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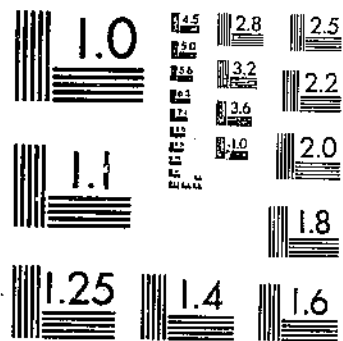
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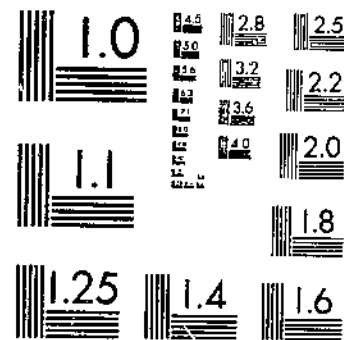
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SEASONAL CHANGES IN FLORIDA TEMPLE ORANGES
HARDING, P. L. SUNDAY, M. B.

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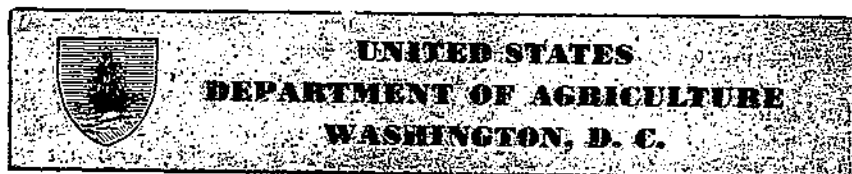
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



Seasonal Changes in Florida Temple Oranges¹

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INTRODUCTION

The Temple orange (probably Tangor hybrid, *Citrus reticulata* × *C. sinensis*) (12, 13)³ is one of the most attractive fruits in the citrus group. Its beauty in depth of color is seldom equaled. The fruit has a notably fine eating quality, is exceptionally juicy, and is easy to peel. In addition, it contains aromatic constituents that impart to flesh and juice a unique and unusually desirable bouquet, spicy and rich. Introduced to Florida reportedly from Jamaica, the variety has been propagated commercially in the State since 1917. Within the 23 years 1928-50 some 970,652 Temple orange trees—enough for planting about 15,000 acres—were reported to the Florida State Plant Board nursery inspector as having been moved from Florida nurseries to Florida destinations.⁴ Production of the fruit in the 1950-51 season was estimated (11) at about 900,000 packed 1 3/5-bushel boxes.

The variety's possible origin and horticultural history have been discussed by Robinson (9). Webber, in a 1943 publication (13), stated that in general the Temple orange "is less frost-resistant than the tangerine and is perhaps to be considered as slightly more tender than the sweet orange," and that the variety could not be recommended for commercial planting in any section of the United States other than Florida but was worthy of careful trial elsewhere.

Temple oranges have been grown chiefly on rough lemon (*Citrus limon*) and sour orange (*C. aurantium*) rootstocks. Because of the poor quality of fruit grown on young rough lemon trees and the susceptibility of sour orange to the virus disease tristeza, these two kinds of rootstock are losing favor. In recent years there has been no large-scale planting of Temples on rough lemon trees. Most Temples planted since 1945 have been on rootstocks of Cleopatra tangerine (*C. reticulata*, referred to hereafter as Cleopatra) and sweet orange (*C. sinensis*).

The Temple orange attains prime condition in January or February; however, harvesting usually begins about December 1 and extends through March. During the 4 months December-March marked physical and chemical changes occur in the fruit. The degree of ripeness of the fruit at the time of harvest is the most important of the factors determining eating quality. Oranges, like grapefruit, do not improve in palatability after harvest. They contain practically no starch; do not undergo marked changes in composition after being picked from the tree, as do apples, pears, or bananas; and owe their sweetness to natural sugars contained when they are picked. It can readily be understood that they should not be harvested until they are ripe. Eating quality is undoubtedly affected by factors other than ripeness, such as rainfall, sunshine, soil, fertilizer, cultivation, pruning, spraying, and dusting, but it has not been determined in what way or to what extent.

Data on quantities of total acid, ascorbic acid, and total solids per orange, showing the actual physiological trends at various stages, have commercial value to the growers and also to operators of canneries and concentrate plants, who naturally desire to process the fruit at the stage of greatest juiciness and greatest food value.

³ Italic numbers in parentheses refer to Literature Cited, p. 28.

⁴ Acknowledgment is due H. G. Hamilton, head of the Department of Agricultural Economics, Florida Agricultural Experiment Station, for the information given here on number of trees reported.

The purpose of the investigation reported here was to study the physical and chemical changes that occur in the Temple orange during its ripening period and to obtain data on which to base a practical standard for determining the quality of the fruit. The work was carried out similarly to work, already reported, on 11 varieties of orange (7), grapefruit (5), and tangerine (6), in which palatability ratings were definitely associated with the chemical composition of the fruit. A practical method was devised by which fruit that will meet consumer approval can be identified on the basis of chemical analyses of representative samples.

Although ripening of fruit is commonly referred to as a process that follows maturing, the two processes are referred to in this report as taking place at the same time. According to the results of taste tests made in the study, when Temple oranges are mature (have attained their greatest weight and volume of juice) they are also ripe (have attained their greatest palatability). The various stages in development are designated in this report as immature, or not ripe; mature, or ripe; and post-mature, or overripe. The stage of ripeness at which the fruit reaches optimum taste is designated as prime.

EXPERIMENTAL CONDITIONS AND METHODS

PLOTS AND SAMPLES

The 21 groves used for fruit sampling were selected as typical of the commercial Temple plantings in Florida. They were located in the ridge and central districts on soils relatively low in organic matter, and in the east coast and central districts on soils relatively high in organic matter. The rootstocks on the plots were rough lemon in 8 different groves, sour orange in 10, Cleopatra in 2, and sweet orange in 1. In each of the 3 districts the plots had Temples on both rough lemon and sour orange rootstocks. The sample groves ranged in age from 5 to 26 years; most of them were mature. They included 4 dating back to 1917-21, of which 3 had rough lemon and 1 had sour orange rootstock. The locations of the plots, their soil types⁵ and kinds of rootstock, the ages of the trees, and the seasons of investigation are given in table 1. The soil types are described as follows:

LAKELAND SAND. Lakeland sand is characterized by 4 to 6 inches of a gray sand underlain by yellow sand, which passes into sandy clay beds usually within 8 feet of the surface. This soil is exceptionally well drained and is subject to excessive leaching because of its low content of clay and organic matter. The Lakeland series is one of the major soil types in Florida and is the one most extensively planted to citrus.

LAKELAND FINE SAND.—Lakeland fine sand, otherwise similar to Lakeland sand, is more than half fine plus very fine sand. This soil is usually considered a little more productive than the Lakeland sand.

BLANTON FINE SAND.—Blanton fine sand is closely related to the Lakeland fine sand, differing from it mainly in the subsoil, which is slightly mottled pale-yellow to yellowish-gray fine sand underlain at 5 feet or lower by sandy clay beds. This soil is not so excessively drained as the Lakeland fine sand.

⁵ Information on soil types was furnished by Matthew Drosdoff, soil technologist, Bureau of Plant Industry, Soils, and Agricultural Engineering.

TABLE 1.—Location and description of study plots in Florida commercial plantings of Temple orange, and dates of study of each plot

Kind of rootstock and plot number	Age ¹ of trees	Location	District	Soil type ²	Season or seasons of study
	Years				
Rough lemon:					
1	25	Winter Haven	Ridge	Blanton fine sand	1943-44 to 1946-47.
2	³ 16	Windermere	Central	Lakeland fine sand	Do.
3	21	Lake Wales	Ridge	Lakeland sand	Do.
4	21	do	do	do	Do.
5	24	do	do	Lakeland fine sand	1946-47.
6	³ 20	Alturas	do	Lakeland sand	Do.
7	5	Winter Haven	do	do	Do.
8	26	Lake Alfred	do	do	Do.
Sour orange:					
9	22	Minorville	Central	Orlando fine sand	1943-44 to 1946-47.
10	13	Windermere	do	Lakeland fine sand	Do.
11	³ 16	Merritt Island	East coast	do	Do.
12	10	Orlovista	Central	do	1943-44 to 1945-46.
13	8	Lake Wales	Ridge	Blanton fine sand	1944-45 to 1946-47.
14	³ 20	Winter Haven	do	Lakeland sand	1943-44 to 1945-46.
15	20	Dundee	do	do	1944-45 and 1946-47.
16	11	Vero Beach	East coast	Manatee fine sandy loam.	1946-47.
17	16	Florence Villa	Ridge	Lakeland sand	Do.
18	13	Dundee	do	do	Do.
Cleopatra:					
19	19	Merritt Island	East coast	St. Johns fine sand	1943-44 to 1946-47.
20	13	Windermere	Central	Lakeland fine sand	Do.
Sweet orange: 21	13	do	do	do	Do.

¹ As of 1943.
² Lakeland sand and Lakeland fine sand were formerly called Norfolk.
³ Approximate.

ORLANDO FINE SAND.—Orlando fine sand has a dark-gray surface soil 10 to 15 inches thick grading into a gray fine sand, which generally grades into a light-gray to yellowish-gray fine sand.

MANATEE FINE SANDY LOAM.—Under natural conditions, Manatee fine sandy loam is very poorly drained. The surface 10 to 12 inches is a black loam underlain by 12 to 15 inches of a mottled-gray fine sandy clay, which rests on a hard marl. This soil was formerly included in the Parkwood series.

ST. JOHNS FINE SAND.—St. Johns fine sand is associated with the Leon fine sand, from which it differs mainly in having a black surface soil 6 or more inches thick. A grayish-white subsurface and an organic hardpan layer are present as in the Leon soil.

The great variation in the soil types represented by the study plots made it impractical to attempt to determine what direct influence soil type may have on the quality of the Temple orange.

All the groves sampled were in good physical condition and received normal cultural, fertilizer, and spray treatments. The trees showed no evidence of deficiency disorders and had been producing crops of average size. Each plot had 15 to 20 trees.

Samples consisting of 100 or more fruits each were picked on each plot at intervals of about 4 weeks from the beginning of October, when the fruit was very immature, until April, when the fruit was postmature. Care was taken to pick fruits from the regular bloom only; otherwise, fruits were selected at random. Immediately after being picked the samples were taken to the laboratory at Orlando, Fla., and placed in storage at 36° F. They were tested as promptly thereafter as was feasible. The sampling continued through the four seasons 1943-44 to 1946-47, a period within which considerable variation occurred in weather conditions, particularly rainfall.

TASTE TESTING

Palatability ratings were given by a panel of about 40 taste testers, of whom a majority were staff members of the Bureau of Plant Industry, Soils, and Agricultural Engineering and the Bureau of Entomology and Plant Quarantine stationed at Orlando, Fla. This panel of taste judges likewise rated tangerines (6), but not on days when they rated oranges.

All fruit samples were rated according to the arbitrary standard scale on the score card reproduced below.

SCORE CARD FOR TESTING TASTE OR FLAVOR OF TEMPLES

Arbitrary standard	Taste or flavor of fruit	Numerical rating range corresponding to description	Individual numerical rating
Very acid	Very acid, raw, immature flavor	20-39	
Acid	Acid with absence of raw, immature flavor.	40-59	
Tart	Too tart for consumer approval	60-69	
Pleasantly tart	Minimum stage of acceptability to consumer.	70-79	
Pleasantly tart to sweet.	Pleasant blend of sugars and acid, with very good texture and flavor.	80-100	
Inspid or aged	Very sweet, watery, lacking in flavor, low in acidity.		

In each test, 50 to 100 oranges were used. The fruits were halved crosswise, and from each half 2 wedge-shaped pieces were cut for testing. Each judge was instructed to taste several pieces of fruit from a lot before rating the lot. Judges did not discuss their ratings with each other. Each judge individually appraised each lot of fruit and gave it a numerical rating, and the ratings of all judges were averaged for each lot. Tasters were not restricted to any numerical range in rating insipid or aged fruit.

CHEMICAL ANALYSES

From each fruit sample, 25 fruits were used for chemical analysis. Determinations for various chemical constituents were made on individual fruits or composite juice samples. Juice to be tested was extracted with a pressure extractor (7) and then strained through cheesecloth in order to remove the seeds and pulp. For 10 plots, chemical analyses continued through the four seasons 1943-44 to 1946-47. About 1,500 individual fruits and composite juice samples were analyzed.

Chemical analyses included determinations of total acid (as citric), total solids (principally sugars), ascorbic acid (vitamin C), active acidity (pH), and total ash. Official methods (1, 2) were followed. Hydrogen-ion concentrations were determined and averaged for individual samples and the results converted to pH.

EVALUATING PHYSICAL CHARACTERS

Considerable attention was given to evaluating physical characters, in order to determine as closely as possible how these are correlated with chemical characters and palatability. Periodic determinations were made of the weight and diameter of fruit, color and thickness of rind, color and condition of flesh, and volume of juice.

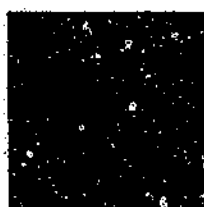
Color of rind was determined with reference to the color standards shown in plate 1. A numerical value was assigned to each of the color standards, the colors of individual fruits were rated on this basis, and typical color for a 25-fruit lot was determined by averaging.

The color of the flesh of each individual fruit was determined by matching the halves with standard color charts (8) and was classified according to the nearest of the three standard colors orange yellow, yellow orange, and orange and then given a numerical value that had been assigned to this color. Typical color for a sample lot was determined by averaging.

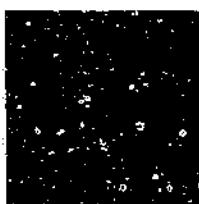
The flesh condition of each sample was classified on the basis of the percentage of fruits coming under each of these four descriptions: (1) Ricey-textured. Flesh rice-like in appearance, vesicles containing only small quantities of juice. (2) Coarse-textured. Vesicle cell walls thick and conspicuous, vesicles not distended with juice. (3) Good-textured. Vesicle cell walls thin and inconspicuous, vesicles fully distended with juice. (4) Dry (characteristic of overripe fruit). Some vesicles dried out in appearance, flesh a faded whitish yellow.

STUDY OF FROZEN FRUIT

After a severe freeze that took place in Florida the week of February 6, 1947, comparative tests were made on frozen and unfrozen Temple



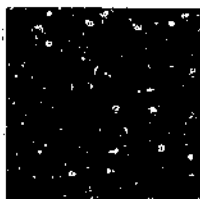
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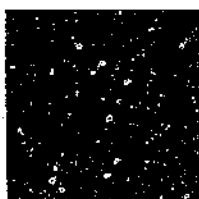
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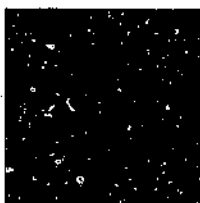
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C



G



K



D



H



L

United States Department of Agriculture standards for determining the color of
Temple orange rind.

oranges to determine how the freeze had affected the fruit (4). The oranges were obtained from plots that had been sampled regularly through the season, in five commercial groves. Studies of the physical and chemical condition of the fruit were made about 1 month and also about 2 months after the freeze. The fruits in each sample were classified as unfrozen or frozen on the basis of careful observation of the juice sacs of the stem end and of the center cut, according to usual inspection methods.

RESULTS

Values obtained by averaging original data for the plots studied are presented in tables 2-5 and 8 and in figures. By this method of computation, values representing 4-year averages are weighted according to the number of plots observed per year. Data for individual plots are presented as an appendix, in tables 12-32. Comparisons among kinds of rootstock on the basis of the study data are offered with the reminder that the data on sweet orange and Cleopatra tangerine are inadequate.

PALATABILITY

Palatability increased rather rapidly from October to January (table 2, fig. 1). It usually decreased slightly in fruit that remained on the trees beyond February. In October the fruits received palatability ratings averaging, according to kind of rootstock, from 32 to 36. In December practically all the fruit, on all four rootstocks, met the minimum standard of acceptability; average ratings for that month, by rootstock, ranged between 77 and 81. Prime quality was reached in February, the average ratings in that month ranging between 93 and 96. For the fruit picked in April, the average taste scores ranged between 89 and 91. During the stages of maturing and ripening that led to prime condition, increase in palatability was associated with increases in total solids, the solids-acid ratio, and volume of juice, and with decrease in total acids (table 3, fig. 1). As the fruit became overripe, decrease in palatability was associated with increase in total solids beyond about 12.5 percent and with increase in the solids-acid ratio.

According to the palatability ratings the quality of the fruit was slightly influenced by the kind of rootstock on which the trees were grown. In this respect the kinds of rootstock ranked in this order: Cleopatra, sweet orange, sour orange, rough lemon.

CHEMICAL FACTORS

TOTAL SOLIDS AND TOTAL ACID

Percentage of total solids (principally sugars) by weight increased gradually during the various stages of maturing and ripening (table 3, fig. 1). In October, when the fruits were immature, average total solids content according to kind of rootstock ranged between 8.29 and 8.91 percent. In December, when average palatability for every kind of rootstock met the minimum standard of acceptability, the solids ranged between 10.31 and 11.04 percent. In February, when prime eating quality was reached, they ranged between 12.00 and 12.59 percent. After this time the solids percentage continued to increase, and in the (overripe)

TABLE 2.—Seasonal changes in average palatability rating of Temple oranges in each of the crop years 1943-44 to 1946-47, by kind of rootstock

Kind of rootstock and crop year	Palatability rating ¹ of fruit harvested at indicated period						
	Oct. 1-5	Nov. 1-5	Dec. 1-5	Jan. 1-5	Feb. 1-5	Mar. 1-5	Apr. 1-5
Rough lemon:							
1943-44.	28	53	78	91	93	93	86
1944-45.	32	53	74	89	94	90	89
1945-46.	34	60	76	89	96	91	89
1946-47.	33	54	78	89	91	92	89
Sour orange:							
1943-44.	28	53	77	92	97	95	91
1944-45.	32	53	73	90	94	90	92
1945-46.	35	59	75	89	95	89	89
1946-47.	32	57	81	92	94	94	91
Cleopatra:							
1943-44.	29	55	83	94	97	96	92
1944-45.	40	57	78	95	96	92	93
1945-46.	38	62	78	93	95	91	88
1946-47.	36	62	87	94	96	96	91
Sweet orange:							
1943-44.	20	57	80	94	97	95	90
1944-45.	43	60	79	93	95	92	94
1945-46.	36	55	76	88	93	90	
1946-47.	37	60	84	94	95	95	90

¹ Average of ratings given by about 40 tasters using the score card shown on p. 5.

fruit picked in April it ranged between 13.03 and 14.26. Fruits grown on Cleopatra and sour orange stocks contained greater percentages of total solids than the others.

Weight of total solids per orange increased very rapidly from October to January (fig. 2). After February it leveled off. The fruits on Cleopatra rootstock averaged highest in total solids, and those on sweet orange averaged lowest. The variation in weight of total solids according to kind of rootstock was more pronounced in ripe than in unripe fruit.

A gradual downward trend in percentage of acid by weight characterized the oranges as they ripened (table 3, fig. 1). Total acid according to kind of rootstock averaged between 2.15 and 2.39 percent in October, between 1.25 and 1.38 percent in December, between 0.85 and 1.00 percent in February, and between 0.77 and 0.90 percent in April. The fact that overripe oranges contained moderately high percentages of total acid explains their retention of high palatability. Total acidity was greater in fruit grown on sour orange rootstock than in other fruit.

Weight of total acid per orange tended in general to decrease regularly from October to April (fig. 2). It was significantly greater in fruit grown on sour orange rootstock.

The ratio of weight of solids to weight of acid, according to kind of rootstock, ranged between 3.68 to 1 and 3.96 to 1 in October, between 7.91 to 1 and 8.83 to 1 in December, and between 12.59 to 1 and 14.55 to 1 in February (table 3, fig. 1). In fruit picked in April it rose as high as 18.52 to 1. It averaged highest in the fruit grown on Cleopatra rootstock and lowest in that grown on sour orange.

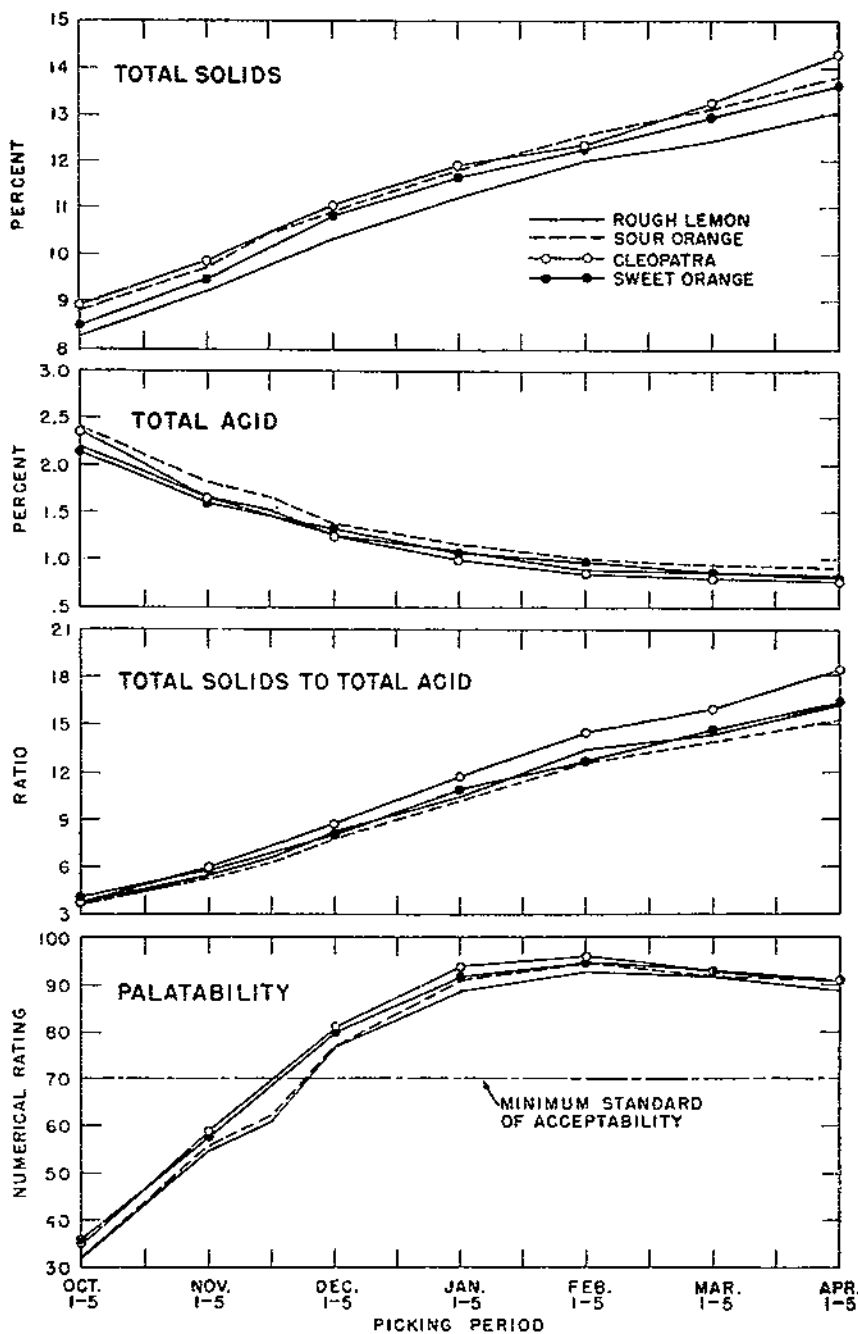


FIGURE 1.--Palatability (for scale, see p. 5), percentages of solids and acid by weight, and solids-acid weight ratio of Temple oranges at different picking periods, according to kind of rootstock. (Averages of all data.)

TABLE 3.—Palatability ratings and chemical composition of Temple oranges harvested at critical times, by kind of rootstock
(Figures represent averages for all data)

Kind of rootstock	Palatability rating ¹				Volume of juice per fruit				Total solids				Total acid				Solids-acid ratio			
	Oct. 1-5	Dec. 1-5	Feb. 1-5	Apr. 1-5	Oct. 1-5	Dec. 1-5	Feb. 1-5	Apr. 1-5	Oct. 1-5	Dec. 1-5	Feb. 1-5	Apr. 1-5	Oct. 1-5	Dec. 1-5	Feb. 1-5	Apr. 1-5	Oct. 1-5	Dec. 1-5	Feb. 1-5	Apr. 1-5
Rough lemon.....	32	77	93	89	<i>Ml.</i>	<i>Ml.</i>	<i>Ml.</i>	<i>Ml.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	3.77	8.25	13.48	16.29
Sour orange.....	32	77	95	91	92	142	161	152	8.29	10.31	12.00	13.03	2.20	1.25	0.89	0.80	3.68	7.91	12.59	15.33
Cleopatra.....	35	81	96	91	88	138	164	148	8.91	11.04	12.37	14.26	2.35	1.25	.85	.77	3.79	8.83	14.55	18.52
Sweet orange.....	36	80	95	91	92	134	154	136	8.51	10.87	12.29	13.61	2.15	1.32	.96	.83	3.96	8.23	12.80	16.40

¹ Average of ratings given by about 40 tasters using the score card shown on p. 5.

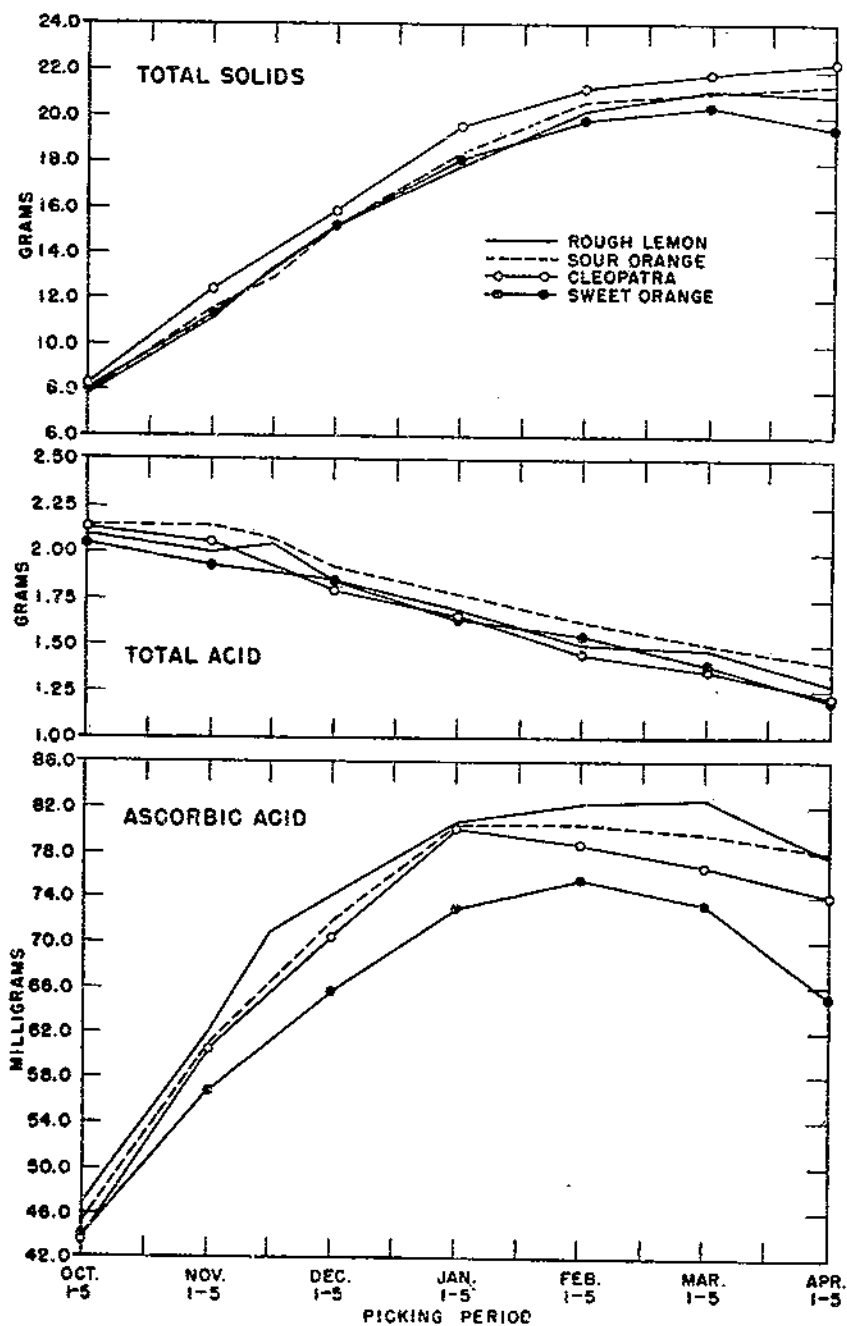


FIGURE 2.—Weights of total solids, total acid, and ascorbic acid per fruit in Temple oranges at different picking periods, according to kind of rootstock. (Averages of all data.)

ASCORBIC ACID

The Temple orange proved to be outstanding as a source of ascorbic acid (vitamin C). The concentration of this valuable vitamin in its juice remained consistently high throughout the 6-month period October-March (table 4, fig. 3). In earlier studies the concentration of ascorbic

TABLE 4.—Seasonal changes in average ascorbic acid concentration of Temple oranges in each of the crop years 1943-44 to 1946-47, by kind of rootstock

Kind of rootstock and crop year	Ascorbic acid per milliliter of juice of fruit harvested at indicated period						
	Oct. 1-5	Nov. 1-5	Dec. 1-5	Jan. 1-5	Feb. 1-5	Mar. 1-5	Apr. 1-5
Rough lemon:	<i>Mg.</i>	<i>Mg.</i>	<i>Mg.</i>	<i>Mg.</i>	<i>Mg.</i>	<i>Mg.</i>	<i>Mg.</i>
1943-44	0.52	0.55	0.55	0.50	0.55	0.54	0.50
1944-45	.54	.54	.51	.53	.49	.49	.49
1945-46	.51	.52	.53	.53	.52	.52	.52
1946-47	.48	.49	.49	.50	.50	.50	.51
Sour orange:							
1943-44	.53	.55	.54	.53	.52	.51	.52
1944-45	.55	.56	.55	.56	.53	.53	.53
1945-46	.54	.54	.56	.54	.53	.52	.54
1946-47	.49	.50	.51	.53	.51	.52	.53
Cleopatra:							
1943-44	.52	.50	.52	.53	.50	.49	.51
1944-45	.51	.53	.52	.51	.48	.48	.47
1945-46	.51	.52	.52	.51	.49	.49	.53
1946-47	.46	.47	.49	.49	.46	.50	.49
Sweet orange:							
1943-44	.46	.48	.49	.49	.50	.48	.47
1944-45	.49	.49	.47	.47	.47	.48	.49
1945-46	.50	.50	.54	.53	.54	.52	
1946-47	.47	.47	.46	.48	.46	.49	.49

acid had been found to decrease gradually during the ripening period in sweet orange (7), grapefruit (5), and tangerine (6).

Weight of ascorbic acid per milliliter of juice varied slightly according to kind of rootstock (fig. 3). It was greatest in fruit grown on sour orange stock. In this respect the fruit grown on rough lemon ranked second and that grown on Cleopatra ranked third. Variation among groves in ascorbic acid content of juice was small.

Weight of ascorbic acid per fruit increased rapidly from October until January or later (fig. 2), as volume of juice increased (fig. 4). Toward the end of the season it decreased, as volume of juice decreased. In weight of ascorbic acid the fruit grown on rough lemon stock ranked first, that grown on sour orange second, and that grown on Cleopatra third (fig. 2).

ACTIVE ACIDITY

Active acidity, the measure of which is the pH value, gradually decreased as the fruit ripened (fig. 3). The pH value of the juice according

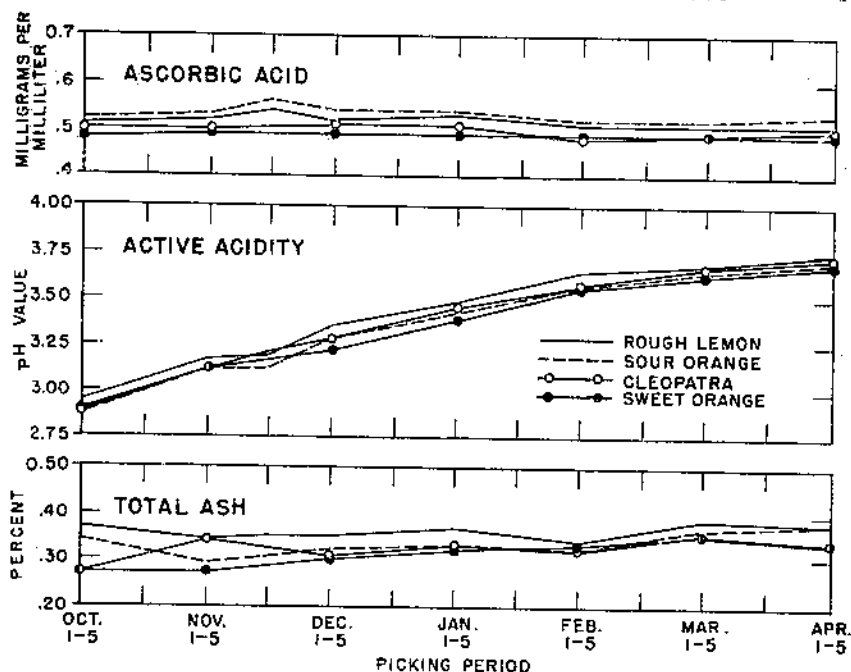


Figure 3.--Percentage of total ash, active acidity, and weight of ascorbic acid per milliliter of juice in Temple oranges at different picking periods, according to kind of rootstock. (Averages of all data.)

to kind of rootstock ranged between 2.87 and 2.94 for fruits picked in October. For fruits picked in April it ranged between 3.68 and 3.75, signifying considerably reduced acidity.

The pH values of the juice varied among groves only very slightly. They were highest for fruit grown on rough lemon and lowest for fruit grown on sweet orange rootstock (fig. 3).

TOTAL ASH

The ash content of the fruit, composed largely of mineral salts, generally increased a little as the fruit ripened and was usually slightly higher in overripe than in ripe fruit (fig. 3). The differences were not pronounced, and the trends were not always consistent. Percentage of ash was slightly higher in oranges grown on rough lemon rootstock than in the others.

PHYSICAL FACTORS

VOLUME AND WEIGHT OF JUICE

Volume of juice increased rapidly until the fruit reached prime condition and decreased in fruit that was overripe (table 3, fig. 4). Milliliters of juice per fruit according to kind of rootstock ranged between 87 and 92 in October, between 154 and 164 in February, and between 136 and 152 in April. Fruits grown on rough lemon and Cleopatra rootstocks averaged higher in juiciness than the others.

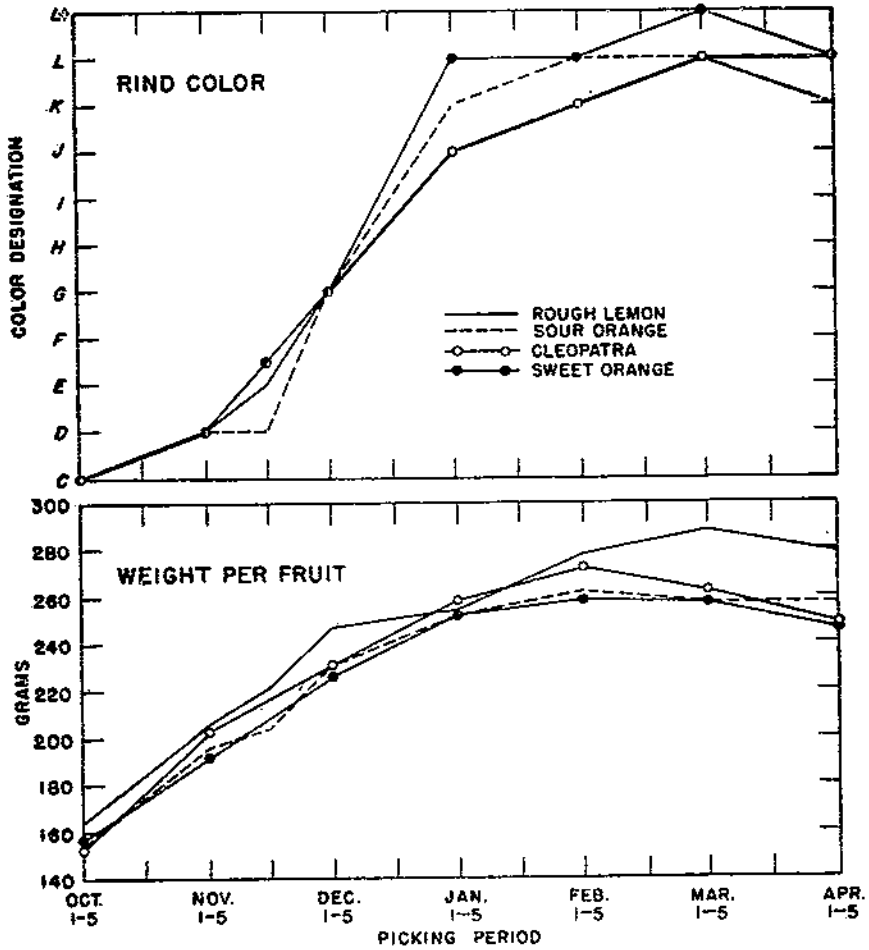


FIGURE 4.—Continued on opp. site page.

Little seasonal change was found in weight of juice per fruit when this was computed as a percentage of weight of fruit (fig. 4) or in volume of juice per 100 grams of fruit. During the 6-month period between early October and early April these values ranged, on an average, between 57 and 63 percent and between 55 and 60 milliliters per 100 grams, respectively.

WEIGHT AND SIZE OF FRUIT

Average weight per fruit increased rapidly as the fruit approached maturity (table 5 and fig. 4). Average recorded weight most frequently reached its maximum in February; for each rootstock it failed to do so until March or April in one or more of the study years. There was usually a downward trend after the maximum was reached. Fruits grown on rough lemon and Cleopatra rootstocks were slightly heavier than the others.

Average diameter of fruit increased as the fruit matured and ripened (table 6). On the two plots where diameters were measured, the fruits

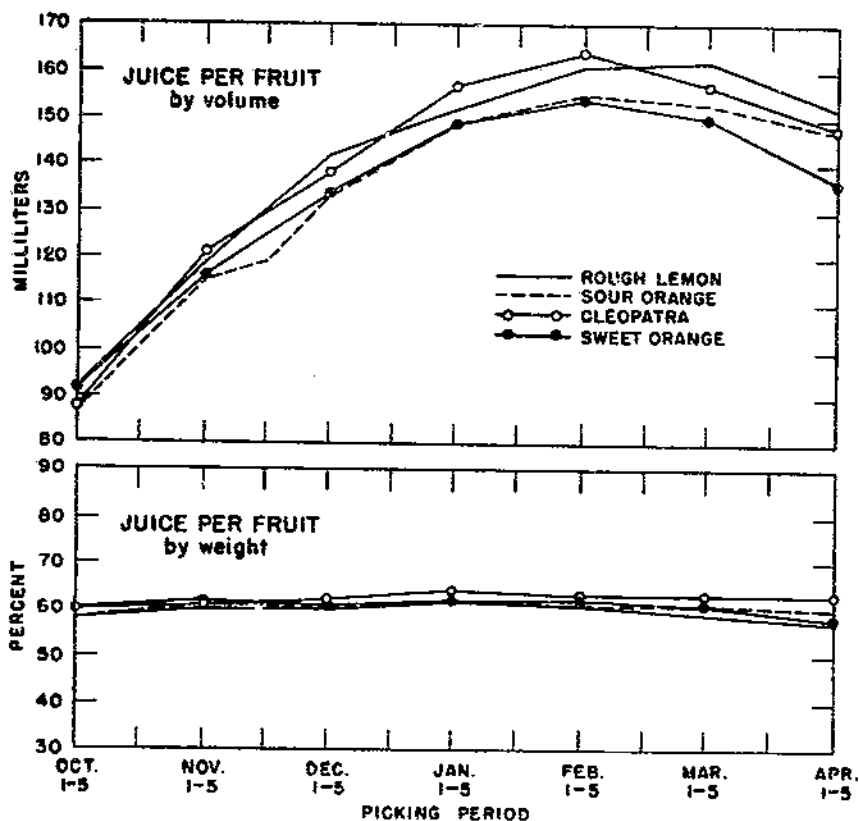


FIGURE 4.—Weight of juice as a percentage of weight of fruit, volume of juice per fruit, weight per fruit, and color of rind (as rated according to the standards shown in pl. 1) of Temple oranges at different picking periods, according to kind of rootstock. (Averages of all data.)

produced on rough lemon rootstock grew larger in diameter than those produced on sour orange; diameter averages in October and February were 69 and 82 millimeters for the fruit produced on rough lemon, 65 and 78 millimeters for the fruit produced on sour orange.

COLOR AND THICKNESS OF RIND

Rind color as determined by matching the fruit with the standards shown in plate 1 was fairly uniform for the fruits in each sample. The results obtained in determining rind color for each of the 25 fruits in each sample used for chemical analysis and averaging are shown in figure 4.

Natural degreening, associated with the ripening of the fruit, progressed very rapidly during the 3 months November to January (fig. 4). After this time there was usually a gradual increase in brightness of rind color until early March; later, the rind color tended to fade slightly. Fruits grown on sweet orange were a little brighter than the others.

Thickness of rind, on the two plots where it was measured, remained practically unchanged throughout the various stages of growth and ripening, averaging about 3 millimeters (table 7).

TABLE 5.—Seasonal changes in average weight of Temple oranges in each of the crop years 1943-44 to 1946-47, by kind of rootstock

Kind of rootstock and crop year	Average weight of fruit harvested at indicated period						
	Oct. 1-5	Nov. 1-5	Dec. 1-5	Jan. 1-5	Feb. 1-5	Mar. 1-5	Apr. 1-5
Rough lemon:	Grams	Grams	Grams	Grams	Grams	Grams	Grams
1943-44	143	185	221	234	247	270	277
1944-45	163	214	242	254	289	272	247
1945-46	167	202	242	247	254	261	271
1946-47	174	216	264	271	303	313	293
Sour orange:							
1943-44	133	170	209	235	237	244	245
1944-45	153	198	227	238	244	234	244
1945-46	153	190	221	245	246	249	241
1946-47	169	216	260	276	307	294	291
Cleopatra:							
1943-44	131	176	202	230	248	255	244
1944-45	156	206	228	243	258	257	241
1945-46	157	204	240	255	255	247	247
1946-47	169	227	266	304	329	290	269
Sweet orange:							
1943-44	123	157	196	226	227	217	233
1944-45	165	197	215	251	255	248	223
1945-46	157	180	203	217	224	236	
1946-47	181	235	289	315	328	326	282

TABLE 6.—Seasonal changes in average diameter of Temple oranges on rough lemon and sour orange rootstocks in each of the crop years 1943-44 to 1945-46

Kind of rootstock and crop year	Average diameter ¹ of fruit harvested at indicated period						
	Oct. 1-5	Nov. 1-5	Dec. 1-5	Jan. 1-5	Feb. 1-5	Mar. 1-5	Apr. 1-5
Rough lemon:	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.
1943-44	67	72	75	78	81		
1944-45	69	76	81	81	83	82	75
1945-46	70	76	80	82	83	85	83
Sour orange:							
1943-44	66	68	72	74	77	76	77
1944-45	62	73	77	77	81	78	78
1945-46	66	72	77	77	76	75	76

¹ Each figure represents a mean of 25 measurements for 1 season on 1 plot.

COLOR AND CONDITION OF FLESH

The flesh color of ripe immature fruit was usually orange yellow; that of coarse-textured immature fruit, yellow orange; and that of mature, good-textured fruit, orange. The flesh color was usually orange yellow to yellow orange from October through December and orange from January throughout the remainder of the harvesting season. In ripe fruit the flesh color did not differ significantly among lots.

TABLE 7.—Seasonal changes in average thickness of rind of Temple oranges on rough lemon and sour orange rootstocks in each of the crop years 1943-44 to 1945-46

Kind of rootstock and crop year	Average rind thickness ¹ of fruit harvested at indicated period						
	Oct. 1-5	Nov. 1-5	Dec. 1-5	Jan. 1-5	Feb. 1-5	Mar. 1-5	Apr. 1-5
Rough lemon:	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.
1943-44.	3	3	3	3	4		
1944-45.	3	4	3	4	4	3	3
1945-46.	3	3	3	4	3	3	4
Sour orange:							
1943-44.	3	3	3	3	3	3	3
1944-45.	3	3	3	3	3	3	3
1945-46.	3	3	3	3	3	2	3

¹ Each figure represents a mean of 25 measurements for 1 season on 1 plot.

Oranges picked in October were usually ricey, those picked in November coarse-textured, and those picked in December or later good-textured (table 8). Drying out of the flesh was not a serious factor, although some dried fruits were found in samples picked late in the season.

TABLE 8.—Seasonal changes in average condition of the flesh of Temple oranges in each of the crop years 1943-44 to 1946-47, by kind of rootstock

Kind of rootstock and crop year	Average condition of flesh of fruit harvested at indicated period						
	Oct. 1-5	Nov. 1-5	Dec. 1-5	Jan. 1-5	Feb. 1-5	Mar. 1-5	Apr. 1-5
Rough lemon:							
1943-44.	Ricey.	Coarse.	Good.	Good.	Good.	Good.	Good.
1944-45.	do.	do.	do.	do.	do.	do.	Do.
1945-46.	Coarse.	Good.	do.	do.	do.	do.	Do.
1946-47.	Ricey.	Coarse.	Coarse.	do.	do.	do.	Do.
Sour orange:							
1943-44.	do.	do.	Good.	do.	do.	do.	Do.
1944-45.	do.	do.	do.	do.	do.	do.	Do.
1945-46.	Coarse.	Good.	do.	do.	do.	do.	Do.
1946-47.	Ricey.	Coarse.	do.	do.	do.	do.	Do.
Cleopatra:							
1943-44.	do.	do.	do.	do.	do.	do.	Do.
1944-45.	do.	do.	do.	do.	do.	do.	Do.
1945-46.	Coarse.	do.	do.	do.	do.	do.	Do.
1946-47.	Ricey.	do.	do.	do.	do.	do.	Do.
Sweet orange:							
1943-44.	do.	do.	do.	do.	do.	do.	Do.
1944-45.	Coarse.	do.	do.	do.	do.	do.	Do.
1945-46.	do.	Good.	do.	do.	do.	do.	Do.
1946-47.	do.	Coarse.	Coarse.	do.	do.	do.	Good.

PHYSICAL AND CHEMICAL FACTORS IN RELATION TO PALATABILITY

Sinclair and Bartholomew (10) called attention to the fact that soluble constituents of orange juice other than sugars and acids have an important influence on taste sensations. They pointed out that acids of citrus juices are stable; and that the occurrence of off-flavors in either natural or processed orange juice is in no small measure due to oxidation and decomposition of substances in the relatively small fraction of the soluble constituents that is neither acid nor sugar.

Results presented in this bulletin show that the seasonal trends of palatability as determined by taste tests corresponded with those of rind color, weight of fruit, color and texture of flesh, volume of juice, total solids, and ratio of solids to acid. These factors improved or increased in the ripening fruit. In very ripe fruit there was a slight deterioration of flavor, accompanied by a slight decrease in weight of fruit and in volume of juice and a fading of the bright-orange rind color.

Data on solids content and acid content of representative lots of fruit that did and did not receive ratings of 70 or more in taste tests were plotted in nomograph form. The resulting chart (fig. 5) illustrates the

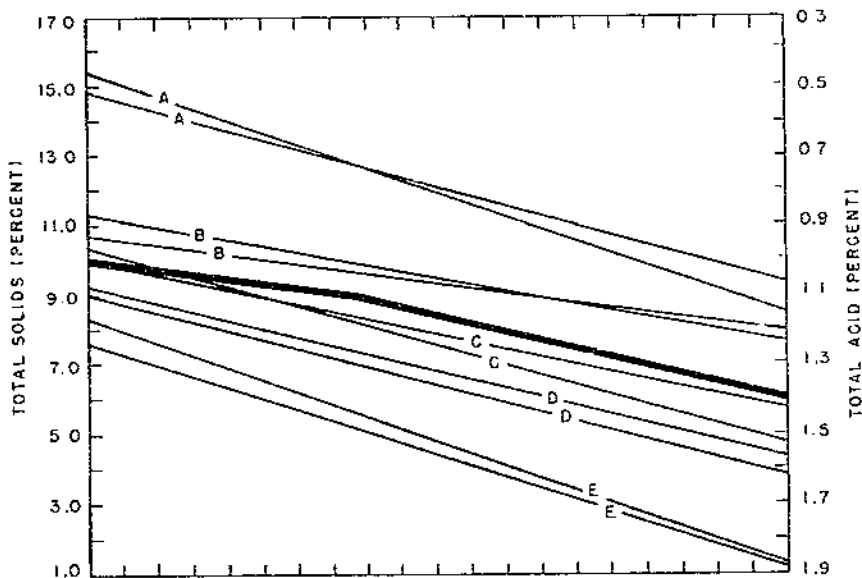


FIGURE 5.—Nomograph illustrating the relation of consumer approval or disapproval to total solids and total acid in representative samples of Temple oranges. The lines that are entirely above the heavy bar represent fruit that met consumer approval according to taste tests. Those that cross the heavy bar or are below it at all points represent fruit that did not meet consumer approval. *A*, Pleasantly tart to sweet fruit (scoring 94 to 96); *B*, pleasantly tart fruit (scoring 76 to 78); *C*, tart fruit (scoring 62 to 63); *D*, acid fruit (scoring 53 to 57); *E*, very acid fruit (scoring 29 to 39).

percentages of solids that are present, and the percentages of acid that are associated with them, in acceptable fruit, highly acceptable fruit, and fruit that is unacceptable in various degrees.

The material available for use in plotting the nomograph included the results of 406 taste tests, in 265 of which the fruit samples scored 70

or above. In the acceptable lots of fruit, the total solids content ranged between 9.37 and 15.40 percent and the total acidity between 0.63 and 1.82 percent. In a great majority of these lots the total solids ranged from 10 to 14 percent and the total acid from 0.70 to 1.40 percent. In order to make the nomograph a more reliable standard, borderline cases were excluded from the material used in preparing it. This was done by setting the minimum acceptable content of total solids at 10 percent and the maximum acceptable content of total acid at 1.40 percent. In order to be within the "acceptable" area of the nomograph, fruit that contained 10 percent total solids could not contain more than 1.27 percent total acid and fruit that contained 10.80 percent total solids could not contain more than 1.40 percent total acid. Under these conditions, the solids-acid ratios are at least 7.87 to 1 and 7.71 to 1, respectively.

Data on the 243 acceptable samples that were used in constructing the nomograph are given in table 9, and data on the 22 acceptable samples that were excluded are given in table 10. Seven samples were excluded

TABLE 9.—Composition of 243 samples of Temple oranges that came within the "acceptable" area of figure 5 by scoring 70 or above in taste tests and containing at least 10 percent solids and not more than 1.40 percent acid

Total solids (percent)	Total acid	Palatability rating	Samples
	Percent		Number
10.02 to 10.97	0.87 to 1.39	72 to 91	40
11.00 to 11.98	0.70 to 1.36	76 to 98	56
12.00 to 12.97	0.63 to 1.29	81 to 97	91
13.07 to 13.94	0.71 to 1.36	85 to 97	33
14.00 to 14.87	0.71 to 1.10	90 to 96	20
15.08 to 15.40	0.84 to 1.16	88 to 96	3

because the total solids content was slightly below 10 percent, and 15 samples because the total acid slightly exceeded 1.40 percent. One unacceptable sample, scoring 69 to taste, proved to be a borderline case; it contained 10.05 percent total solids and 1.25 percent total acid.

In work of this nature borderline cases are to be expected, because of the qualitative method of scoring.

TABLE 10.—Composition of 22 samples of Temple oranges that scored 70 or above in taste tests but were excluded from figure 5 because they contained less than 10 percent solids or more than 1.40 percent acid

Total solids (percent)	Total acid	Palatability rating	Samples
	Percent		Number
9.37 to 9.90	0.94 to 1.38	72 to 80	7
10.27 to 10.92	1.41 to 1.52	76 to 79	3
11.11 to 11.45	1.41 to 1.75	73 to 85	7
12.03 to 12.78	1.41 to 1.82	75 to 90	4
13.47	1.42	93	1

The nomograph strongly confirms consumer demand for fruit that is ripe and hence sweet.

Considerable improvement in Florida's maturity standards for oranges was brought about by the adoption of the State's 1949 Citrus Code (3). Under the former maturity law the required ratio of total solids to total acid was 7.5 to 1 if total solids content was below 10 percent, and for the range of solids from 10.1 to 10.9 percent the required ratio was graduated to a minimum of 7 to 1. Since 1949 the minimum for total solids is 9 percent, the minimum ratio of solids to acid is 9 to 1, and for the range of solids from 9.1 to 10.5 percent the required ratio is graduated to a minimum of 7.5 to 1.

Many shippers are of the opinion that the present maturity requirements permit the shipment of Temple oranges that are too tart to have consumer appeal. A careful review of the data in table 9 has led to the following suggestions: First, fruit would be picked later and would be sweeter if the standards were changed to 10 percent solids and an 8-to-1 solids-acid ratio. This standard would have resulted in a delay in the picking of about 12 percent of the samples examined in this study. Of the 12 percent, three-fourths were picked in the month of December and the others were picked in January. Second, fruit would be picked later and would be of higher quality if the standards were changed to 11 percent solids and a 9-to-1 solids-acid ratio. This change in standards would have resulted in a delay in the picking of 23 percent of the samples. Of the 23 percent, two-thirds were picked in the month of December and the others in January.

INFLUENCE OF KIND OF ROOTSTOCK ON FRUIT QUALITY

Slight to moderate differences in such factors as juiciness, total solids, and solids-acid ratio were associated with differences in kind of rootstock (table 3, figs. 1-4). Taste ratings and chemical analyses indicated that Cleopatra ranked first among the four kinds of rootstock in quality of oranges produced, sweet orange second, sour orange third, and rough lemon fourth. Volume of juice averaged high in the fruits grown on rough lemon stock, but concentration of total solids was lowest in these fruits. For mature trees, the variation in fruit quality according to rootstock was less than for young trees.

YEARLY VARIATION IN PHYSICAL AND CHEMICAL FACTORS

Variations occurred from year to year in physical characters and chemical constituents of the fruit. Some of these variations are shown in tables 4-8 and in figures 6-11.

Degreening took place somewhat later and the mature rind color was less bright in 1946-47 than in the three other crop years (fig. 6).

Diameter of fruit (on the two plots the fruit from which was measured) was greater in the years 1944-45 and 1945-46 than in 1943-44 (table 6).

Condition of flesh varied only slightly from year to year (table 8). There was some evidence that the fruit matured later in 1946-47 than in the other years.

Volume of juice per fruit varied considerably from year to year (fig. 7). It was comparatively low in 1943-44 and high in 1946-47.

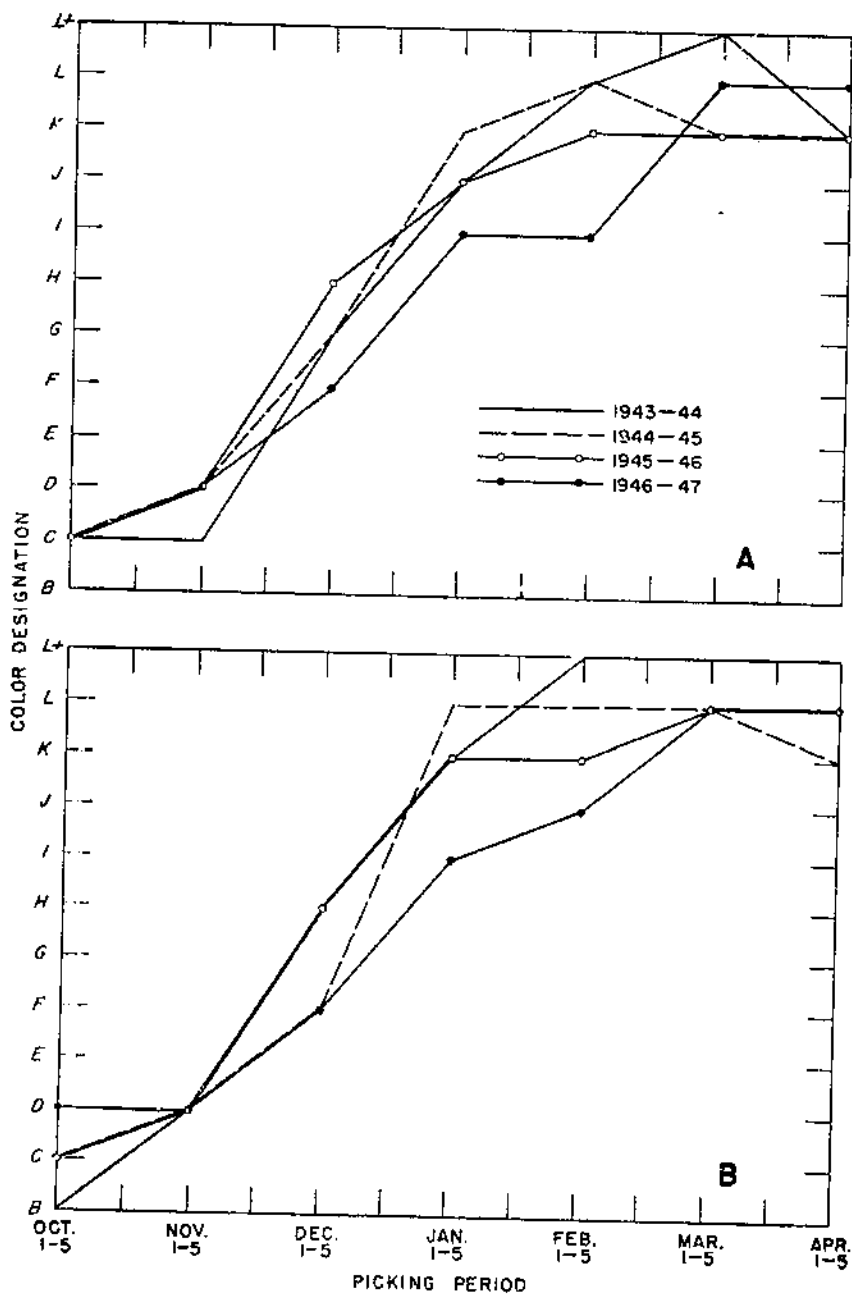


FIGURE 6.—Yearly variations in average color of the rind of Temple oranges (as rated according to the standards shown in pl. 1) at different picking periods, 1943-44 to 1946-47: A, On rough lemon rootstock; B, on sour orange rootstock.

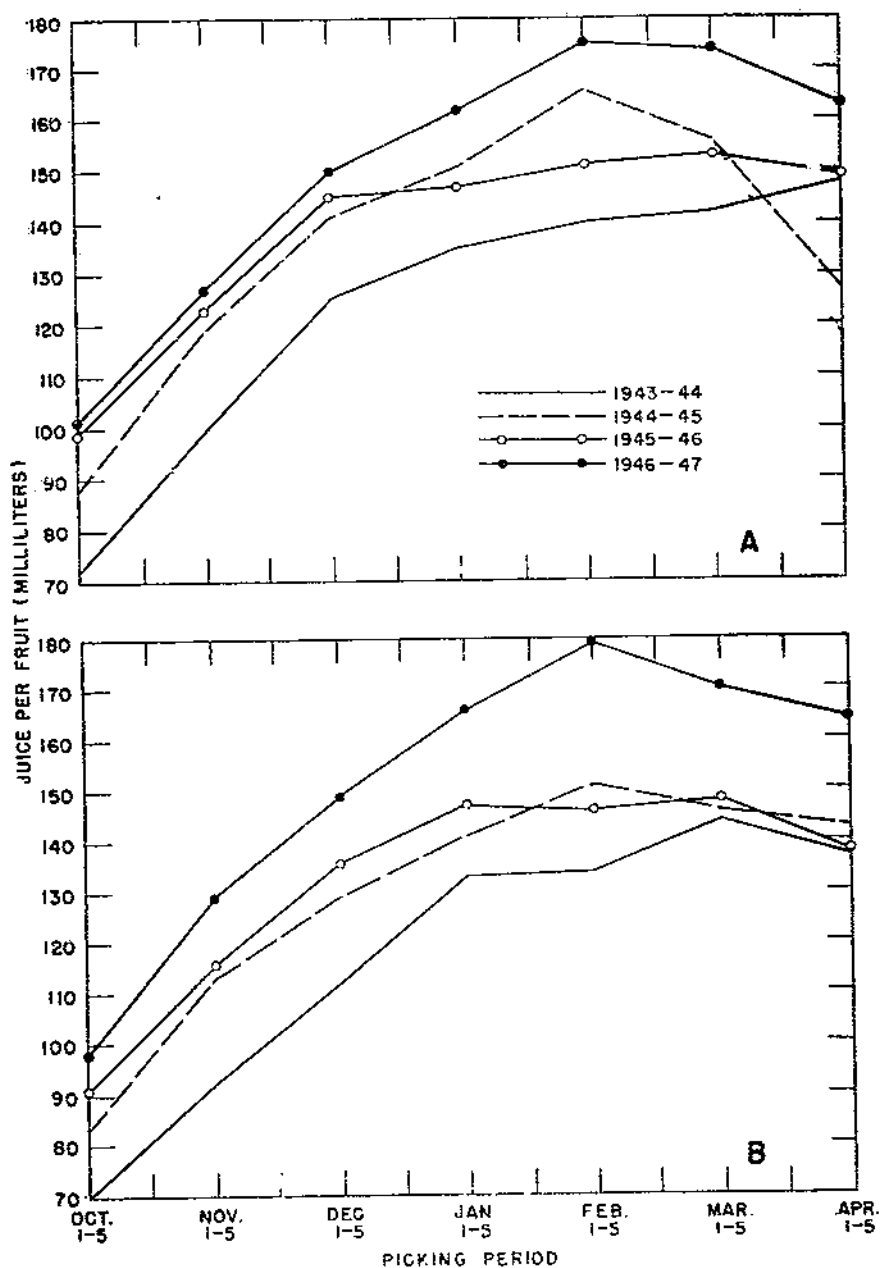


FIGURE 7.—Yearly variations in average volume of juice per fruit of Temple oranges at different picking periods, 1943-44 to 1946-47: A, On rough lemon rootstock; B, on sour orange rootstock.

Total solids content varied from year to year, not always consistently (fig. 8). In general, it was greatest in 1946-47 and least in 1945-46. In 1944-45 it was fairly high during the early stages of fruit development but was lower in the ripe fruit, especially on rough lemon rootstock, than in the other years.

Moderate yearly differences were observed in the total acid content of immature fruits (fig. 9) but not in that of ripe fruits. Total acidity was highest in 1943-44 and lowest in 1945-46 and 1946-47.

The solids-acid ratios (fig. 10) were fairly uniform during the first three crop years. From October to February of 1946-47 they were higher, total solids being greater and total acid less than usual at that time.

Active acidity was higher in the 1943-44 season than in the others (fig. 11).

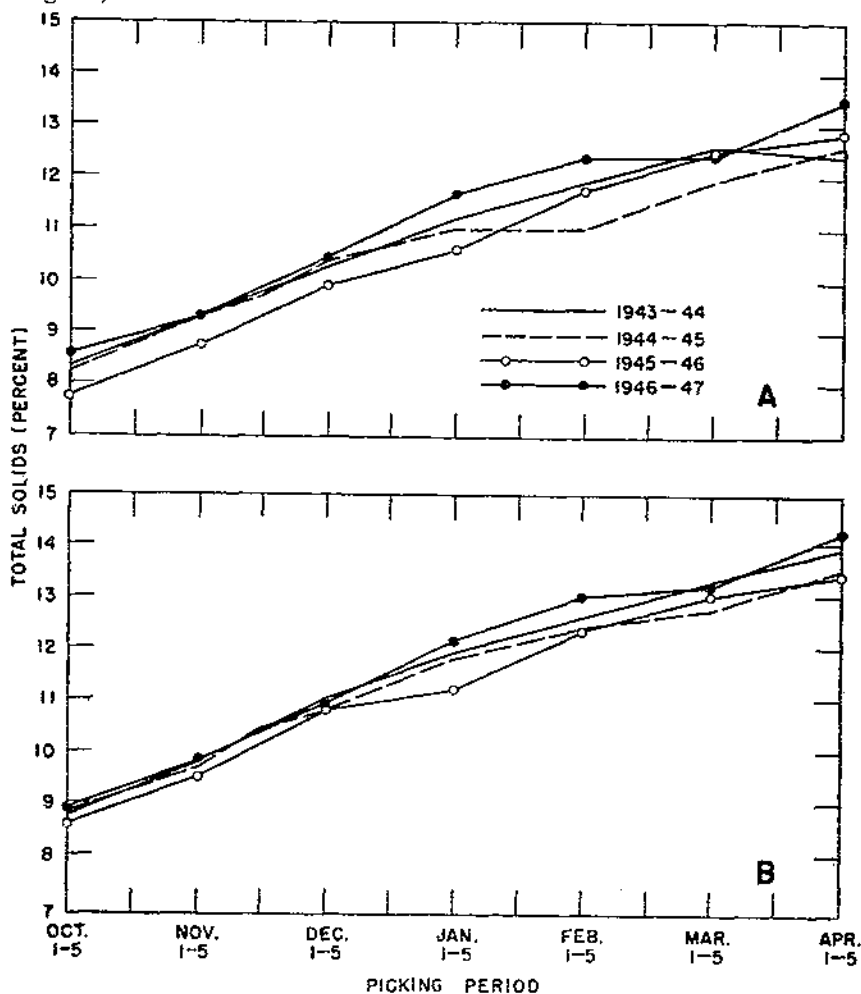


FIGURE 8.—Yearly variations in average weight of total solids of Temple oranges at different picking periods, 1943-44 to 1946-47: A, On rough lemon rootstock; B, on sour orange rootstock.

TABLE 11.--Effect of the 1947 freeze on the composition of Temple oranges ¹

Plot, and condition of fruit	Weight per fruit		Volume of juice per fruit		Volume of juice per 100 grams of fruit		Weight of juice per fruit		Ascorbic acid per milliliter of juice		Active acidity		Total solids		Total acid		Solids-acid ratio		Palatability ²				
	Mar. 1-5	Apr. 1-5	Mar. 1-5	Apr. 1-5	Mar. 1-5	Apr. 1-5	Mar. 1-5	Apr. 1-5	Mar. 1-5	Apr. 1-5	Mar. 1-5	Apr. 1-5	Mar. 1-5	Apr. 1-5	Mar. 1-5	Apr. 1-5	Mar. 1-5	Apr. 1-5	Mar. 1-5		Apr. 1-5		
	Gm.	Gm.	ML.	ML.	ML.	ML.	Pct.	Pct.	Mg.	Mg.	pH	pH	Pct.	Pct.	Pct.	Pct.			Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating	
Plot 3:																							
Unfrozen	304		172		56		59		0.48		3.70		12.74		0.81		15.73		P tart to S.	95			
Frozen	327		175		54		56		.44		3.82		12.00		.65		18.46		Inspid.	80			
Plot 4:																							
Unfrozen	299	304	169	173	59	57	61	60	54	0.50	3.59	3.72	13.20	13.12	1.00	0.88	13.29	14.91	P tart to S.	94	P tart to S.	85	
Frozen	285	322	159	162	56	50	58	53	52	.47	3.67	3.82	13.05	12.37	.94	.73	13.88	16.95	Inspid.	81	Inspid.	75	
Plot 6:																							
Unfrozen	343	251	167	143	49	57	51	59	46	.51	3.71	3.82	11.57	12.77	.87	.71	13.30	17.99	P tart to S.	85	Inspid.	81	
Frozen	311	255	142	80	46	32	47	33	38	.39	3.92	4.16	10.92	11.37	.63	.45	17.33	25.27	Inspid.	65	do.	64	
Plot 13:																							
Unfrozen	299	305	163	174	55	57	57	60	55	.56	3.60	3.63	13.67	14.76	1.10	1.10	12.43	13.40	P tart to S.	94	P tart to S.	92	
Frozen	308	330	163	171	53	52	55	54	56	.54	3.67	3.65	13.67	14.14	.93	.96	14.70	14.73	Inspid.	84	Inspid.	84	
Plot 18:																							
Unfrozen	300	327	176	186	59	57	62	60	61	.60	3.57	3.73	13.75	13.94	.99	.75	15.28	18.59	P tart to S.	96	P tart to S.	90	
Frozen	317	332	160	168	50	51	53	53	53	.54	3.72	3.94	12.75	12.80	.67	.59	19.03	23.02	Inspid.	76	Inspid.	68	

¹ Freezing temperatures occurred the week of February 6, 1947. Collections and analyses of fruit were made within the periods March 1-5 and April 1-5, 1947.

² P, pleasantly; S, sweet.

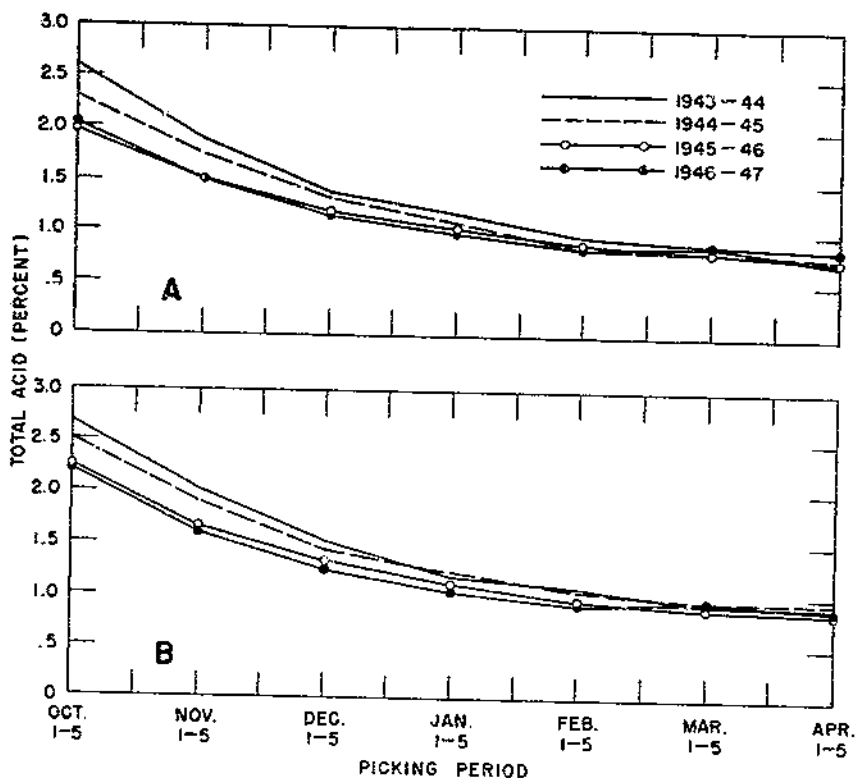


FIGURE 9.—Yearly variations in average weight of total acid of Temple oranges at different picking periods, 1943-44 to 1946-47: A, On rough lemon rootstock; B, on sour orange rootstock.

EFFECT OF THE 1947 FREEZE

Study of oranges frozen the week of February 6, 1947, disclosed damage ranging from slight to very severe (table 11).

In the severely frozen fruit, drying occurred throughout. Freezing affected both the volume and the quality of the juice. The frozen fruits contained less juice and had lower content of total solids, of total acid, and of ascorbic acid (vitamin C), and had lower active acidity. The juice of frozen oranges was insipid and their solids-acid ratio was higher. High solids-acid ratio and poor flavor are closely correlated in any citrus fruit. In this particular case they appear to have resulted primarily from marked reduction in the acidity of frozen fruits, which generally exceeded the reduction in total solids.

Frozen fruits were notably lacking in aroma. However, no pronounced off-flavors were noted in them either 1 or 2 months after the freeze. Changes observed in some of the chemical constituents suggested that the rate of metabolism was higher in frozen than in unfrozen fruits.

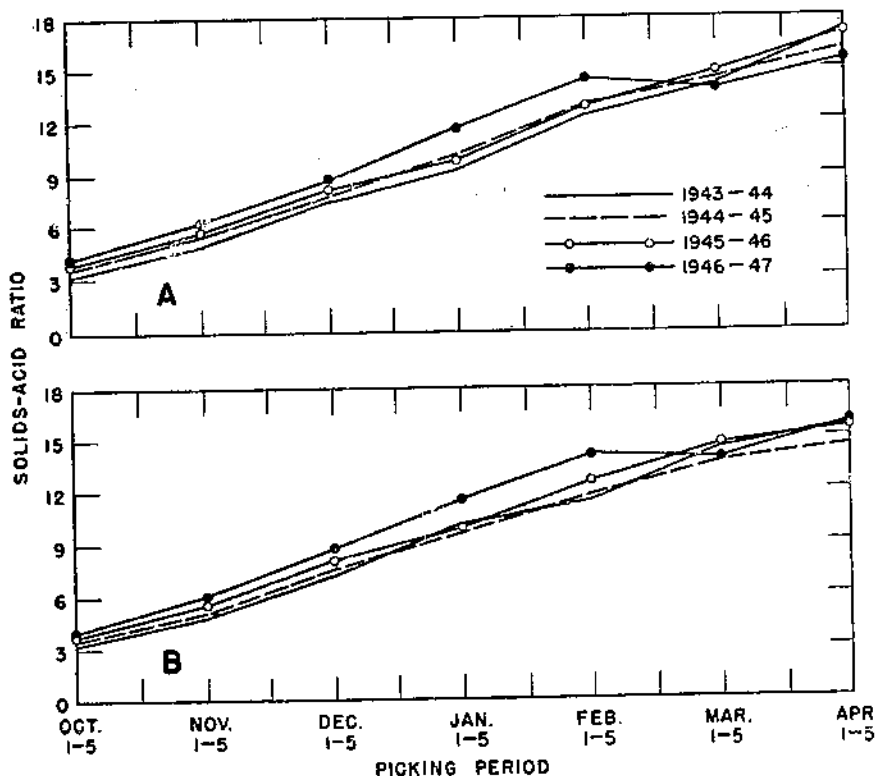


FIGURE 10.—Yearly variations in average ratios, by weight, of total solids to total acid of Temple oranges at different picking periods, 1943-44 to 1946-47: A, On rough lemon rootstock; B, on sour orange rootstock.

SUMMARY

Results are presented of the periodic analysis of about 1,500 fruits and composite juice samples of the Temple orange (probably Tangor hybrid, *Citrus reticulata* × *C. sinensis*) on which duplicate determinations were made for various chemical constituents and of associated taste tests and physical determinations. The testing period was from October to April for the four crop years 1943-44 to 1946-47. The oranges used came from 21 groves chosen as typical of Temple plantings in Florida. Most of them were grown on rootstocks of rough lemon (*C. limon*) and sour orange (*C. aurantium*); the others were grown on Cleopatra tangerine (*C. reticulata*) and sweet orange (*C. sinensis*). Samples of fruit for testing were picked within the first 5 days of each month.

The eating quality of the oranges improved rapidly during October and November, and practically all the fruit harvested in December met the minimum standard of consumer acceptance. Prime eating condition was reached in February. Later, palatability slightly decreased. Fruit that met the minimum standard of consumer acceptance contained, by weight, at least about 10 percent total solids. Fruit containing only about 10 percent total solids was not acceptable if it contained more

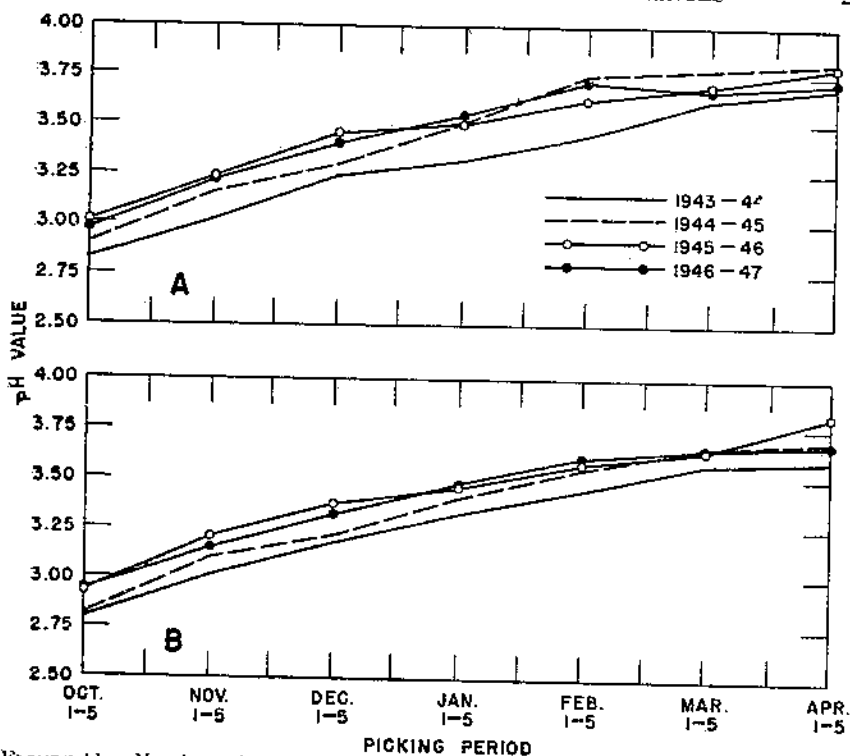


FIGURE 11.—Yearly variations in average active acidity of Temple oranges at different picking periods, 1943-44 to 1946-47: A, On rough lemon rootstock; B, on sour rootstock.

than 1.27 percent total acid. Fruit containing 10.80 percent total solids proved acceptable only if it had a total acid content of not more than 1.40 percent. Under these two sets of conditions, the solids-acid ratios are at least 7.87 to 1 and 7.71 to 1, respectively. It is suggested that fruit would be picked later and would be sweeter if the legal minimum standards were changed from 9 percent total solids and a 9-to-1 solids-acid ratio to 10 percent total solids and an 8-to-1 solids-acid ratio; and that fruit would be picked later and would be of higher quality if the standards were changed to 11 percent solids and a 9-to-1 solids-acid ratio.

Total weight of solids increased gradually during the various stages of growth and ripening. In contrast, total weight of acid characteristically decreased as the oranges ripened.

The concentration of ascorbic acid (vitamin C) in the fruit was consistently high throughout the period from October to April, and showed no pronounced tendency to decrease with ripening. As the fruit ripened, its active acidity gradually decreased and its total ash, composed largely of mineral salts, increased slightly.

Volume of juice per fruit and weight per fruit were closely associated. Both these measurements increased rapidly as the fruit approached ripeness, remained rather constant in prime fruit, and slightly decreased in fruit that was overripe.

Degreening, associated with ripening, proceeded very rapidly during the months November to January. In April the bright-orange rind color tended to fade slightly.

The thickness of the rind, according to data taken on two plots, remained practically unchanged during growth and ripening, averaging about 3 mm.

The color of the flesh was orange and its condition was good from January to April. Drying out of the flesh was not a serious factor.

The study data on rootstocks for Temple orange, in which sour orange and rough lemon are represented adequately and sweet orange and Cleopatra tangerine inadequately, yield evidence that kind of rootstock had slight to moderate effect on color of rind, weight of fruit, and volume of juice and had some effect on total solids, total acid, ascorbic acid, active acidity, and ash—factors that largely determine eating quality. In fruit from mature trees the variation in quality according to rootstock was less than in fruit from young trees. According to the taste ratings and chemical analyses the four kinds of rootstock used ranked as follows: First, Cleopatra; second, sweet orange; third, sour orange; and fourth, rough lemon.

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APPENDIX

TABLE 12.—Seasonal changes in physical characters and chemical constituents of Temple oranges on rough lemon rootstock on plot 1, at Winter Haven, Fla., 1943-44 to 1946-47

Picking period	Weight per fruit	Rind color ^{2 2}				Flesh color ^{2 4}				Flesh condition ²				Diameter of fruit ²		
		1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46
		<i>Gm.</i>												<i>Mm.</i>	<i>Mm.</i>	<i>Mm.</i>
Oct. 1-5	166	C	C	C	C	OY	YO	OY	OY	Ricey	Coarse	Coarse	Ricey	67	69	70
Nov. 1-5	208	C	D	D	C	YO	YO	O	OY	Coarse	Good	Good	Coarse	72	76	76
Nov. 15	224		E				YO			do	do	do	do	75	77	80
Dec. 1-5	243	H	E	H	F	O	YO	O	YO	Good	do	Good	Coarse	78	81	82
Jan. 1-5	250	I	K	J	J	O	O	O	O	do	do	do	Good	81	83	83
Feb. 1-5	268	K	L	K	J	O	O	O	O	do	do	do	do		82	85
Mar. 1-5	279		K	L	L+		O	O	O	do	do	do	do		75	83
Apr. 1-5	253		K	K	L+		O	O	O	do	do	do	do			

Picking period	Rind thickness ²			Juice per 100 grams of fruit ¹	Juice per fruit ²	Palatability ⁴					
	1943-44					1944-45		1945-46		1946-47	
	1943-44	1944-45	1945-46			Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating
Oct. 1-5	<i>Mm.</i> 3	<i>Mm.</i> 3	<i>Mm.</i> 3	<i>Ml.</i> 57	<i>Pct.</i> 60	V acid 43	V acid 31	V acid 20	V acid 35		
Nov. 1-5	3	4	3	57	62	Tart 61	Acid 57	Tart 61	Acid 55		
Nov. 15		3		57			Tart 62				
Dec. 1-5	3	3	3	57	60	P tart 79	P tart 75	P tart to S 80	P tart 76		
Jan. 1-5	3	4	4	58	60	P tart to S 90	P tart to S 87	do 91	P tart to S 90		
Feb. 1-5	4	4	3	57	61	do 93	do 94	do 96	do 92		
Mar. 1-5		3	3	57	59		do 92	do 93	do 94		
Apr. 1-5		3	4	54	57		do 91	do 92	do 93		

Picking period	Total ash ¹			Ascorbic acid per milliliter ²				Active acidity ³			
	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47
	Pct.	Pct.	Pct.	Mg.	Mg.	Mg.	Mg.	pH	pH	pH	pH
Oct. 1-5	0.44	0.38	0.37	0.15	0.51	0.48	0.43	2.85	3.02	3.08	3.04
Nov. 1-5	.29	.36	.34	.50	.51	.51	.43	3.08	3.28	3.20	3.28
Nov. 15	.34				.53				3.21		3.41
Dec. 1-5	.36	.35	.37	.51	.51	.53	.45	3.28	3.38	3.45	3.44
Jan. 1-5	.32	.48	.30	.50	.51	.52	.46	3.27	3.49	3.54	3.54
Feb. 1-5	.38	.36	.38	.55	.48	.53	.48	3.25	3.59	3.59	3.72
Mar. 1-5	.41	.38	.40		.46	.52	.47		3.70	3.71	3.70
Apr. 1-5	.38	.33	.39		.40	.51	.49		3.09	3.77	3.72

Picking period	Total solids				Total acid				Solids-acid ratio			
	1943-44 ¹	1944-45 ²	1945-46 ²	1946-47 ²	1943-44 ¹	1944-45 ²	1945-46 ²	1946-47 ²	1943-44	1944-45	1945-46	1946-47
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.				
Oct. 1-5	8.94	9.49	8.25	8.33	2.28	2.12	1.87	2.00	3.92	4.00	4.41	4.17
Nov. 1-5	10.59	8.06	9.42	8.90	1.65	1.62	1.56	1.53	6.42	5.53	6.04	5.82
Nov. 15		9.95				1.43				6.96		
Dec. 1-5	10.92	10.25	10.42	10.84	1.41	1.26	1.18	1.25	7.74	8.13	8.83	8.67
Jan. 1-5	11.53	10.74	11.00	11.45	1.28	1.11	1.14	1.09	9.01	9.68	9.65	10.50
Feb. 1-5	11.48	11.04	11.78	12.82	1.00	.95	.94	.99	11.48	11.62	12.53	12.95
Mar. 1-5		11.67	12.79	12.14		.91	.87	1.00		12.82	14.70	12.14
Apr. 1-5		12.85	13.52	14.39		.89	.79	1.00		14.44	17.11	14.39

¹ With the exceptions indicated, each figure represents a mean of 75 determinations made in 3 seasons or of 100 determinations made in 4 seasons.

² Each figure or description represents a mean of 25 determinations made in 1 season.

³ See U. S. Department of Agriculture color chart (pl. 1).

⁴ OY, orange yellow; YO, yellow orange; O, orange; V, very; P, pleasantly; S, sweet.

⁵ Each figure represents a mean of duplicate determinations.

TABLE 13. Seasonal changes in physical characters and chemical constituents of Temple oranges on rough lemon rootstock on plot 2, at Wintermere, Fla., 1943-44 to 1946-47

Picking period	Hind color 1		Flesh color 2				Flesh condition 3					
	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47
Oct. 1-5	B	D	C	C	OY	OY	OY	OY	Coarse	Coarse	Coarse	Coarse
Nov. 1-5	B	D	C	C	OY	OY	OY	OY	Coarse	Coarse	Coarse	Coarse
Nov. 15	B	D	C	C	OY	OY	OY	OY	Coarse	Coarse	Coarse	Coarse
Dec. 1-5	H	H	C	E	YO	YO	YO	YO	Good	Good	Good	Good
Jan. 1-5	L	H	C	E	YO	YO	YO	YO	do	do	do	do
Jan. 15	L	H	C	E	YO	YO	YO	YO	do	do	do	do
Feb. 1-5	L	L	K	K	O	O	O	O	do	do	do	do
Mar. 1-5	L	L	K	K	O	O	O	O	do	do	do	do
Apr. 1-5	L	L	K	K	O	O	O	O	Dry	Dry	Dry	Dry

Picking period	Juice per 100 grams of pulp 4	Juice per fruit 4	Palatability 4			
			1943-44	1944-45	1945-46	1946-47
Oct. 1-5	Mg. 37	Pct. 50	Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating
Nov. 1-5	51	62	V. acid	48	V. acid	39
Nov. 15	50	52	Acid	50	Acid	02
Dec. 1-5	60	63	P. tart.	70	P. tart.	78
Jan. 1-5	61	63	P. tart. to S.	91	P. tart. to S.	91
Jan. 15	60	62	do	93	do	96
Feb. 1-5	57	55	do	87	do	90
Mar. 1-5	57	54	Insipid	86	do	do
Apr. 1-5	52	54	Insipid	82	do	do

Picking period	Total ash †		Ascorbic acid per milliliter ‡				Active acidity §		pH
	1943-44	1944-45	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	
Oct. 1-5	Pct. 0.43	Pct. 0.31	Mg. 0.34	Mg. 0.50	Mg. 0.50	Mg. 0.30	pH 2.81	pH 2.90	1946-47
Nov. 1-5	Pct. 0.36	Pct. 0.33	Mg. 0.36	Mg. 0.51	Mg. 0.40	Mg. 0.30	pH 2.81	pH 3.21	1945-46
Nov. 15	Pct. 0.38	Pct. 0.35	Mg. 0.38	Mg. 0.50	Mg. 0.40	Mg. 0.30	pH 3.03	pH 3.31	
Dec. 1-5	Pct. 0.38	Pct. 0.39	Mg. 0.51	Mg. 0.51	Mg. 0.38	Mg. 0.38	pH 3.27	pH 3.41	
Jan. 1-5	Pct. 0.40	Pct. 0.34	Mg. 0.51	Mg. 0.51	Mg. 0.44	Mg. 0.44	pH 3.36	pH 3.54	
Feb. 1-5	Pct. 0.36	Pct. 0.31	Mg. 0.51	Mg. 0.49	Mg. 0.46	Mg. 0.46	pH 3.57	pH 3.92	
Mar. 1-5	Pct. 0.43	Pct. 0.40	Mg. 0.39	Mg. 0.51	Mg. 0.46	Mg. 0.46	pH 3.68	pH 3.68	
Apr. 1-5	Pct. 0.42	Pct. 0.39	Mg. 0.46	Mg. 0.51	Mg. 0.48	Mg. 0.48	pH 3.78	pH 3.92	
Picking period	Total solids †		Total acid ‡				Solids-acid ratio		pH
	1943-44	1944-45	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	
Oct. 1-5	Pct. 7.37	Pct. 8.10	Pct. 2.65	Pct. 1.92	Pct. 1.88	Pct. 2.17	pH 2.86	pH 4.45	1946-47
Nov. 1-5	Pct. 8.70	Pct. 9.17	Pct. 1.90	Pct. 1.46	Pct. 1.38	Pct. 1.48	pH 4.83	pH 6.26	
Nov. 15	Pct. 9.45	Pct. 8.70	Pct. 1.22	Pct. 1.03	Pct. 1.14	Pct. 1.06	pH 7.73	pH 7.73	
Dec. 1-5	Pct. 9.37	Pct. 10.02	Pct. 1.31	Pct. 1.03	Pct. 1.14	Pct. 1.06	pH 7.45	pH 6.54	
Jan. 1-5	Pct. 10.05	Pct. 10.47	Pct. 1.01	Pct. 0.87	Pct. 0.90	Pct. 0.90	pH 6.03	pH 6.03	
Feb. 1-5	Pct. 11.28	Pct. 12.00	Pct. 0.82	Pct. 0.75	Pct. 0.86	Pct. 0.86	pH 11.71	pH 11.71	
Mar. 1-5	Pct. 11.85	Pct. 12.21	Pct. 0.74	Pct. 0.74	Pct. 0.79	Pct. 0.80	pH 10.42	pH 10.50	
Apr. 1-5	Pct. 12.12	Pct. 12.32	Pct. 0.63	Pct. 0.60	Pct. 0.67	Pct. 0.67	pH 19.24	pH 19.24	

† With the exceptions indicated, each figure represents a mean of 75 determinations made in 3 seasons or of 100 determinations made in 4 seasons.
 ‡ Each figure or description represents a mean of 25 determinations made in 1 season.

§ See U. S. Department of Agriculture color chart (pl. U-10), orange yellow; YG, yellow orange; O, orange; V, very; P, pleasant; S, sweet.
 † Each figure represents a mean of duplicate determinations.

TABLE 14. Seasonal changes in physical characters and chemical constituents of Temple oranges on rough lemon rootstock on plot 3, at Lake Wales, Fla., 1943-44 to 1948-47

Picking period	Weight per fruit (Gms.)	Skin color			Flesh color			Flesh condition												
		1943-44	1944-45	1945-46	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52										
Oct. 1-5	140	B	C	C	OY	OY	OY	OY	OY	OY	OY	OY	OY	OY	OY	OY	OY	OY	OY	OY
Nov. 1-5	105	C	D	D	OY	OY	OY	OY	OY	OY	OY	OY	OY	OY	OY	OY	OY	OY	OY	OY
Nov. 15	105																			
Dec. 1-5	232	F	L	L	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
Jan. 1-5	242	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J
Feb. 1-5	276	L+	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J
Mar. 1-5	274	L+	K	K	L+	L+	L+	L+	L+	L+	L+	L+	L+	L+	L+	L+	L+	L+	L+	L+
Apr. 1-5	271	J	K	K	L+	L+	L+	L+	L+	L+	L+	L+	L+	L+	L+	L+	L+	L+	L+	L+
Picking period	Juice per 100 grams of fruit (%)	Palatability			Palatability			Palatability												
		1943-44	1944-45	1945-46	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52										
Oct. 1-5	33	Y acid	35	Y acid	24	Y acid	34	Y acid	31											
Nov. 1-5	30	Acid	40	Acid	43	Acid	59	Acid	51											
Nov. 15	58				54															
Dec. 1-5	57	P tart to S.	79	Tart	90	P tart	75	P tart	77											
Jan. 1-5	59	P tart to S.	89	P tart to S.	88	P tart to S.	80	P tart to S.	91											
Feb. 1-5	48	do	84	do	do	do	90	do	93											
Mar. 1-5	36	do	83	do	do	do	90	do	95											
Apr. 1-5	57	do	80	do	do	do	80	do												

Picking period	Total ash, %		Asorbic acid per milliliter		Active acidity		Total solids ¹		Total acid ²		Solids-acid ratio	
	1943-44	1944-45	1943-44	1944-45	1943-44	1944-45	1943-44	1944-45	1943-44	1944-45	1943-44	1944-45
	Pct.	Mg.	Mg.	pH	pH	pH	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Oct. 1-5	0.37	0.51	0.58	2.90	2.77	2.81	8.03	8.16	2.97	2.08	2.97	2.74
Nov. 1-5	0.54	0.57	0.55	3.20	2.86	3.03	8.33	8.16	2.30	1.59	4.12	4.37
Nov. 15		0.54	0.54	3.07	3.07	3.07	9.98	9.98	1.84	1.84	5.14	5.14
Dec. 1-5	0.38	0.54	0.54	3.47	3.47	3.47	10.82	10.82	1.28	1.28	7.08	7.08
Jan. 1-5	0.30	0.53	0.53	3.52	3.52	3.52	10.15	10.15	1.04	1.04	8.80	8.80
Feb. 1-5	0.26	0.53	0.55	3.75	3.75	3.75	11.52	11.52	1.27	1.27	11.90	11.90
Mar. 1-5	0.35	0.50	0.50	3.72	3.72	3.72	12.90	12.90	0.85	0.85	12.08	12.08
Apr. 1-5	0.51	0.50	0.50	3.84	3.84	3.84	12.72	12.72	0.81	0.81	13.70	13.70

¹ With the exceptions indicated, each figure represents a mean of 50 determinations made in 2 seasons, or 75 determinations made in 3 seasons, or of 100 determinations made in 4 seasons.

² See U. S. Department of Agriculture color chart (pl. D).

³ OY, orange yellow; Y, yellow; V, very; P, pleasantly; S, sweet.

⁴ Each figure represents a mean of duplicate determinations.

¹ With the exceptions indicated, each figure represents a mean of 50 determinations made in 2 seasons, or 75 determinations made in 3 seasons, or of 100 determinations made in 4 seasons.

² See U. S. Department of Agriculture color chart (pl. D).

³ OY, orange yellow; Y, yellow; V, very; P, pleasantly; S, sweet.

⁴ Each figure represents a mean of duplicate determinations.

TABLE 15. —Seasonal changes in physical characters and chemical constituents of Temple oranges on rough lemon rootstock on plot 4, at Lake Wales, Fla., 1943-44 to 1946-47

Picking period	Weight per fruit	Hind color 1 3				Flesh color 1 4				Flesh condition 1			
		1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47
Oct. 1-5	160	C	C	OY	OY	OY	OY	OY	OY	Ricey	Ricey	Ricey	Ricey
Nov. 1-5	208	D	D	OY	D	OY	D	OY	OY	Coarse	Coarse	Coarse	Coarse
Nov. 15	224			OY		OY		OY	OY	do	do	do	do
Dec. 1-5	230	H	H	OY	H	OY	H	OY	OY	Good	Good	Good	Good
Jan. 1-5	238	L	L	OY	L	OY	L	OY	OY	do	do	do	do
Feb. 1-5	248	R	R	OY	R	OY	R	OY	OY	do	do	do	do
Mar. 1-5	260	R	R	OY	R	OY	R	OY	OY	do	do	do	do
Apr. 1-5	294	R	R	OY	R	OY	R	OY	OY	do	do	do	do

Picking period	Juice per 100 grams of fruit 1	Juice per fruit 1	Palatability 4			
			1943-44	1944-45	1945-46	1946-47
Oct. 1-5	57	Per.	28	35	34	30
Nov. 1-5	60	Acid	50	53	57	58
Nov. 15	62	Tart	78	83	72	80
Dec. 1-5	58	P tart	93	75	87	91
Jan. 1-5	60	P tart to S	90	90	95	94
Feb. 1-5	53	do			90	94
Mar. 1-5	53				87	94
Apr. 1-5	33					85

Picking period	Total ash, ⁵ 1946- 47	Ascorbic acid per milliliter ³				Active acidity ⁴				Total solids ²				Total acid ²				Solids-acid ratio			
		1943- 44	1944- 45	1945- 46	1946- 47	1943- 44	1944- 45	1945- 46	1946- 47	1943- 44	1944- 45	1945- 46	1946- 47	1943- 44	1944- 45	1945- 46	1946- 47	1943- 44	1944- 45	1945- 46	1946- 47
	<i>Pct.</i>	<i>Mg.</i>	<i>Mg.</i>	<i>Mg.</i>	<i>Mg.</i>	<i>pH</i>	<i>pH</i>	<i>pH</i>	<i>pH</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>				
Oct. 1-5	-----	0.59	0.58	0.51	0.51	2.83	2.81	2.94	2.98	8.68	8.12	7.90	8.80	2.80	2.33	2.14	2.18	3.10	3.48	3.60	4.04
Nov. 1-5	-----	.60	.58	.51	.52	2.92	3.14	3.17	3.19	9.53	9.27	8.70	9.60	2.11	1.57	1.52	1.60	4.52	5.90	5.72	6.00
Nov. 15	-----	-----	.58	-----	-----	-----	3.15	-----	-----	-----	9.78	-----	-----	-----	1.44	-----	-----	-----	-----	-----	-----
Dec. 1-5	-----	.61	.60	.51	.54	3.16	3.24	3.40	3.32	11.12	10.57	9.75	11.00	1.47	1.25	1.23	1.31	7.56	8.46	7.93	8.40
Jan. 1-5	-----	.65	.58	.53	.50	3.27	3.47	3.44	3.61	12.34	11.73	10.25	12.10	1.27	1.06	1.08	.93	9.72	11.07	9.49	13.01
Feb. 1-5	-----	.58	-----	.50	.55	3.45	-----	3.61	3.62	12.74	-----	11.72	13.32	1.01	-----	.90	1.05	12.61	-----	13.02	12.69
Mar. 1-5	-----	-----	-----	.50	.54	-----	-----	3.67	3.59	-----	-----	12.47	13.29	-----	-----	.83	1.00	-----	-----	15.02	13.29
Apr. 1-5	-----	0.39	-----	.50	-----	-----	-----	3.80	3.72	-----	-----	12.30	13.12	-----	-----	.73	.88	-----	-----	16.85	14.91

¹ With the exceptions indicated, each figure represents a mean of 50 determinations made in 2 seasons, of 75 determinations made in 3 seasons, or of 100 determinations made in 4 seasons.

² Each figure or description represents a mean of 25 determinations made in 1 season.

³ See U. S. Department of Agriculture color chart (pl. 1).

⁴ OY, orange yellow; YO, yellow orange; O, orange; V, very; P, pleasantly; S, sweet.

⁵ Each figure represents a mean of duplicate determinations.

TABLE 16.—Seasonal changes in physical characters and chemical constituents of Temple oranges on rough lemon rootstock on plot 5, at Lake Wales, Fla., 1946-47

Picking period	Weight per fruit ¹	Rind color ^{1,2}	Flesh color ^{1,3}	Flesh condition ¹	Juice per 100 grams of fruit ¹	Juice per fruit ¹	Palatability ³		Ascorbic acid per milliliter ⁴	Active acidity ⁴	Total solids ⁴	Total acid ⁴	Solids-acid ratio
							Arbitrary standard	Numerical rating					
	<i>Gm.</i>				<i>Ml.</i>	<i>Pct.</i>			<i>Mg.</i>	<i>pH</i>	<i>Pct.</i>	<i>Pct.</i>	
Oct. 1-5	221	D	OY	Coarse	57	59	V acid	33	0.59	2.97	8.80	2.01	4.38
Nov. 1-5	265	E	OY	do	53	54	Acid	53	.58	3.12	9.57	1.56	6.13
Dec. 1-5	312	H	YO	Good	53	56	P tart to S	82	.58	3.34	10.75	1.15	9.35
Jan. 1-5	333	I	O	do	58	60	do	92	.58	3.49	11.80	.96	12.29
Feb. 1-5	390	J	O	do	53	56	do	92	.59	3.70	12.72	.80	15.90
Mar. 1-5	372	K	O	do	53	55	do	92	.58	3.72	12.84	.78	16.46
Apr. 1-5	382	K	O	do	51	54	do	92	.54	3.70	14.00	.79	17.72

¹ Each figure or description represents a mean of 25 determinations made in 1 season.

² See U. S. Department of Agriculture color chart (pl. 1).

³ OY, orange yellow; YO, yellow orange; O, orange; V, very; P, pleasantly; S, sweet.

⁴ Each figure represents a mean of duplicate determination.

TABLE 17.—Seasonal changes in physical characters and chemical constituents of Temple oranges on rough lemon rootstock on plot 6, at Alturas, Fla., 1946-47

Picking period	Weight per fruit ¹	Rind color ^{1,2}	Flesh color ^{1,3}	Flesh condition ¹	Juice per 100 grams of fruit ¹	Juice per fruit ¹	Palatability ³		Total ash ⁴	Ascorbic acid per milliliter ⁴	Active acidity ⁴	Total solids ⁴	Total acid ⁴	Solids-acid ratio
							Arbitrary standard	Numerical rating						
	<i>Gm.</i>				<i>Ml.</i>	<i>Pct.</i>			<i>Pct.</i>	<i>Mg.</i>	<i>pH</i>	<i>Pct.</i>	<i>Pct.</i>	
Oct. 1-5	188	C	OY	Coarse	60	62	V acid	35	0.45	3.02	8.30	1.85	4.49	
Nov. 1-5	222	D	YO	do	61	63	Acid	55	.44	3.30	8.97	1.29	6.95	
Dec. 1-5	277	E	YO	do	58	59	P tart	79	.45	3.45	9.90	1.01	9.80	
Jan. 1-5	286	F	O	Good	62	64	P tart to S	48	.48	3.61	10.93	.87	12.56	
Feb. 1-5	299	J	O	do	55	60	do	90	.47	3.72	11.94	.79	15.11	
Mar. 1-5	343	K	O	do	49	51	do	85	0.37	4.6	11.57	.87	13.30	
Apr. 1-5	251	K	O	do	57	59	Insipid	81	.38	5.1	12.77	.71	17.99	

¹ Each figure or description represents a mean of 25 determinations made in 1 season.

² See U. S. Department of Agriculture color chart (pl. 1).

³ OY, orange yellow; YO, yellow orange; O, orange; V, very; P, pleasantly; S, sweet.

⁴ Each figure represents a mean of duplicate determinations.

TABLE 18.—Seasonal changes in physical characters and chemical constituents of Temple oranges on rough lemon rootstock on plot 7, at Winter Haven, Fla., 1946-47

Picking period	Weight per fruit ¹	Rind color ^{1, 2}	Flesh color ^{1, 3}	Flesh condition ¹	Juice per 100 grams of fruit ¹	Juice per fruit ¹	Palatability ³		Ascorbic acid per milliliter ⁴	Active acidity ⁴	Total solids ⁴	Total acid ⁴	Solids-acid ratio
							Arbitrary standard	Numerical rating					
Oct. 1-5	Gm. 159	C	OY	Riccy	Ml. 59	Pct. 60	Acid	40	Mg. 0.43	pH 2.99	Pct. 8.80	Pct. 1.78	5.00
Nov. 1-5	187	C	OY	Coarse	59	61	do	59	.42	3.25	9.57	1.28	7.48
Dec. 1-5	241	D	YO	do	52	54	P tart to S	80	.39	3.49	9.80	.94	10.43
Jan. 1-5	234	F	O	Good	57	59	do	89	.44	3.56	11.53	.85	13.56
Feb. 1-5	252	E	O	do	55	57	do	89	.43	3.76	11.00	.70	17.00

¹ Each figure or description represents a mean of 25 determinations made in 1 season.

² See U. S. Department of Agriculture color chart (pl. 1).

³ OY, orange yellow; YO, yellow orange; O, orange; P, pleasantly; S, sweet.

⁴ Each figure represents a mean of duplicate determinations.

TABLE 19.—Seasonal changes in physical characters and chemical constituents of Temple oranges on rough lemon rootstock on plot 8, at Lake Alfred, Fla., 1946-47

Picking period	Weight per fruit ¹	Rind color ^{1, 2}	Flesh color ^{1, 3}	Flesh condition ¹	Juice per 100 grams of fruit ¹	Juice per fruit ¹	Palatability ³		Ascorbic acid per milliliter ⁴	Active acidity ⁴	Total solids ⁴	Total acid ⁴	Solids-acid ratio
							Arbitrary standard	Numerical rating					
Oct. 1-5	Gm. 185	C	OY	Riccy	Ml. 58	Pct. 60	V acid	31	Mg. 0.54	pH 3.01	Pct. 8.80	Pct. 2.03	4.33
Nov. 1-5	235	D	OY	Coarse	59	61	Acid	50	.58	3.23	10.17	1.64	6.20
Dec. 1-5	260	E	YO	do	59	61	P tart	74	.57	3.34	10.80	1.38	7.83
Jan. 1-5	249	K	O	Good	63	65	P tart to S	83	.57	3.44	12.03	1.27	9.47
Feb. 1-5	294	J	O	do	61	63	do	85	.52	3.69	12.07	.91	13.26
Mar. 1-5	329	L+	O	do	59	62	do	93	.50	3.64	12.38	.97	12.76
Apr. 1-5	282	L+	O	do	58	60	do	93	.53	3.66	13.50	.96	14.06

¹ Each figure or description represents a mean of 25 determinations made in 1 season.

² See U. S. Department of Agriculture color chart (pl. 1).

³ OY, orange yellow; YO, yellow orange; O, orange; V, very; P, pleasantly; S, sweet.

⁴ Each figure represents a mean of duplicate determinations.

TABLE 20.—Seasonal changes in physical characters and chemical constituents of Temple oranges on sour orange rootstock on plot 9, at Minorville, Fla., 1943-44 to 1946-47

Picking period	Weight per fruit ¹	Rind color ^{2 3}				Flesh color ^{2 4}				Flesh condition ²			
		1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47
Oct. 1-5.....	Gm. 155	B	C	D	C	OY	OY	OY	OY	Ricey	Coarse	Coarse	Coarse
Nov. 1-5.....	191	D	D	D	D	OY	OY	OY	OY	Coarse	do.	Good	do.
Nov. 15.....	² 191		E			YO	YO	YO	YO	Good	Good	Good	Good
Dec. 1-5.....	226	H	G	H	F	YO	YO	YO	YO	do.	do.	do.	do.
Jan. 1-5.....	248	I	L	L+	L	YO	O	O	O	do.	do.	do.	do.
Feb. 1-5.....	256	L+	L+	L	K	O	O	O	O	do.	do.	do.	do.
Mar. 1-5.....	244	L+	L+	L+	L+	O	O	O	O	do.	do.	do.	do.
Apr. 1-5.....	255	L+	L	L+	L+	O	O	O	O	do.	do.	do.	do.

Picking period	Juice per 100 grams of fruit ¹	Juice per fruit ¹	Palatability ⁴							
			1943-44		1944-45		1945-46		1946-47	
			Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating
Oct. 1-5.....	ML. 55	Pct. 57	V acid.....	27	V acid.....	32	V acid.....	38	V acid.....	30
Nov. 1-5.....	58	60	Acid.....	52	Acid.....	54	Tart.....	61	Acid.....	57
Nov. 15.....	² 58	² 60			Tart.....	62				
Dec. 1-5.....	58	60	P tart.....	75	P tart.....	72	P tart.....	75	P tart to S.....	80
Jan. 1-5.....	58	61	P tart to S.....	91	P tart to S.....	90	P tart to S.....	86	do.....	91
Feb. 1-5.....	58	61	do.....	95	do.....	92	do.....	96	do.....	95
Mar. 1-5.....	57	59	do.....	92	do.....	88	do.....	88	do.....	93
Apr. 1-5.....	56	58	do.....	86	do.....	89	do.....	87	do.....	90

Picking period	Ascorbic acid per milliliter ⁵				Active acidity ²				Total solids ⁴				Total acid ³				Solids-acid ratio			
	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47
Oct. 1-5	Mg. 0.55	Mg. 0.51	Mg. 0.54	Mg. 0.48	pH 2.90	pH 2.92	pH 3.01	pH 2.91	Pct. 8.73	Pct. 8.67	Pct. 8.15	Pct. 9.27	Pct. 2.33	Pct. 2.25	Pct. 1.97	Pct. 2.47	3.75	3.85	4.14	3.75
Nov. 1-5	.53	.50	.52	.50	3.12	3.21	3.32	3.17	8.85	8.98	9.30	10.12	1.79	1.73	1.43	1.72	4.94	5.19	6.50	5.88
Nov. 15		.54				3.20				9.97				1.62				6.15		
Dec. 1-5	.52	.54	.55	.48	3.29	3.29	3.47	3.36	10.62	10.68	10.80	10.87	1.37	1.37	1.23	1.34	7.75	7.80	8.78	8.11
Jan. 1-5	.51	.55	.50	.51	3.37	3.54	3.58	3.49	11.44	11.12	10.75	12.60	1.12	1.17	1.02	1.08	10.21	9.50	10.54	11.67
Feb. 1-5	.52	.50	.50	.49	3.47	3.67	3.66	3.62	12.10	11.80	11.29	12.74	1.04	1.05	.90	.95	11.63	11.24	12.54	13.41
Mar. 1-5	.46	.53	.49	.51	3.58	3.75	3.72	3.62	12.81	12.00	12.72	12.90	.94	.90	.85	1.10	13.63	13.33	14.96	11.73
Apr. 1-5	.45	.52	.49	.52	3.71	3.74	3.90	3.68	13.17	12.70	12.53	14.74	.77	.93	.76	.99	17.10	13.66	16.49	14.89

¹ With the exceptions indicated, each figure represents a mean of 100 determinations made in 4 seasons.

² Each figure or description represents a mean of 25 determinations made in 1 season.

³ See U. S. Department of Agriculture color chart (pl. 1).

⁴ OY, orange yellow; YO, yellow orange; O, orange; V, very; P, pleasantly; S, sweet.

⁵ Each figure represents a mean of duplicate determinations.

TABLE 21.—Seasonal changes in physical characters and chemical constituents of Temple oranges on sour orange rootstock on plot 10, at Windermere, Fla., 1943-44 to 1946-47

Picking period	Weight per fruit ¹	Rind color ^{2,3}				Flesh color ^{2,4}				Flesh condition ²			
		1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47
	<i>Gm.</i>												
Oct. 1-5	185	C	C	C	D	OY	OY	OY	OY	Coarse	Coarse	Coarse	Ricey
Nov. 1-5	204	D	E	D	E	OY	OY	YO	OY	do	do	Good	Coarse
Nov. 15	212		E				YO				Good		
Dec. 1-5	238	I	G	H	G	YO	YO	YO	YO	Good	do	Good	Coarse
Jan. 1-5	274	L	K	K	J	O	YO	YO	O	do	do	do	Good
Feb. 1-5	275	L+	L	L+	K	O	O	O	O	do	do	do	do
Mar. 1-5	278	L+	L	L+	L+	O	O	O	O	do	do	do	do
Apr. 1-5	268	L+	L		L+	O	O		O	do	do		do

Picking period	Juice per 100 grams of fruit ¹	Juice per fruit ¹	Palatability ⁴							
			1943-44		1944-45		1945-46		1946-47	
			Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating
	<i>Ml.</i>	<i>Pct.</i>								
Oct. 1-5	57	59	V acid	30	V acid	37	V acid	38	V acid	32
Nov. 1-5	61	63	Acid	58	Acid	50	Tart	62	Acid	58
Nov. 15	60	62			Tart	64				
Dec. 1-5	59	61	P tart	79	P tart	76	P tart	78	P tart to S	81
Jan. 1-5	60	63	P tart to S	93	P tart to S	94	P tart to S	91	do	93
Feb. 1-5	59	62	do	98	do	95	do	95	do	95
Mar. 1-5	60	62	do	96	do	94	do	89	do	95
Apr. 1-5	56	59	do	90	do	92	do		do	90

SEASONAL CHANGES IN FLORIDA TEMPLE ORANGES

Picking period	Total ash †				Ascorbic acid per milliliter ‡				Active acidity §			
	1943-43	1943-40	1943-41	1943-42	1944-45	1944-46	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47
	Pct.	Pct.	Mg.	Mg.	Mg.	Mg.	Mg.	Mg.	pH	pH	pH	pH
Oct. 1-5	0.39	0.29	0.62	0.54	0.51	0.48	0.48	0.48	3.75	3.84	3.92	3.90
Nov. 1-5	0.29	0.30	0.53	0.51	0.51	0.48	0.48	0.48	3.05	3.12	3.14	3.13
Nov. 15	0.30	0.31	0.54	0.51	0.51	0.48	0.48	0.48	3.17	3.17	3.17	3.17
Dec. 1-5	0.38	0.31	0.55	0.51	0.51	0.48	0.48	0.48	3.15	3.22	3.27	3.27
Jan. 1-5	0.32	0.28	0.52	0.51	0.48	0.48	0.48	0.48	3.27	3.45	3.42	3.44
Feb. 1-5	0.31	0.29	0.51	0.51	0.48	0.48	0.48	0.48	3.38	3.45	3.52	3.56
Mar. 1-5	0.40	0.35	0.47	0.51	0.48	0.48	0.48	0.48	3.53	3.60	3.62	3.59
Apr. 1-5	0.40	0.33	0.46	0.51	0.48	0.48	0.48	0.48	3.61	3.70	3.62	3.65

Picking period	Total solids †				Total acid ‡				Solids-acid ratio			
	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Oct. 1-5	8.72	8.30	2.68	2.05	2.13	2.26	2.13	2.26	3.25	4.29	4.13	3.98
Nov. 1-5	9.40	9.30	1.58	1.01	1.68	1.61	1.68	1.61	3.00	5.80	5.54	6.24
Nov. 15	9.98	10.71	1.45	1.30	1.31	1.24	1.31	1.24	7.70	7.13	7.13	7.78
Dec. 1-5	11.17	10.97	1.07	1.03	1.08	1.02	1.08	1.02	16.93	11.14	10.54	11.81
Jan. 1-5	11.70	11.38	1.02	0.92	0.94	0.91	0.94	0.91	11.75	12.83	12.77	14.01
Feb. 1-5	11.99	12.00	0.93	0.80	0.83	0.83	0.83	0.83	15.31	13.71	15.18	15.63
Mar. 1-5	12.71	12.60	0.77	0.81	0.83	0.83	0.83	0.83	17.30	13.83	15.18	16.25
Apr. 1-5	13.32	12.92										

† With the exceptions indicated, each figure represents a mean of 75 determinations made in 3 seasons or of 100 determinations made in 4 seasons.
 ‡ Each figure or description represents a mean of 25 determinations made in 1 season.
 § See U. S. Department of Agriculture color chart (pl. 1).
 †† Y, orange yellow; YD, yellow orange; O, orange; V, very; P, pleasantly; S, sweet.
 ‡‡ Each figure represents a mean of duplicate determinations.

TABLE 22. Seasonal changes in physical characters and chemical constituents of Temple oranges on sour orange rootstock on plot 11, at Merritt Island, Fla., 1943-44 to 1946-47

Picking period	Weight per fruit	Rind color :					Flesh condition :						
		1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47				
Oct. 1-5	Gen. 143	B	C	C	D	OY	OY	OY	OY	Ripey Course	Ripey Course	Ripey Course	Consp. do
Nov. 1-5	191	C	D	D	D	OY	OY	OY	OY	do	do	do	do
Nov. 13	211					OY	OY	OY	OY	do	do	do	do
Dec. 1-5	222	H	E	H	E	YO	YO	YO	YO	do	do	do	do
Jan. 1-5	354	K	L	K	F	YO	YO	YO	YO	do	do	do	do
Feb. 1-5	373	L	L	K	J	O	O	O	O	do	do	do	do
Mar. 1-5	572	L+	L	K	I+	O	O	O	O	do	do	do	do
Apr. 1-5	587	L+	L	K	K	O	O	O	O	do	do	do	do

Picking period	Juice per 100 grams of fruit	Palatability :				
		1943-44	1944-45	1945-46	1946-47	
Oct. 1-5	Mt. 56					
Nov. 1-5	58					
Nov. 13	59					
Dec. 1-5	59					
Jan. 1-5	58					
Feb. 1-5	50					
Mar. 1-5	61					
Apr. 1-5	54					

Picking period	Juice per fruit	Palatability :				
		1943-44	1944-45	1945-46	1946-47	
Oct. 1-5	Pct. 57					
Nov. 1-5	61					
Nov. 13	61					
Dec. 1-5	60					
Jan. 1-5	62					
Feb. 1-5	61					
Mar. 1-5	64					
Apr. 1-5	62					

Picking period	Juice per 100 grams of fruit	Palatability :				
		1943-44	1944-45	1945-46	1946-47	
Oct. 1-5						
Nov. 1-5						
Nov. 13						
Dec. 1-5						
Jan. 1-5						
Feb. 1-5						
Mar. 1-5						
Apr. 1-5						

Picking period	Ascorbic acid per milliliter ¹				Active acidity ²				Total solids ³				Total acid ⁴				Solids-acid ratio			
	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47
Oct. 1-5	<i>Mg.</i> 0.53	<i>Mg.</i> 0.52	<i>Mg.</i> 0.54	<i>Mg.</i> 0.48	<i>pH</i> 2.76	<i>pH</i> 2.82	<i>pH</i> 2.90	<i>pH</i> 2.98	<i>Pct.</i> 8.03	<i>Pct.</i> 8.17	<i>Pct.</i> 9.50	<i>Pct.</i> 9.07	<i>Pct.</i> 3.18	<i>Pct.</i> 2.61	<i>Pct.</i> 2.38	<i>Pct.</i> 2.17	2.53	3.13	3.09	4.18
Nov. 1-5	.56	.53	.54	.46	2.96	3.24	3.13	3.22	9.23	8.98	10.00	9.57	2.34	1.82	1.80	1.50	3.94	4.93	5.56	6.38
Nov. 15		.54				3.22				9.93				1.49				6.66		
Dec. 1-5	.54	.52	.60	.48	3.24	3.25	3.37	3.41	10.62	10.13	11.45	10.27	1.52	1.32	1.43	1.17	6.99	7.67	8.01	8.78
Jan. 1-5	.55	.51	.56	.47	3.37	3.52	3.45	3.56	11.89	11.53	11.90	11.40	1.15	1.01	1.15	.92	10.34	11.42	10.35	12.39
Feb. 1-5	.56	.49	.54	.47	3.51	3.70	3.61	3.72	12.69	12.10	13.27	12.09	.99	.86	.96	.81	12.82	14.07	13.82	14.93
Mar. 1-5	.54	.48	.52	.48	3.08	3.86	3.73	3.73	13.07	12.12	12.77	12.60	.83	.71	.81	.83	15.75	17.07	15.77	15.18
Apr. 1-5	.59	.49	.51	.48	3.63	3.94	3.98	3.77	14.72	12.25	13.18	13.30	.88	.66	.79	.78	16.73	18.56	16.68	17.05

¹ With the exceptions indicated, each figure represents a mean of 100 determinations made in 4 seasons.

² Each figure or description represents a mean of 25 determinations made in 1 season.

³ See U. S. Department of Agriculture color chart (pl. 1).

⁴ OY, orange yellow; YO, yellow orange; O, orange; V, very; P, pleasantly; S, sweet.

⁵ Each figure represents a mean of duplicate determinations.

TABLE 23.—Seasonal changes in physical characters and chemical constituents of Temple oranges on sour orange rootstock on plot 12, at Orlovista, Fla., 1943-44 to 1945-46

Picking period	Weight per fruit ¹	Rind color ²			Flesh color ²			Flesh condition ²		
		1943-44	1944-45	1945-46	1943-44	1944-45	1945-46	1943-44	1944-45	1945-46
Oct. 1-5	Gm. 150	B	C	C	OY	OY	OY	Coarse	Coarse	Coarse
Nov. 1-5	179	D	E	D	OY	YO	YO	do	do	Good
Nov. 15	193		E			YO			Good	
Dec. 1-5	218	H	G	H	O	YO	YO	Good	do	Good
Jan. 1-5	250	K	L	K	YO	O	O	do	do	do
Feb. 1-5	220	L+	L	K	O	O	O	do	do	do
Mar. 1-5	221	L+	L	K	O	O	O	do	do	do
Apr. 1-5	238	L+	L		O			do		

Picking period	Juice per 100 grams of fruit ¹	Juice per fruit ¹	Palatability ⁴					
			1943-44		1944-45		1945-46	
			Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating
Oct. 1-5	ML. 56	Pct. 57	V acid	31	V acid	37	V acid	34
Nov. 1-5	59	61	Acid	54	Acid	55	Acid	59
Nov. 15	60	63			Tart	63		
Dec. 1-5	58	60	P tart	78	P tart	73	P tart	75
Jan. 1-5	60	62	P tart to S	92	P tart to S	91	P tart to S	90
Feb. 1-5	58	61	do	97	do	94	do	92
Mar. 1-5	59	62	do	95	do	90	do	87
Apr. 1-5	58	60	do	90				

Picking period	Ascorbic acid per milliliter ¹			Active acidity ²			Total solids ³			Total acid ³			Solids-acid ratio		
	1943-44	1944-45	1945-46	1943-44	1944-45	1945-46	1943-44	1944-45	1945-46	1943-44	1944-45	1945-46	1943-44	1944-45	1945-46
	Mg.	Mg.	Mg.	pH	pH	pH	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.			
Oct. 1-5	0.55	0.56	0.57	2.79	2.82	2.95	8.83	8.87	8.00	2.02	2.32	2.11	3.37	3.82	4.08
Nov. 1-5	.54	.58	.56	3.00	3.11	3.19	9.40	9.70	9.40	1.95	1.72	1.40	4.82	5.64	6.31
Nov. 15		.56			3.15			10.37			1.53			6.78	
Dec. 1-5	.53	.55	.59	3.14	3.18	3.44	10.27	10.73	10.40	1.50	1.39	1.21	6.85	7.72	8.60
Jan. 1-5	.53	.55	.57	3.36	3.39	3.47	11.14	11.47	10.80	1.14	1.14	1.00	9.77	10.06	10.80
Feb. 1-5	.55	.50	.53	3.39	3.55	3.65	12.32	11.97	11.49	1.03	.94	.82	11.96	12.73	14.01
Mar. 1-5	.53	.49	.51	3.57	3.60	3.69	12.76	12.05	12.57	.83	.80	.79	15.37	15.06	15.91
Apr. 1-5	.52			3.58			12.97			.85			15.26		

¹ With the exceptions indicated, each figure represents a mean of 75 determinations made in 3 seasons.

² Each figure or description represents a mean of 25 determinations made in 1 season.

³ See U. S. Department of Agriculture color chart (p. 1).

⁴ OY, orange yellow; YO, yellow orange; O, orange; V, very; P, pleasantly; S, sweet.

⁵ Each figure represents a mean of duplicate determinations.

TABLE 24.—Seasonal changes in physical characters and chemical constituents of Temple oranges on sour orange rootstock on plot 13, at Lake Wales, Fla., 1944-45 to 1946-47

Picking period	Weight per fruit ¹	Rind color ^{2 a}			Flesh color ^{2 b}			Flesh condition ^{2 c}		
		1944-45	1945-46	1946-47	1944-45	1945-46	1946-47	1944-45	1945-46	1946-47
Oct. 1-5	Gm. 157	C	C	C	OY	OY	OY	Ricey	Course	Ricey
Nov. 1-5	205	E	D	D	OY	OY	YO	Course	Good	Course
Nov. 15	209	D			YO			do		
Dec. 1-5	239	E	G	F	YO	YO	YO	do	Good	Course
Jan. 1-5	245	K	J	J	O	YO	O	Good	do	Good
Feb. 1-5	268	L	K	K	O	O	O	do	do	do
Mar. 1-5	253	L	K	L +	O	O	O	do	do	do
Apr. 1-5	256	L	L	L +	O	O	O	do	do	do

Picking period	Juice per 100 grams of fruit ¹	Juice per fruit ¹	1944-45		1945-46		1946-47	
			Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating
Oct. 1-5	MI. 58	Pct. 50	V acid	30	V acid	32	V acid	32
Nov. 1-5	59	61	Acid	52	Acid	54	Acid	53
Nov. 15	59	61	do	59				
Dec. 1-5	58	60	Tart	68	P tart	72	P tart to S	81
Jan. 1-5	59	62	P tart to S	86	P tart to S	85	do	90
Feb. 1-5	60	63	do	94	do	95	do	94
Mar. 1-5	58	61	do	89	do	91	do	94
Apr. 1-5	60	63	do	94	do	88	do	92

Pickling period	Total ash, % 1940-47	Ascorbic acid per milliliter ⁴		Active acidity ¹		Total solids ³		Total acid ²		Solids-acid ratio	
		1944-45	1943-46	1946-47	1945-46	1941-45	1943-46	1946-47	1944-45	1946-47	1943-46
Oct. 1-5	Per. 0.20	% 0.59	Mg. 0.54	pH 2.90	pH 3.11	Per. 8.95	Per. 9.20	Per. 2.60	Per. 2.33	3.40	3.22
Nov. 1-5	0.32	0.58	0.54	3.04	3.17	8.87	9.40	2.38	2.36	4.70	5.16
Nov. 1-5	0.28	0.51	0.53	3.04	3.11	10.27	10.25	1.08	1.08	5.48	5.70
Dec. 1-5	0.36	0.50	0.50	3.10	3.17	10.30	10.30	1.28	1.28	6.49	7.07
Jan. 1-5	0.30	0.48	0.48	3.10	3.17	12.03	10.90	1.12	1.12	8.53	8.83
Feb. 1-5	0.36	0.51	0.51	3.28	3.38	12.90	12.47	1.04	1.04	10.93	11.05
Mar. 1-5	0.38	0.55	0.55	3.34	3.66	14.57	12.00	1.10	1.05	12.34	12.48
Apr. 1-5	0.40	0.57	0.50	3.53	3.03	14.12	13.30	1.10	1.00	13.45	13.40
				3.87	3.03			1.10	1.10		

¹ With the exceptions indicated, each figure represents a mean of 75 determinations made in 3 seasons.

² See U. S. Department of Agriculture color chart (pl. 1).
 OY, orange yellow; YO, yellow orange; O, orange; Y, very P, pleasantly; S, sweet.

³ Each figure or description represents a mean of 25 determinations made in 1 season.

⁴ Each figure represents a mean of duplicate determinations.

TABLE 25.—Seasonal changes in physical characters and chemical constituents of Temple oranges on sour orange rootstock on plot 14, at Winter Haven, Fla., 1943-44 to 1945-46

Picking period	Weight per fruit	Rind color		Flesh color	Flesh condition				Diameter of fruit		
		1943-44	1944-45		1943-44	1944-45	1945-46	1943-44	1944-45	1945-46	
Oct. 1-5	147	B	C	OY	Riccy Coarse	Riccy Coarse	Coarse	68	62	66	
Nov. 1-5	178	C	D	YO	do.	do.	Good	68	73	72	
Nov. 15	202		D	YO	do.	do.	Good	72	74	77	
Dec. 1-5	210	H	L	O	do.	do.	do.	74	77	77	
Jan. 1-5	210	L	L	O	do.	do.	do.	77	81	78	
Jan. 1-5	220	L	L	O	do.	do.	do.	79	78	73	
Mar. 1-5	214	L	L	O	do.	do.	do.	77	78	76	
Apr. 1-5	217	L+	H	O	do.	do.	do.	77	78	76	

Picking period	Mm.	Rind thickness	Juice per 100 grams of fruit	Palatability				
				1943-44	1944-45	1945-46	1945-46	
Oct. 1-5	3	3	53	V acid.	V acid.	27	Acid.	35
Nov. 1-5	3	3	54	Acid.	Acid.	48	Tart.	60
Nov. 15	3	3	50			61		
Dec. 1-5	3	3	57	P tart	P tart	76	P tart	77
Jan. 1-5	3	3	57	P tart to S	P tart to S	90	P tart to S	90
Feb. 1-5	3	3	57	do.	do.	64	do.	67
Mar. 1-5	3	3	57	do.	do.	95	do.	92
Apr. 1-5	3	3	55	do.	do.	91	do.	93

Picking period	Total ash ¹		Ascorbic acid per milliliter ²			Active acidity ³			Total solids ⁴			Total acid ⁵			Solids-acid ratio		
	1944-45	1945-46	1943-44	1944-45	1945-46	1943-44	1944-45	1945-46	1943-44	1944-45	1945-46	1943-44	1944-45	1945-46	1943-44	1944-45	1945-46
Oct. 1-5	<i>Pct.</i> 0.45	<i>Pct.</i> 0.39	<i>Mg.</i> 0.48	<i>Mg.</i> 0.68	<i>Mg.</i> 0.52	<i>pH</i> 2.81	<i>pH</i> 2.78	<i>pH</i> 2.92	<i>Pct.</i> 9.41	<i>Pct.</i> 9.12	<i>Pct.</i> 8.40	<i>Pct.</i> 2.03	<i>Pct.</i> 3.20	<i>Pct.</i> 2.35	3.58	2.85	3.57
Nov. 1-5	.20	.34	.57	.59	.55	2.93	3.04	3.14	11.95	10.41	9.68	2.22	2.29	1.85	5.38	4.55	5.21
Dec. 1-5	.33	.30	.56	.60	.57	3.11	3.03	3.27	11.14	11.11	11.11	1.82	1.91	1.45	5.83	9.13	7.66
Jan. 1-5	.30	.43	.56	.54	.57	3.23	3.31	3.27	12.46	11.32	11.64	1.42	1.24	1.45	6.85	9.13	7.66
Feb. 1-5	.32	.36	.48	.59	.57	3.46	3.30	3.44	13.47	12.20	11.64	1.42	1.41	1.24	9.49	8.65	9.39
Mar. 1-5	.38	.41	.56	.55	.57	3.46	3.39	3.48	13.80	12.84	13.30	1.36	1.29	1.10	10.15	9.95	12.09
Apr. 1-6	.37	.38	.60	.54	.59	3.48	3.53	3.56	15.08	13.17	14.45	1.16	1.10	1.03	13.00	11.97	14.03
			.60	.50	.58	3.47	3.57	3.69	15.40	14.06	14.73	1.16	1.08	.88	13.28	13.02	16.74

¹ With the exceptions indicated, each figure represents a mean of 75 determinations made in 3 seasons.

² Each figure or description represents a mean of 25 determinations made in 1 season.

³ See U. S. Department of Agriculture color chart (pl. 1).

⁴ OY, orange yellow; YO, yellow orange; O, orange; V, very; P, pleasantly; S, sweet.

⁵ Each figure represents a mean of duplicate determinations.

TABLE 26.—Seasonal changes in physical character and chemical constituents of Temple oranges on sour orange rootstock on plot 15, at Dundee, Fla., 1944-45 and 1946-47

Picking period	Weight per fruit	Rind color ^{1, 2}	Flesh color ^{1, 3}	Flesh condition ⁴		Juice per 100 grams of fruit ¹	Palatability ⁵		Numerical rating
				1944-45	1946-47		1944-45	1946-47	
Oct. 15	144	C	OY	Riv	Med	60	39	V acid	31
Nov. 15	201	D	OY	Coarse	56	53	52	Acid	55
Nov. 15	207	E	YO	up	25	51	41		
Dec. 15	231	F	YO	Good	37	51	73	P tart to S	80
Jan. 15	233	K	O	do	40	52	88	do	91
Feb. 15	264	L	O	do	38	51	93	do	95
Mar. 15	278	L	O	do	38	50	91	do	
Apr. 15	248	L	O	do	38	50	91	do	
				Active acidity ⁶	Total solids ⁷	Total acid ⁸			
				1944-45	1946-47	1944-45	1946-47	1944-45	1946-47
				Me.	Me.	Pct.	Pct.		
				0.55	0.44	9.37	8.80	2.32	3.70
				0.27	0.46	10.92	9.57	1.72	5.05
				0.20	0.57	11.23	11.30	1.41	6.17
				0.31	0.48	11.33	12.17	1.11	6.47
				0.27	0.30	12.78	14.07	1.09	8.94
				0.31	0.32	13.30	14.07	1.09	10.96
				0.35	0.36	13.77	14.07	1.09	12.10
				0.35	0.61	14.87	14.87	1.07	13.30
				pH	pH				
				2.79	2.89				
				3.00	3.09				
				3.07					
				3.08					
				3.27					
				3.43					
				3.50					
				3.62					
				3.62					
				3.61					

¹ See U. S. Department of Agriculture color chart (pl. D).

² OY, orange yellow; Y, yellow orange; O, orange; V, very; P, pleasantly; S, sweet.

³ Each figure represents a mean of 25 determinations made in 1 season.

⁴ With the exceptions indicated, each figure represents a mean of 30 determinations made in 2 seasons.

⁵ Each figure or description represents a mean of 25 determinations made in 1 season.

⁶ Each figure represents a mean of 25 determinations made in 1 season.

⁷ Each figure represents a mean of 25 determinations made in 1 season.

⁸ Each figure represents a mean of 25 determinations made in 1 season.

TABLE 27.—Seasonal changes in physical characters and chemical constituents of Temple oranges on sour orange rootstock on plot 16, at Vero Beach, Fla., 1946-47

Picking period	Weight per fruit ¹	Rind color ^{1 2}	Flesh color ^{1 3}	Flesh condition ¹	Juice per 100 grams of fruit ¹	Juice per fruit ¹	Palatability ³		Ascorbic acid per milliliter ⁴	Active acidity ⁴	Total solids ⁴	Total acid ⁴	Solids-acid ratio
							Arbitrary standard	Numerical rating					
	<i>Gm.</i>				<i>Ml.</i>	<i>Pct.</i>			<i>Mg.</i>	<i>pH</i>	<i>Pct.</i>	<i>Pct.</i>	
Oct. 1-5	165	C	OY	Riccy	57	58	V acid.....	30	0.45	2.95	8.77	2.27	3.86
Nov. 1-5	204	D	OY	Coarse	59	61	Acid.....	55	.47	3.13	10.12	1.75	5.78
Dec. 1-5	252	E	YO	Good	57	59	P tart to S	81	.47	3.31	10.87	1.28	8.49
Jan. 1-5	263	H	O	do	58	61	do	92	.50	3.49	11.97	1.03	11.62
Feb. 1-5	296	I	O	do	58	60	do	93	.51	3.57	13.29	.91	14.60
Mar. 1-5	273	K	O	do	57	60	do	96	.52	3.67	14.10	.90	15.67
Apr. 1-5	272	K	O	do	56	59	do	92	.51	3.68	14.70	.89	16.52

¹ Each figure or description represents a mean of 25 determinations made in 1 season.

² See U. S. Department of Agriculture color chart (pl. 1).

³ OY, orange yellow; YO, yellow orange; O, orange; V, very; P, pleasantly; S, sweet.

⁴ Each figure represents a mean of duplicate determinations.

TABLE 28.—Seasonal changes in physical characters and chemical constituents of Temple oranges on sour orange rootstock on plot 17, at Florence Villa, Fla., 1946-47

Picking period	Weight per fruit ¹	Rind color ^{1, 2}	Flesh color ^{1, 3}	Flesh condition ¹	Juice per 100 grams of fruit ¹	Juice per fruit ¹	Palatability ³		Ascorbic acid per milliliter ⁴	Active acidity ⁴	Total solids ⁴	Total acid ⁴	Solids-acid ratio
							Arbitrary standard	Numerical rating					
Oct. 1-5.....	<i>Gm.</i> 184	C	OY	Coarse	<i>Ml.</i> 59	<i>Pct.</i> 61	V acid	35	<i>Mg.</i> 0.49	<i>pH</i> 3.04	<i>Pct.</i> 8.18	<i>Pct.</i> 2.02	4.05
Nov. 1-5.....	230	D	OY	do	59	61	Tart	61	.49	3.25	9.57	1.43	6.69
Dec. 1-5.....	286	E	YO	Good	57	60	P tart to S	81	.50	3.40	10.90	1.18	9.15
Jan. 1-5.....	292	J	O	do	60	63	do	93	.55	3.49	12.15	1.11	10.95
Feb. 1-5.....	323	J	O	do	57	59	do	93	.47	3.72	12.72	.83	15.33
Mar. 1-5.....	304	L+	O	do	57	60	do	92	.47	3.70	12.72	.98	12.98

¹ Each figure or description represents a mean of 25 determinations made in 1 season.

² See U. S. Department of Agriculture color chart (pl. 1).

³ OY, orange yellow; YO, yellow orange; O, orange; V, very; P, pleasantly; S, sweet

⁴ Each figure represents a mean of duplicate determinations.

TABLE 29.—Seasonal changes in physical characters and chemical constituents of Temple oranges on sour orange rootstock on plot 18, at Dundee, Fla., 1946-47

Picking period	Weight per fruit ¹	Rind color ^{1, 2}	Flesh color ^{1, 2}	Flesh condition ¹	Juice per 100 grams of fruit ¹	Juice per fruit ¹	Palatability ³		Ascorbic acid per milliliter ⁴	Active acidity ⁴	Total solids ⁴	Total acid ⁴	Solids-acid ratio
							Arbitrary standard	Numerical rating					
	Gm.				Ml.	Pct.			Mg.	pH	Pct.	Pct.	
Oct. 1-5.....	185	D	OY	Coarse.....	60	62	V acid.....	34	0.58	2.96	9.43	1.97	4.70
Nov. 1-5.....	228	E	OY	do.....	60	62	Tart.....	60	.58	3.14	10.17	1.49	6.83
Dec. 1-5.....	268	G	YO	Good.....	56	59	P tart to S.....	84	.61	3.31	11.47	1.20	9.56
Jan. 1-5.....	276	I	O	do.....	61	64	do.....	92	.61	3.40	12.65	1.02	12.40
Feb. 1-5.....	339	J	O	do.....	57	59	do.....	93	.55	3.64	12.84	.81	15.85
Mar. 1-5.....	300	K	O	do.....	59	62	do.....	96	.61	3.66	13.75	.90	15.28
Apr. 1-5.....	327	L+	O	do.....	57	60	do.....	90	.60	3.73	13.94	.75	18.59

¹ Each figure or description represents a mean of 25 determinations made in 1 season.

² See U. S. Department of Agriculture color chart (pl. 1).

³ OY, orange yellow; YO, yellow orange; O, orange; V, very; P, pleasantly; S, sweet.

⁴ Each figure represents a mean of duplicate determinations.

TABLE 30.—Seasonal changes in physical characters and chemical constituents of Temple oranges on Cleopatra rootstock on plot 19, at Merritt Island, Fla., 1943-44 to 1946-47

Picking period	Weight per fruit ¹	Rind color ^{2 3}				Flesh color ^{2 4}				Flesh condition ²			
		1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47
Oct. 1-5.....	Gm. 152	B	D	D	D	OY	OY	OY	OY	Ricey	Coarse	Coarse	Coarse
Nov. 1-5.....	214	D	D	D	E	YO	OY	YO	YO	Course	do	do	do
Nov. 15.....	² 227		E				YO			Good	do	do	do
Dec. 1-5.....	244	H	E	G	F	O	YO	YO	YO	Good	do	Good	Good
Jan. 1-5.....	247	K	K	I	H	O	O	YO	O	do	do	do	do
Feb. 1-5.....	289	L+	K	J	I	O	O	O	O	do	do	do	do
Mar. 1-5.....	271	L+	K	J	K	O	O	O	O	do	do	do	do
Apr. 1-5.....	252	L+	L	L		O	O	O	O	do	do	do	do

Picking period	Juice per 100 grams of fruit ¹	Juice per fruit ¹	Palatability ¹											
			1943-44		1944-45		1945-46		1946-47					
			Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating				
	<i>Mt.</i>	<i>Pct.</i>	V acid		Acid.		V acid		V acid		V acid		V acid	
Oct. 1-5	59	61	Acid.	29	do	40	Tart.	39	Tart.	62	do	37	do	64
Nov. 1-5	59	61		54		41								
Nov. 15	80	82	P tart to S	85	P tart.	81	P tart.	77	P tart to S	88	P tart to S	88	do	93
Dec. 1-5	80	82	do	93	P tart to S	78	P tart.	77	do	93	do	93	do	95
Jan. 1-5	61	64	do	93	do	93	do	94	do	96	do	96	do	96
Feb. 1-5	80	83	do	96	do	94	do	96	do	96	do	96	do	96
Mar. 1-5	80	83	do	96	do	90	do	92	do	92	do	96	do	96
Apr. 1-5	61	66	do	93	do	90	do	88	do	88	do	96	do	96

Picking period	Ascorbic acid per milliliter ²				Active acidity ²				Total solids ²				Total acid ²				Solids-acid ratio			
	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47
	<i>Mg.</i>	<i>Mg.</i>	<i>Mg.</i>	<i>Mg.</i>	<i>pH</i>	<i>pH</i>	<i>pH</i>	<i>pH</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>				
Oct. 1-5	0.57	0.50	0.54	0.46	2.76	2.86	2.87	2.97	9.33	8.87	9.50	9.27	2.77	2.22	2.39	2.70	3.37	4.00	3.97	3.43
Nov. 1-5	.53	.53	.53	.47	2.92	3.14	3.16	3.27	9.97	9.92	10.05	10.12	2.00	1.64	1.57	1.39	4.84	6.05	6.40	7.28
Nov. 15		.52				3.18				10.53				1.40				7.07		
Dec. 1-5	.55	.51	.54	.52	3.17	3.29	3.37	3.39	11.17	10.73	10.80	11.37	1.50	1.20	1.22	1.12	7.45	8.94	8.85	10.15
Jan. 1-5	.56	.50	.53	.50	3.34	3.52	3.50	3.61	12.04	11.83	11.60	12.25	1.07	1.03	.95	.87	11.26	11.49	12.21	14.08
Feb. 1-5	.53	.47	.52	.47	3.52	3.72	3.63	3.79	12.65	12.15	12.12	12.29	.87	.82	.84	.71	14.54	14.82	14.43	17.31
Mar. 1-5	.51	.47	.51	.52	3.58	3.86	3.81	3.70	13.32	12.72	13.37	14.00	.87	.75	.71	.87	15.31	16.00	18.83	16.09
Apr. 1-5	.55	.47	.53		3.66	3.87	3.76		14.37	14.07	15.13		.73	.75	.84		19.08	18.76	18.01	

¹ With the exceptions indicated, each figure represents a mean of 75 determinations made in 3 seasons or of 100 determinations made in 4 seasons.
² Each figure or description represents a mean of 25 determinations made in 1 season.

³ See U. S. Department of Agriculture color chart (pl. 1).
⁴ OY, orange yellow; YO, yellow orange; O, orange; V, very; P, pleasantly; S, sweet.
⁵ Each figure represents a mean of duplicate determinations.

TABLE 31.—Seasonal changes in physical characters and chemical constituents of Temple oranges on Cleopatra rootstock on plot 20, at Windermere, Fla., 1943-44 to 1946-47

Picking period	Weight per fruit ¹	Rind color ^{1 1}				Flesh color ^{2 4}				Flesh condition ²			
		1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47
	<i>Gm.</i>												
Oct. 1-5	154	C	D	C	C	OY	YO	OY	OY	Ricey	Ricey	Coarse	Ricey
Nov. 1-5	192	D	E	D	D	YO	YO	YO	OY	Coarse	Coarse	Good	Coarse
Nov. 15	207		F				YO				Good		
Dec. 1-5	219	I	H	I	G	O	YO	YO	O	Good	do.	Good	Good
Jan. 1-5	249	L	K	K	J	O	O	YO	O	do.	do.	do.	do.
Feb. 1-5	255	L+	L	K	J	O	O	O	O	do.	do.	do.	do.
Mar. 1-5	253	L+	L	L	L+	O	O	O	O	do.	do.	do.	do.
Apr. 1-5	245	L+	K		L+	O	O		O	do.	do.		do.
Picking period	Juice per 100 grams of fruit ¹	Juice per fruit ¹	Palatability ⁴										
			1943-44		1944-45		1945-46		1946-47				
			Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating			
	<i>Ml.</i>	<i>Pct.</i>											
Oct. 1-5	57	59	V acid	28	V acid	30	V acid	37	V acid	34			
Nov. 1-5	60	62	Acid	56	Acid	56	Tart	61	Tart	60			
Nov. 15	58	60			Tart	68							
Dec. 1-5	60	62	P tart to S	81	P tart	78	P tart	79	P tart to S	85			
Jan. 1-5	61	64	do	95	P tart to S	96	P tart to S	92	do	95			
Feb. 1-5	61	63	do	97	do	97	do	94	do	97			
Mar. 1-5	60	63	do	96	do	93	do	89	do	96			
Apr. 1-5	58	61	do	91	do	95	do	do	do	91			

Picking period	Total ash ¹					Ascorbic acid per milliliter ²					Active acidity ³				
	1941-43	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1947-48	1943-44	1944-45	1945-46	1946-47	1947-48
Oct. 1-5	Pct. 8.24		Pct. 0.36		Pct. 0.30		Mg. 0.31		Mg. 0.46		pH 2.73		pH 2.86		pH 2.98
Nov. 1-5	Pct. 8.36		Pct. 0.47		Pct. 0.30		Mg. 0.32		Mg. 0.46		pH 2.73		pH 2.86		pH 3.17
Dec. 1-5	Pct. 8.41		Pct. 0.35		Pct. 0.35		Mg. 0.33		Mg. 0.45		pH 2.73		pH 2.86		pH 3.17
Jan. 1-5	Pct. 8.38		Pct. 0.37		Pct. 0.33		Mg. 0.33		Mg. 0.45		pH 2.73		pH 2.86		pH 3.17
Feb. 1-5	Pct. 8.31		Pct. 0.37		Pct. 0.30		Mg. 0.33		Mg. 0.45		pH 2.73		pH 2.86		pH 3.17
Mar. 1-5	Pct. 8.30		Pct. 0.47		Pct. 0.33		Mg. 0.33		Mg. 0.45		pH 2.73		pH 2.86		pH 3.17
Apr. 1-5	Pct. 8.35		Pct. 0.47		Pct. 0.32		Mg. 0.33		Mg. 0.45		pH 2.73		pH 2.86		pH 3.17
Picking period	Total solids ⁴					Total acid ⁵					Solids-acid ratio ⁶				
	1941-43	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1947-48	1943-44	1944-45	1945-46	1946-47	1947-48
Oct. 1-5	Pct. 7.08		Pct. 2.03		Pct. 5.87		Pct. 2.01		Pct. 2.07		Pct. 3.03		Pct. 4.36		Pct. 4.46
Nov. 1-5	Pct. 9.25		Pct. 1.75		Pct. 8.81		Pct. 1.56		Pct. 1.46		Pct. 5.29		Pct. 6.15		Pct. 6.81
Dec. 1-5	Pct. 11.20		Pct. 1.41		Pct. 9.97		Pct. 1.41		Pct. 1.26		Pct. 8.03		Pct. 8.01		Pct. 9.70
Jan. 1-5	Pct. 10.87		Pct. 1.35		Pct. 11.25		Pct. 1.04		Pct. 1.11		Pct. 8.03		Pct. 9.87		Pct. 11.48
Feb. 1-5	Pct. 12.04		Pct. 1.06		Pct. 12.10		Pct. 1.04		Pct. 0.93		Pct. 11.36		Pct. 11.48		Pct. 13.50
Mar. 1-5	Pct. 12.58		Pct. 0.93		Pct. 12.70		Pct. 0.90		Pct. 0.87		Pct. 13.53		Pct. 13.50		Pct. 15.00
Apr. 1-5	Pct. 13.41		Pct. 0.92		Pct. 13.47		Pct. 0.78		Pct. 0.87		Pct. 16.33		Pct. 16.28		Pct. 18.31
	Pct. 13.07		Pct. 1.71		Pct. 13.67		Pct. 1.71		Pct. 1.81		Pct. 19.83		Pct. 17.21		Pct. 20.11

¹ With the exceptions indicated, each figure represents a mean of 75 determinations made in 3 seasons or of 100 determinations made in 4 seasons.
² Each figure or description represents a mean of 25 determinations made in 1 season.
³ See U. S. Department of Agriculture color chart (pl. 1).
⁴ OY, orange yellow; YO, yellow orange; O, orange; V, very; P, pleasantly; S, sweet.
⁵ Each figure represents a mean of duplicate determinations.
⁶ Each figure represents a mean of duplicate determinations.

TABLE 32. - Seasonal changes in physical characters and chemical constituents of Temple oranges on sweet orange rootstock on plot 21, at Windermere, Fla., 1943-44 to 1946-47

Picking period	Weight per fruit ¹	Rind color ^{2, 3}				Flesh color ^{2, 4}				Flesh condition ²			
		1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47
	<i>Gm.</i>												
Oct. 1-5	157	B	C	C	C	OY	OY	OY	OY	Riccy	Coarse	Coarse	Coarse
Nov. 1-5	192	D	D	D	D	YO	YO	YO	YO	Coarse	do	do	do
Nov. 15	207		E				YO			Good	do	do	do
Dec. 1-5	226	H	E	H	F	O	YO	YO	YO	Good	do	Good	Coarse
Jan. 1-5	252	L	L	L	J	O	O	O	O	do	do	do	Good
Feb. 1-5	259	L+	L+	L	J	O	O	O	O	do	do	do	do
Mar. 1-5	257	L+	L+	L+	L+	O	O	O	O	do	do	do	do
Apr. 1-5	246	L+	L	L	L	O	O	O	O	do	do	do	do
Picking period	Juice per 100 grams of fruit ¹	Juice per fruit ¹	Palatability ⁴										
			1943-44		1944-45		1945-46		1946-47				
			Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating	Arbitrary standard	Numerical rating			
	<i>Ml.</i>	<i>Pct.</i>											
Oct. 1-5	58	60	V acid	29	Acid	43	V acid	36	V acid	37			
Nov. 1-5	60	62	Acid	57	Tart	60	Acid	55	Tart	60			
Nov. 15	61	63			do	89							
Dec. 1-5	59	61	P tart to S	80	P tart	70	P tart	76	P tart to S	84			
Jan. 1-5	59	62	do	94	P tart to S	93	P tart to S	88	do	94			
Feb. 1-5	60	62	do	97	do	95	do	93	do	95			
Mar. 1-5	59	61	do	95	do	92	do	90	do	95			
Apr. 1-5	55	58	do	90	do	94	do		do	90			

Picking period	Total ash ¹			Ascorbic acid per milliliter ²				Active acidity ³			
	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Mg.</i>	<i>Mg.</i>	<i>Mg.</i>	<i>Mg.</i>	<i>pH</i>	<i>pH</i>	<i>pH</i>	<i>pH</i>
Oct. 1-5.....	0.27	0.27	0.27	0.46	0.49	0.50	0.47	2.79	2.91	2.91	2.95
Nov. 1-5.....	.30	.23	.29	.48	.49	.50	.47	3.02	3.19	3.13	3.16
Nov. 15.....	.27				.48				3.21		
Dec. 1-5.....	.33	.26	.31	.49	.47	.54	.46	3.18	3.18	3.25	3.28
Jan. 1-5.....	.36	.35	.24	.49	.47	.53	.48	3.28	3.45	3.39	3.45
Feb. 1-5.....	.36	.35	.29	.50	.47	.54	.46	3.45	3.60	3.54	3.60
Mar. 1-5.....	.40	.39	.29	.48	.48	.52	.49	3.55	3.70	3.64	3.59
Apr. 1-5.....	.33		.34	.47	.40		.49	3.63	3.72		3.70

Picking period	Total solids ¹				Total acid ²				Solids-acid ratio			
	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47	1943-44	1944-45	1945-46	1946-47
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>				
Oct. 1-5.....	7.98	8.82	8.15	9.07	2.49	1.82	2.21	2.06	3.20	4.85	3.69	4.40
Nov. 1-5.....	8.90	9.60	9.40	10.07	1.79	1.43	1.73	1.43	4.97	6.71	5.43	7.04
Nov. 15.....		10.05				1.25				8.04		
Dec. 1-5.....	11.57	10.23	10.87	10.80	1.36	1.30	1.39	1.23	8.51	7.87	7.82	8.78
Jan. 1-5.....	11.65	11.44	11.40	12.04	1.09	.96	1.20	.98	10.69	11.92	9.50	12.29
Feb. 1-5.....	12.23	12.47	12.14	12.32	1.00	.92	1.06	.85	12.23	13.55	11.45	14.49
Mar. 1-5.....	13.36	12.45	12.72	13.29	.93	.75	.94	.89	14.37	16.60	13.53	14.93
Apr. 1-5.....	13.42	13.25		14.17	.76	.81		.92	17.66	16.36		15.40

¹ With the exceptions indicated, each figure represents a mean of 75 determinations made in 3 seasons or of 100 determinations made in 4 seasons.
² Each figure or description represents a mean of 25 determinations made in 1 season.

³ See U. S. Department of Agriculture color chart (pl. 1).
⁴ OY, orange yellow; YO, yellow orange; O, orange; V, very; P, pleasantly; S, sweet.
⁵ Each figure represents a mean of duplicate determinations.

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