

Lemon Fruit Quality

rootstocks affect juice content, soluble solids, acidity of Eurekas

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Eureka lemons to be used for processing are profitably grown on Sampson tangelo stock, while fruits from Rough lemon stock are not desirable.

Juice content and acidity—two qualities that determine growers' returns from processed lemons—are among the properties of lemon fruits influenced by rootstocks.

As a large percentage of the lemon crop is now used for juice processing, proper selection of stock is of increasing importance.

To determine the influence that rootstocks exert on the quality of lemon fruits, samples were picked from 23-year-old Eureka lemon trees at Riverside. Included in the test were fruits from trees budded on Bessie sweet orange, Rubidoux sour orange, Rough lemon, No. 343 grapefruit, Sampson tangelo, and Cleopatra mandarin. Fruits were sampled January 3, January 23, February 15, and March 12, 1951.

Quality Compared

There was no apparent seasonal effect between the first and the last sampling dates. Fruit from trees on the Rough lemon stock was consistently lower in juice content, soluble solids and titratable acidity than fruit grown on any of the other stocks. Fruit grown on Sampson tangelo stock was generally slightly higher in juice content and soluble solids than fruit from any of the other stocks. Such fruit was also high in citric acid content. Fruit from trees on the Cleopatra mandarin stock was slightly lower in juice content and soluble solids than

fruits from the other stocks but was considerably higher than fruit from trees on Rough lemon stock. Fruit on the grapefruit stock tended to be high in citric acid. With the exception of fruit on the Rough lemon there were no marked differences between quality of fruit grown on the other stocks but the slight differences between them were consistent.

Ascorbic acid content—which was determined on only one sampling date—was lowest in Rough lemon, and tended to be highest in fruits on grapefruit, Sampson tangelo and sour orange stocks.

Fruit on the Rough lemon stock was noticeably coarser in appearance than fruits grown on the other stocks. The peel was thicker and rag more apparent. These factors probably account for the lower juice content.

The practical importance of the differences in quality of fruit from trees on the various rootstocks is increased by the relations of one factor to another.

Fruit on Sampson tangelo stock was not only 8.4% higher in juice content than fruit on Rough lemon but also 13.6% higher in citric acid content. Fruits on sweet orange and sour orange stocks were 7.1% and 7.0% higher than fruit on Rough lemon in juice content, and 11.8% and 9.3% higher in citric acid content.

Processing Value

Fruit for by-product purposes is sold on a tonnage basis. In this experiment fruit of trees on Rough lemon stock would have yielded 40.06 pounds of anhydrous citric acid per ton. By comparison, one

ton of fruit from trees on sweet orange stock yielded 47.96 pounds, that of trees on Sampson tangelo 49.34 pounds—or 19.7% and 23.2% respectively more than one ton of fruit from trees on Rough lemon.

At the time of the tests the value of lemons for juice processing was \$65 a ton for fruit yielding 35.575 pounds of anhydrous citric acid. On the basis of their citric acid content the fruits of trees on Rough lemon stock would have returned \$73.19 per ton. The returns for fruit of trees on sweet orange stock would have been \$87.63 per ton, and for fruit of trees on Sampson tangelo stock, \$90.15.

Many lemon orchards yield 20 tons of fruit per acre. On the basis of this production, and assuming that all the fruit was utilized for juice processing, the returns per acre for fruit of trees on all the other stocks would have been at least \$250 more than for fruit of trees on Rough lemon stock. Actually these values would perhaps not be this high since—among other factors—only a part of the crop is used for juice by-products.

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MARKETING

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which leaves 46¢ of the consumer's dollar for growers' costs.

There are significant differences among stores with respect to their spoilage loss, retail margin, and consumer price. These variations can be partly explained by differences in location, size, and type of store.

For carrots, possibly the most significant difference is the considerably lower retail price and retail margin prevailing at most cash-carry stores in the larger cities.

For celery, retail prices and retail margins are lower at cash-carry stores and in southern California. Spoilage losses are higher for these two categories.

For asparagus, retail prices and retail margins are lower and spoilage is higher at cash-carry stores and in northern California. In the large cities of the Central Valley, retail prices and especially spoilage losses are much higher in the large fruit and vegetable stores than they are in grocery stores.

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Fruit Quality of Eureka Lemons Grown on Various Rootstocks (Riverside, California 1951*)

Rootstock	Per cent juice by weight ¹	Per cent soluble solids ²	Per cent Citric acid ³	Pounds citric acid/ton	Value per ton ⁴	Ascorbic acid mg/100 ml juice ⁵
Sweet orange	41.56	8.76	5.77	47.96	\$87.63	46.46
Sour orange	41.53	8.76	5.64	46.85	85.59	50.95
Rough lemon	38.82	7.84	5.16	40.06	73.19	45.49
Grapefruit	41.36	8.64	5.86	48.47	88.56	47.88
Samp. Tang.	42.10	8.81	5.86	49.34	90.15	48.54
Cleo. Mand.	41.40	8.54	5.71	47.27	86.37	46.87

* Fruit sampled 1/3/51, 1/23/51, 2/15/51, and 3/12/51.

¹ Average 24 samples.

² Average 18 samples, corrected for temperature and titratable acidity.

³ Average 18 samples, corrected for specific gravity.

⁴ Computed at \$65 per ton for lemons containing 35.575 lbs. anhydrous citric acid per ton.

⁵ 1/23/51 samples only.