a certain minimum Brix at a particular ratio level during each of the five months may be extracted. If these percentages are applied to the average number of boxes utilized by processors during these months (3,4), the approximate available tonnage at those particular levels may be calculated. Table 6 has been prepared to illustrate this application at a minimum Brix of 10 degrees, with an 11 to 1 minimum ratio. In the only really "wet" season among the five tabulated, 1953-54 (5), it will be noted that much more fruit was available early, even at these Brix and ratio levels.

(2) Percentage data may be calculated in terms of average number of boxes per month, at each of the tabulated brackets, both as to degrees Brix and as to ratio, and transferred to graphs so as to show at a glance what ratios or degrees Brix may be expected during each month of the utilization period. Figures 1 and 2 illustrate this application. For comparison purposes, the 1953-54 season is graphed separately in Figures 1A and 2A.

Aside from the data contained in the tables, weighted averages of degrees Brix and Brix-acid ratios, by week or by month, may also be obtained from the inspectors' worksheets. Figure 3 is a simple graph of these factors for the months listed. As might be anticipated in four of the five seasons, these average figures are very close. In the other season, 1953-54, which apparently was quite similar to what we may expect this current season, the profound influence of excessive rainfall on both degrees Brix and ratios need hardly be pointed out.

Although the factual data presented here reflect an accurate account of the fruit utilized by processors for the five seasons tabulated, the complicating factors listed previously must be remembered by processors who may use this study as a planning guide. If tangerines were grown for processing, and if the economics were such that a processor could pick and choose, an entirely different picture might be painted for future planning purposes. Although there is a definite trend towards more tangerine concentrate (4), the increased use of sugar permits considerable latitude in fruit requirements. Hence, with conditions as they are, and with due consideration of the weather factors, there is little reason to expect any major changes in utilization intervals in the near future, although there would appear to be a fertile field here for continuing research.

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