

THE RELATION OF MATURITY TO QUALITY IN FLORIDA AVOCADOS¹

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In the past there was no legal standard for picking avocados grown in Florida. Many conscientious growers and shippers picked and allowed to soften a few representative fruits. Marketing was based on the outcome of these tentative observations. The purpose of the present investigation was to find an easily applied test whereby palatability of the softened fruit would be correlated with maturity. The changes that occur in Florida avocados during their maturing, ripening, and softening periods were studied to obtain data on which to base a practical standard for determining the quality of the fruit. The results presented indicate that maturity of a variety can be fairly well designated by correlating minimum fruit weights and picking dates.

During the 1953-54 season some 200 different lots of avocados representing 16 commercial varieties were tested at Orlando for minimum maturity requirements. Special attention was given to (a) picking date and (b) fruit weight in accordance with the proposals made by the leaders in the industry.

REVIEW OF LITERATURE

In 1925 California avocado growers succeeded in having established a State maturity standard of 8 percent fat or oil content. Hodgson (2) stated that "this action has been productive of very great benefit to the industry in that it has helped eliminate immature fruit, mostly windfalls or stolen fruit from the market."

Wolfe, Toy, and Stahl (5) published results of analyses of fruit of a large number of avocado varieties grown in Florida. They found no correlation between fat content and good quality as far as comparison of varieties is concerned. Their results showed that two of the finest varieties for eating are the Trapp and Pollock, both low in fat. The varieties Collinson and Linda, almost equally esteemed, have twice the fat content of the other two. Wolfe, Toy, and Stahl further stated that some varieties low and some high in this constituent are distinctly mediocre in palatability.

MATERIAL AND METHODS

Most of the avocado fruit used in this study was grown in Dade County, but a few lots were obtained from other parts of Florida.

The samples consisted of 40 or more fruits picked at intervals of 1 and 2 weeks. About 20 fruits of each sample were shipped to Orlando via Railway Express Agency with a transit period of 2 or 3 days. The portions of the samples retained in Homestead were

tested for oil content by the refractive index method used in California (3, 4). Seasonal changes in the oil content of avocados will be discussed by Harkness (1).

The period of testing was August to January, and usually various stages of fruit development from immaturity to post-maturity were covered. Immediately on arrival at the Horticultural Field Station at Orlando, Florida, each fruit was numbered, weighed, and stored at 75 degrees F. for softening. Picking date, weight of fruit, number of days required for softening, loss in weight during softening, and flavor or "taste" also were recorded. All lots were rated by about ten members of the staff on the arbitrary standard scale on the score card reproduced herein.

RESULTS

The varieties Waldin, Booth 8, Lula, Booth 7, Hickson, Taylor, Hall, Booth 1, and Booth 3 are represented adequately in the experimental data, and Trapp, Pinnelli, Tonnage, Collinson, Herman, Wagner, and Choquette are inadequately represented (table 1).

SCORE CARD FOR TESTING TASTE OR FLAVOR OF AVOCADOS

| Arbitrary Standard | Taste or flavor of fruit | Numerical rating range corresponding to description | Individual numerical rating |
|--------------------|---|---|-----------------------------|
| Green | Green, grassy bitter, unpleasant after taste, unpalatable and rubbery to soft texture (Does not meet consumer acceptance) | 50 - 59 | |
| Unpalatable | Flat, watery, slightly bitter, slightly unpleasant after taste and rubbery to soft texture (Does not meet consumer acceptance) | 60 - 69 | |
| Palatable | Smooth, mellow, watery, satisfactory flavor and firm to soft texture (Meets minimum standard of consumer acceptance) | 70 - 79 | |
| Excellent | Smooth, mellow, tasty, rich, nutty with quality of distinct excellence and buttery texture (Excellent) | 80 - 100 | |

Underscore or write in character or characters that determined your rating

The general findings (table 1) showed a close relation between quality of fruit and definite picking dates and weight. In the 1953-54 crop year, the proposed standards would have permitted the shipment of fairly satisfactory fruit. The results indicate no change from the proposed minimum standard for Waldin and Lula. However, weight of fruit should be slightly increased for Booth 7 and slightly decreased for Booth 1 and Booth 3.

Large avocados of any variety were rated higher in flavor than small fruit. In this

connection it should, however, be pointed out that quality was not directly associated with large fruit per se. It was frequently demonstrated that large to very large avocados of a late maturing variety would not ripen satisfactorily when picked too early. The texture was usually soft and rubbery, and the flavor was "green" and "unpalatable." Smaller avocados in a lot often required longer periods to soften at 75 degrees F. than did the larger fruit. The small fruit was frequently unpalatable when soft. The flavor was flat, watery, and slightly bitter. There was a slightly unpleasant after taste, and the texture was rubbery to soft (fig 1).

Palatability was correlated with maturity of fruit on the tree. Avocados, particularly Lula. Booth 8, Booth 3, Hickson, and Hall, were mediocre in quality when picked at an early stage of maturity. The fruit was good to very good when harvested at a later date. After fruits attained maturity, quality varied among groves. For example, the fruit from Grove A rated higher than that from Grove D (fig. 2). However, it should be pointed out that the stage of maturity of the fruit when harvested is directly related to its palatability and is the most important factor that influences eating quality. Other factors, such as weather conditions, including rainfall and sunshine, soils and fertilizers, likewise may affect eating quality; but it has not been feasible to determine in what way or to what extent.

The rate of softening of fruit at 75 degrees F. was fairly uniform. The time required for fruit to reach eating quality was 3 to 10 days and averaged 5 days. The loss in weight of fruit during the softening period at 75 degrees F. averaged about 5 percent. Decay was not very important during ripening. Total decay ranged from 0 to 2.4 percent. The total decay for the 200 lots averaged 1 percent.

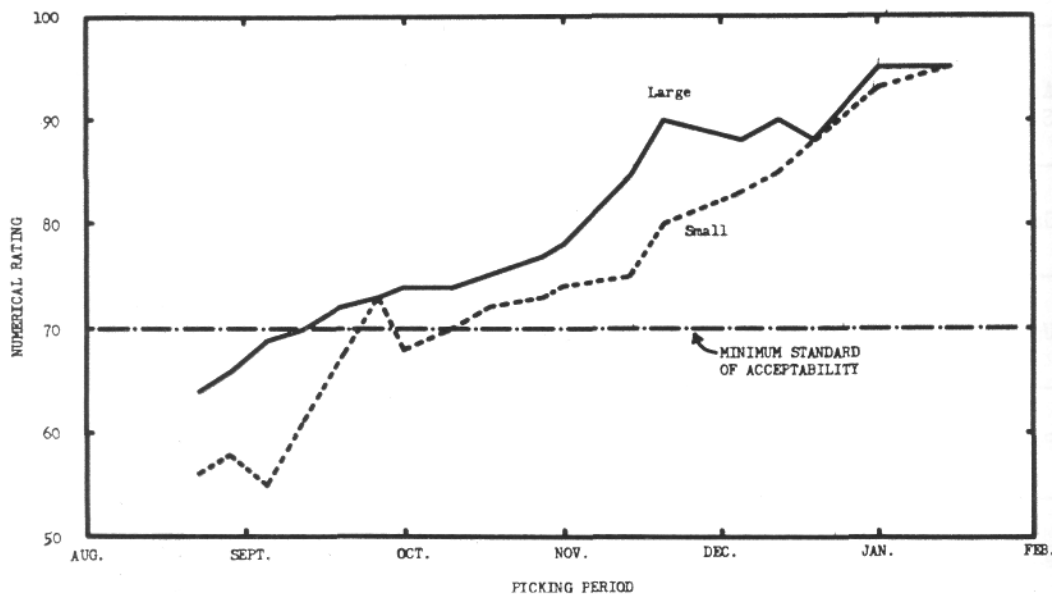


Figure 1.--The palatability of large (average weight 18 ounces) and small (average weight 12 ounces) Lula avocados at different picking periods. Results based on averages of 3 crops of fruit, 1953-54.

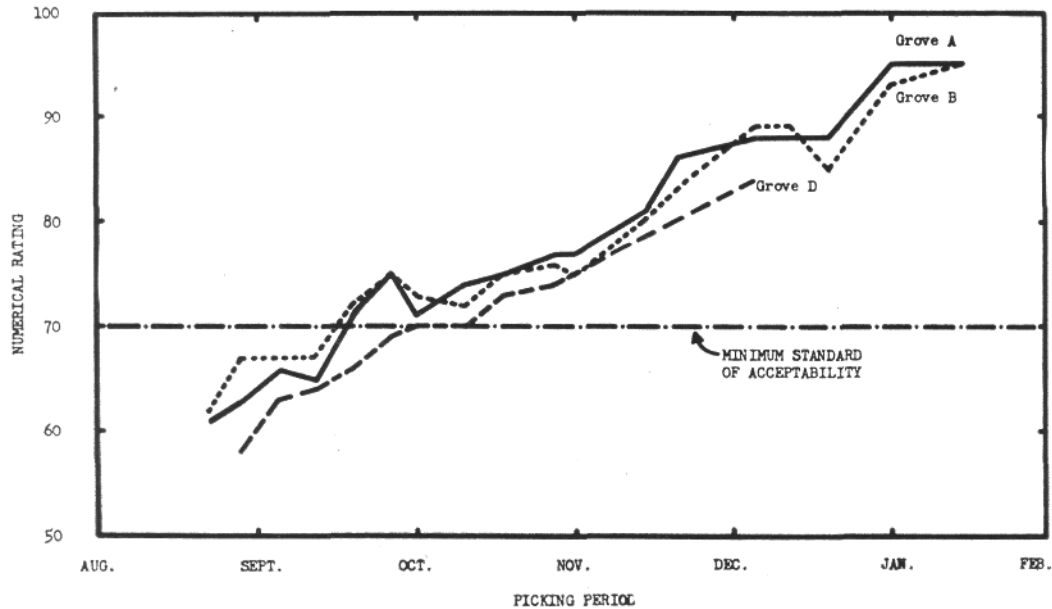


Figure 2.--Effect of crop or grove variation on the palatability of Lula avocados, 1953-54.

SUMMARY

During the 1953-54 season some 200 different lots of avocado fruits representing 16 commercial varieties were tested for maturity and quality. Holding was at 75 degrees F., and information was obtained on number of days required for softening. Softening of fruit was fairly uniform, and the time required for fruit to reach eating quality was 3 to 10 days and averaged 5 days. The loss in weight of fruit during the holding period averaged about 5 percent. Total decay was commercially unimportant and averaged 1 percent. Maturity of fruit within a variety could be fairly well defined on the basis of specified picking dates in conjunction with minimum weight. The stage of maturity of fruit at picking is the most important factor in palatability of avocados.

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Table 1. Maturity of avocados in relation to picking dates and fruit sizes, 1953-54.

| Variety | Proposed picking date ^{1/} | Proposed fruit size ^{1/} Ounces | Grower | Lots tested Number | Earliest picking date | Fruit size | | Softening period (75° F.) ^{2/} | | Loss in weight Percent | Numerical flavor rating |
|-----------|-------------------------------------|---|--------|-----------------------|-----------------------|------------|--------|--|-------|---------------------------|-------------------------|
| | | | | | | Minimum | Range | Average | Range | | |
| | | | | | | Ounces | Ounces | Days | Days | | |
| Waldin | Aug. 7 | 16 | A | 6 | Aug. 12 | 15 | 9-18 | 6 | 4-10 | 5.3 | 72 |
| | | | B | 7 | Aug. 12 | 14 | 7-17 | 7 | 6-10 | 8.2 | 72 |
| | | | C | 2 | Aug. 12 | 15 | 11-16 | 6 | 4-11 | 6.9 | 72 |
| | | | J | 1 | Aug. 5 | 14 | 6-15 | 6 | 5-7 | .5 | 70 |
| | | | D | 1 | Aug. 19 | 16 | 14-17 | 5 | 3-7 | 4.7 | 75 |
| Trapp | Aug. 15 | 14 | D | 1 | Aug. 19 | 14 | 13-16 | 6 | 3-7 | 6.5 | 72 |
| | | | F | 1 | Aug. 16 | 14 | 10-15 | 4 | 3-6 | 7.7 | 70 |
| Pinnelli | Aug. 15 | 14 | F | 1 | Sept. 16 | 16 | 13-19 | 4 | 3-4 | 3.3 | 72 |
| Tonnage | Aug. 15 | -- | G | 1 | Aug. 15 | 16 | 14-17 | 6 | 6 | 5.3 | 75 |
| | | | G | 1 | Aug. 15 | 10 | 9-11 | 7 | 6-7 | 8.1 | 70 |
| Booth 8 | Sept. 15 | 16 | A | 12 | Sept. 16 | 13 | 6-15 | 6 | 3-8 | 9.3 | 70 |
| | | | B | 14 | Sept. 16 | 12 | 7-12 | 5 | 4-7 | 8.8 | 70 |
| | | | D | 10 | Sept. 22 | 9 | 7-10 | 5 | 3-9 | 6.5 | 72 |
| Vula | Oct. 1 | 14 | A | 18 | Sept. 16 | 14 | 9-16 | 5 | 4-5 | 8.1 | 73 |
| | | | B | 17 | Sept. 16 | 16 | 12-17 | 5 | 4-5 | 6.6 | 73 |
| | | | D | 10 | Sept. 29 | 16 | 9-17 | 5 | 3-5 | 8.8 | 72 |
| Booth 7 | Oct. 15 | 14 | A | 8 | Sept. 29 | 20 | 14-23 | 6 | 4-7 | 6.5 | 73 |
| | | | C | 9 | Sept. 29 | 17 | 13-17 | 6 | 4-8 | 6.2 | 70 |
| Hickson | Oct. 15 | 16 | A | 7 | Oct. 13 | 14 | 9-15 | 4 | 3-7 | 4.0 | 70 |
| | | | C | 5 | Oct. 13 | 15 | 9-19 | 5 | 4-6 | 1.7 | 70 |
| | | | H | 2 | Oct. 18 | 13 | 11-15 | 5 | 5-6 | .7 | 75 |
| Collinson | Oct. 15 | 12 | D | 2 | Oct. 27 | 17 | 15-19 | 3 | 3 | 4.3 | 70 |
| Taylor | Nov. 1 | 16 | B | 9 | Nov. 10 | 11 | 9-16 | 5 | 4-5 | 5.2 | 75 |
| | | | C | 6 | Oct. 22 | 13 | 11-15 | 4 | 4-5 | 3.6 | 70 |
| Hall | Nov. 1 | 16 | C | 9 | Nov. 10 | 17 | 14-27 | 6 | 5-6 | 3.8 | 70 |
| | | | D | 6 | Nov. 10 | 28 | 21-30 | 6 | 5-6 | 4.5 | 75 |
| Herman | Nov. 1 | 10 | A | 2 | Nov. 11 | 15 | 13-17 | 5 | 5 | 4.8 | 80 |
| Booth 1 | Nov. 15 | 15 | A | 2 | Oct. 22 | 14 | 14-20 | 4 | 4-5 | 3.7 | 70 |
| | | | C | 6 | Oct. 22 | 15 | 14-24 | 4 | 4 | 2.7 | 70 |
| Booth 3 | Nov. 15 | 14 | C | 4 | Oct. 22 | 19 | 14-23 | 4 | 3-4 | 4.2 | 78 |
| | | | D | 10 | Oct. 22 | 13 | 12-19 | 4 | 4-5 | 3.3 | 70 |
| Wagner | Dec. 1 | 14 | D | 2 | Dec. 16 | 10 | 9-10 | 5 | 4-5 | 0 | 72 |
| Choquette | Jan. 1 | 16 | I | 1 | Dec. 8 | 48 | 46-51 | 3 | 3-4 | 3.4 | 75 |

^{1/} Information on maturity requirements (earliest picking date and minimum size) for avocados as proposed by leaders in the industry, published by Mr. Charles H. Steffani, Dade County Agricultural Agent, Homestead, Fla., August 4, 1953.

^{2/} Number of days at 75°F. does not include rail transit time of 2 or 3 days from Homestead, Fla. to Orlando, Fla.

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