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COMPOSITION OF FLORIDA AVOCADOS

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PURPOSE OF INVESTIGATION

The work here reported was undertaken for the purpose of gaining some knowledge and throwing light upon the following problems of the avocado.

Avocados are harvested when hard and kept in storage until soft. When it is desirable to harvest fruits before they mature the problem of determining the time of their optimum condition is seldom an easy one and knowledge of their composition at maturity is imperative.

Much difficulty has been encountered in trying to place the avocado in northern markets in a state satisfactory to the consumer, the tendency being to harvest the fruit before it is ready, which results in putting a poor and flavorless product in the hands of the consumer. If picked too early, the fruit has a tendency to become rubbery, shrivelled, and darkened, and lacks the characteristic good flavor of well matured fruit. Its maturity problem thus assumes special importance.

Furthermore, this fruit is now in the first period of its development so far as the American market is concerned. False impressions of its quality created at this time may greatly injure its future. Already some adverse criticism of the avocado, usually traceable to those who have bought and eaten immature fruits, has been encountered.

The greatest problem in the study of changes in composition during growth and maturity investigations is the correlation between the physical appearance and the composition. As a rule it is not hard to decide fairly accurately from its composition at what stage of growth a fruit is in its optimum condition. It is comparatively difficult, however, to correlate this stage with some physical aspect, particularly when the optimum condition desired necessitates the gathering of the fruit some time before it is to be eaten. All fruit reaches a stage where maturity is manifest from its physical appearance but usually when this stage is reached in the avocado the fruit has passed the optimum condition for long distance shipment and storage.

In the search for promising varieties and in breeding new varieties, any knowledge of the chemical composition of the fruit or of changes taking place during growth may be of invaluable aid.

The composition of all the avocado varieties now grown in Florida is a matter of no little interest to the avocado grower.

INVESTIGATIONAL WORK

Methods of Sampling

The fruit for the investigation was obtained from marked trees in the avocado groves of the Brooks Properties, Inc., Homestead, and the Ivey Properties, Inc., Lake Placid. Samples were taken every three weeks from the time of setting until the time of maturity. As far as possible all samples were obtained from a single tree of each of the varieties selected. In some cases the fruit of several trees had to be employed in order to continue sampling throughout the season but, in such cases, the trees were always side by side, having had the same cultural treatments. The trees reserved for fruit sampling were young strong growing specimens between six and eight years of age. The fruit was shipped to Gainesville where the analyses were made. Samples consisting of four fruits were sent every three weeks and divided at the laboratory into two sets; one set was analyzed at once and the other set stored at thirty-five or forty degrees Fahrenheit and allowed to soften. Before the fruit was large enough to permit a complete analysis of a single fruit, large numbers of fruit were used and the pulp ground and mixed well. The samples analyzed at once are here designated "hard samples" or "A"; the others held in storage until soft designated "soft samples" or "B."

Methods of Analysis

The method of analysis of the Association of Official Agricultural Chemists was used.

Specific gravity of the fruit was determined by weighing it in air and under water. Each fruit was then cut in half, the seed removed, and the pulp separated from the skin. It was necessary to remove the skin of the fresh immature samples by paring. In such cases the separations could not always be accurately made, a fact which must be taken into consideration in interpreting the results. The seed, skin, and pulp were weighed and the percentage of each determined. The following analyses were then made on the fresh edible pulp.

Moisture was determined by drying to constant weight in vacuo at 70° Centigrade.

Ash was determined by the official method for fruits of the Association of Official Agricultural Chemists.

Fat was extracted from the moisture-free samples with anhydrous ether in a Sargent extractor.

Sugar was determined by the Shaffer-Hartmann method, using the cuprous titration.

Nitrogen was determined by the Kjeldahl-Gunning method, the result being multiplied by 6.25 for protein.

RESULTS OF INVESTIGATION

The results of this investigation are given in Tables I to IX. The data obtained from the analyses of the fruit from the selected trees are presented in these tables. Each figure in the table is an average of two analyses. Tabulations of only representative varieties of each of the races and hybrids are given here, as presentation of the data of all varieties tested would be more than necessary. Table X shows the rank of each variety as to

total weight and percentages of seed, skin, and edible pulp. Table XI shows the rank of each variety in per cent of moisture and oil and fat (green basis and water-free basis).

DISCUSSION OF RESULTS

Even a superficial study of the tabulated data reveals many interesting relations between the composition of the fruit and its maturity. As stated previously, the greatest problem in maturity investigations is the correlation between the physical appearance and the composition.

Purple and black avocados change in color during growth. An extended study of these varieties might show some correlation between their color and their composition. In the case of green colored fruit, however, such an opportunity is not afforded. Neither kind can be left on the tree until soft enough to eat with satisfactory results for, besides the loss in time; there is a noticeable loss in flavor.

The color of the stem has been used as an indication of maturity. This may prove to be practicable with a few varieties but observations by the author lead to no definite conclusions in this regard. The stems of some fruit are green after the fruit has reached a mature state for picking, while the stems of other decidedly immature fruits are yellowish. The size of the fruit cannot be taken as a criterion of maturity as small fruits may be ripe when much larger ones on the same tree are decidedly immature. In some varieties the skin of the fruit takes on a sheen or luster when near maturity but in others this is not the case. As far as physical appearances are concerned, it has been impossible to correlate closely any character or set of characters with the maturity of the fruit.

There is, however, a definite correlation between some other characteristics and ripeness brought out by this analysis study. Thus, the time which elapses after picking until the fruit becomes sufficiently soft to be edible roughly indicates whether or not it was in a satisfactory condition when picked. For example, data of the Lula avocado in Table II show that during growth there was a sharp decline in the time necessary for this softening. Fruit picked on September first took 104 days to ripen and the number of days grew less thereafter until only twenty-eight were required to soften fruit picked February first. This change is seldom correlated with the fat content. It appears that the period required for softening is only an approximate indication of a satisfactory condition for harvesting.

The total weight of the fruit and the per cent edible matter increase in all varieties as the fruits mature but there seems to be no line of demarcation which indicates maturity.

The per cent seed increases in some varieties and decreases in others with maturity but in most varieties remains somewhat constant throughout. The per cent skin, however, decreases with maturity of fruits. Here, again, there seems to be no line of demarcation indicating maturity.

Specific gravity of the fruit decreases with maturity. In the very early stages of growth the specific gravity is always above 1.0, being heavier than water. This is always accompanied by low oil content. Just as soon as the oil content increases to any extent the specific gravity decreases and falls below 1.0, being lighter than water. This may be

used as a maturity test but whether these correlations could be made year after year under different weather conditions is as yet unknown.

The amount of moisture, of course, varies inversely with the amount of fat and therefore decreases considerably with maturity.

The percentage of ash in avocados is relatively small. While it increases somewhat with maturity, it is hardly possible to formulate a test with this figure as a basis.

The percentage total sugars in the pulp of the avocado decreases markedly as the fruit ripens but the range is hardly sufficient to be of use in estimating maturity.

The protein content becomes higher as the season advances. This constituent seems variable, however, and therefore less available for standardizing purposes.

The fat and oil of the avocado, of course, is its chief constituent other than water and when it has reached its maximum there is no doubt that the fruit is mature. The question arises, however, as to how long it will be before this point is reached until the fruit can be harvested with satisfactory results as far as eating and storage qualities are concerned. The fruit of all varieties tested shows a very small oil and fat content for the first three or four months after setting when there is a decided increase. After this time the fruit will soften or ripen normally and from this stage on a consistent and more or less uniform increase of oil and fat takes place up to a certain point, after which the increase is much less. This fact is brought out especially when the oil and fat are figured on the water-free basis. Often late in the season apparent decreases are indicated, showing at least that the increases were not sufficient to overcome the variability. In the limited experience of the author it would seem that the point where the uniform increase in fat ceases is about the point where satisfactory maturity is found.

One other source of information concerning changes taking place while the fruit is ripening is afforded by the comparison of the data resulting from the analysis of the fresh and storage samples. When these data are confined to the edible portion of the fruit the differences are more striking after the data have been reduced to a water free basis. Many interesting facts are revealed by a close study of these results. Some of them may be the result of errors in the analyses or of the natural variability in the samples consisting of but four fruits but most of them are undoubtedly the result of changes in composition of the fruit after it is removed from the tree. It is hardly practicable to analyze part of one fruit and store the remainder until it has softened before analyzing it. The best that could be done was to analyze half the number as soon after picking as possible and to hold the other half until they became soft. The data therefore must be considered in the light of these facts. Where changes are almost always in one general direction, the probability of their being the result of individual variation is remote.

The total weight, percentage of edible pulp, and percentage of skin decrease during storage of the samples while the percentage of seed is always higher in the stored samples. This is due mostly much lower specific gravity than the fresh. This, again, is due partially to the loss of water from the fruit.

The percentage of water in the pulp decreases decidedly in all varieties when the fruit is stored, fresh samples generally having a higher moisture content than the stored

samples. The ash content shows variations but no definite statement can be made as an increase in ash in the stored samples occurs at one time and a decrease at another. Too much weight cannot be placed on the ash values as different parts of the avocado fruit vary in ash content and it depends upon from which portion the sample is taken as to whether high or low ash content was obtained. A whole fruit would have to be ashed in order to get reliable data on this constituent.

The protein content shows an increase in all cases in the stored fruit over the fresh samples. Calculation to the water-free basis alters this general ratio to a lesser extent.

There is also a decided increase in fat content in the storage samples and a decrease in total some other constituent of the fruit. In this connection it is to be noted that the loss of sugar accompanies the increase in fat content. These losses are not always uniform or in proportion to the increase in fat. When it is recalled that the analyses were necessarily made on different fruits, small inconsistencies can be explained by individual variations in the fruits. The differences between fresh and stored samples are not due wholly to evaporation of water for the differences are maintained when the data are stated on the water-free basis.

TABLE X

COMPARISON OF AVOCADO VARIETIES TESTED
(Averages of all mature fruit analyzed)

(Homestead, Florida.)

Rank	Weight		Seed		Skin		Edible Pulp	
	Variety	Pounds	Variety	Percent	Variety	Percent	Variety	Percent
1	Pollock	1.63	Linda	09.47	Pollock	08.10	Pollock	77.50
2	Linda	1.53	Pollock	14.40	Trapp	09.16	Linda	75.82
3	Collinson	1.32	Eagle Rock	14.72	Waldin	11.34	Trapp	74.88
4	Eagle Rock	1.31	Collinson	15.71	Winslowson	11.39	Winslowson	71.74
5	Winslowson	1.30	Trapp	15.96	Taylor	12.58	Collinson	71.50
6	Lula	1.12	Winslowson	16.87	Lula	12.75	Eagle Rock	70.15
7	Waldin	1.03	Taylor	18.22	Collinson	12.79	Taylor	69.19
8	Trapp	1.01	Lula	22.27	Linda	14.76	Lula	64.98
9	Taylor	0.81	Waldin	24.68	Eagle Rock	15.13	Waldin	63.98

(Lake Placid, Florida.)

1	Eagle Rock	1.35	Simmons	14.52	Simmons	09.84	Simmons	75.64
2	Simmons	1.27	Eagle Rock	15.72	Trapp	10.40	Trapp	69.95
3	Winslowson	1.21	Winslowson	20.50	Winslowson	12.10	Eagle Rock	68.50
4	Lula	1.09	Trapp	21.08	Lula	12.12	Winslowson	67.40
5	Trapp	1.08	Taylor	21.70	Wagner	12.89	Wagner	64.64
6	Wagner	0.70	Wagner	22.47	Eagle Rock	15.78	Lula	62.85
7	Taylor	0.66	Lula	25.04	Taylor	18.70	Taylor	59.60

TABLE XI

COMPARISON OF AVOCADO VARIETIES TESTED
(Averages of all mature fruit analyzed)

Rank	Moisture		Oil and Fat Green Basis		Oil and Fat Dry Basis	
	Variety	Percent	Variety	Percent	Variety	Percent
					(Homestead, Florida.)	
1	Taylor	76.82	Taylor	12.74	Taylor	54.39
2	Lula	77.55	Winslowson	10.57	Winslowson	54.34
3	Eagle Rock	79.91	Collinson	10.56	Collinson	52.15
4	Collinson	80.50	Eagle Rock	10.33	Eagle Rock	50.39
5	Winslowson	81.03	Lula	09.49	Linda	43.74
6	Waldin	81.23	Linda	08.79	Lula	42.71
7	Linda	81.79	Waldin	07.61	Trapp	40.28
8	Trapp	82.16	Trapp	07.25	Waldin	39.83
9	Pollock	86.46	Pollock	04.17	Pollock	30.45
					(Lake Placid, Florida.)	
1	Wagner	67.85	Wagner	22.53	Wagner	70.33
2	Lula	76.41	Taylor	12.31	Taylor	56.04
3	Taylor	78.36	Winslowson	11.48	Winslowson	51.87
4	Winslowson	78.88	Lula	11.39	Eagle Rock	49.48
5	Simmons	79.47	Eagle Rock	09.75	Lula	49.12
6	Trapp	80.30	Trapp	08.31	Trapp	41.81
7	Eagle Rock	80.74	Simmons	08.23	Simmons	37.70

With the amount of work so far accomplished it is impossible to attempt to recommend any hard and fixed maturity standard on any of the Florida avocado varieties but many interesting and valuable facts are brought out on the composition and change in composition in the avocado.

The average of the analyses of the standard avocado varieties cannot well be used as a basis for comparison for the reason that samples were taken at different stages of maturity. Averages were made, however, of all the mature fresh fruit analyzed and the constituents of the different varieties compared. Tables X and XI were arranged, therefore to show the order in which each variety ranked with respect to each constituent. The figures on these tables are averages of twenty to forty fruits. The maxima are given first rank in case of weight, edible pulp, and fat; the minima in the case of seed, skin, and moisture. When the differences are small these figures should not be given too much weight as the relative position of the variety might be changed by another set of data obtained by trees differently located. It might be better, therefore, to rank the varieties by groups only.

When mature the Pollock and Linda rank first in total weight, averaging well over a pound and a half and the Taylor ranks last, averaging four fifths (4-5) of a pound. The Pollock and Lindo rank first again in the per cent edible pulp with Lula, Taylor, and Waldin ranking last. Linda and Pollock rank first in per cent of seed, having the smallest seed, while Lula and Waldin rank last, the seed constituting about one-fourth (1-4) the total weight. The smallest per cent of skin is found in the Pollock, Simmons, and Trapp and the largest in the Taylor and Eagle Rock.

The Taylor, Wagner, and Lula varieties have the lowest moisture content, the highest being found in the Trapp and Pollock. The oil and fat content is found to be highest in the Wagner, Taylor, and Winslowson and lowest in the Pollock, Trapp, Waldin, and Simmons.

In breeding work and in varietal selection the results of the comparisons of varieties in Tables X and XI would be of invaluable aid.

A survey of the data presented in the accompanying tables shows the avocado to differ widely in many respects from the average for fresh fruits and proves it worthy of special consideration. It might well be said to be in a class by itself.

The tables are replete with interesting points, all very favorable to the avocado. The total dry matter in the edible portion of mature fruit is greater in nearly every instance than that noted for any other fresh fruit, with the exception of the banana which has about an equal amount.

Sugar and starch predominate in the banana as against fat in the avocado.

As far as protein in fresh fruits is concerned the avocado stands in the lead. The carbohydrate content of the avocado is low as compared with the constituent in fresh fruits but contains on an average fully fifty per cent of that found in many fresh fruits.

It is also of interest to note that the percentage of mineral matter or ash in the avocado is equal to that of most fresh fruits and higher than that of many of them.

The chief value of the avocado as food is due to its high content of fat. The avocado ranks higher in fat and oil than any other fresh fruit with the exception of the olive which is its equal.

These facts alone would warrant due consideration of the value of the avocado as a fresh fruit.

TABLE I

LULA AVOCADO ANALYSES — LAKE PLACID, FLORIDA -- 1930-31

Fruit No.	No. Fruit	Date Picked	Date Tested	Condition of Fruit	Total Weight (Gms.)	% Seed	% Skin	% Pulp	% Ash	% Moisture	Specific Gravity	% Oil & Fat Green Basis	% Oil & Fat Dry Basis
1A	22	5-3-30	5-6-30	Hard	148.2	11.72	25.89	62.39	-	86.17	1.0287	0.89	6.44
*1B	20	5-3-30											
2A	6	5-24-30	5-27-30	Hard	154.0	14.05	24.11	61.84	0.08	87.10	1.0314	1.05	8.18
*2B	6	5-24-30											
3A	5	6-14-30	6-17-30	Hard	452.5	17.91	18.75	63.34	0.31	87.53	1.0013	1.04	8.34
*3B	5	6-14-30											
4A	2	7-5-30	7-7-30	Hard	383.1	20.28	14.50	65.22	0.76	86.64	1.0298	1.01	7.69
*4B	2	7-5-30											
5A	2	7-26-30	7-28-30	Hard	364.5	21.70	16.34	61.96	0.50	85.09	1.0047	1.41	8.93
*5B	2	7-26-30											
6A	1	8-16-30	8-23-30	Hard	389.7	26.49	12.00	61.52	0.51	84.81	0.9791	5.47	36.03
6B	1	8-16-30	10-11-30	Soft	384.5	28.91	10.27	60.82	0.71	84.85	0.9413	6.16	40.65
7A	1	9-6-30	9-11-30	Hard	400.5	25.42	13.34	61.24	0.22	82.25	0.9828	3.74	21.07
7B	1	9-6-30	10-3-30	Soft	435.0	-	-	-	0.47	80.34	0.8992	9.77	49.71
8A	1	9-27-30	10-1-30	Hard	531.5	30.77	13.67	55.56	0.55	79.82	0.9826	9.18	45.50
8B	1	9-27-30	12-13-30	Soft	522.4	33.97	09.98	56.05	1.00	74.31	0.8304	13.64	53.08
9A	1	10-18-30	10-22-30	Hard	489.0	30.10	13.61	56.29	1.58	79.65	0.9649	10.55	51.83
#9B	1	10-18-30											
10A	1	11-8-30	11-11-30	Hard	450.0	35.11	11.34	53.55	0.90	75.97	0.9931	13.68	56.95
10B	1	11-8-30	12-19-30	Soft	508.7	30.54	10.44	59.02	0.70	67.66	0.9326	14.35	44.38
11A	1	11-29-30	12-4-30	Hard	717.7	32.02	10.60	57.38	0.72	80.46	0.9676	11.12	56.90
11B	1	11-29-30	12-20-30	Soft	588.5	26.92	08.79	64.29	0.67	75.42	0.9752	8.23	33.51
12A	1	12-10-30	12-12-30	Hard	724.5	25.30	11.38	63.32	1.09	71.41	0.9716	17.81	62.31
12B	1	12-10-30	1-26-31	Soft	638.0	35.08	07.23	57.69	0.78	73.80	0.9407	16.18	61.74
13A	1	1-10-31	1-12-31	Hard	494.0	20.10	10.36	69.54	0.75	75.55	0.9709	12.90	52.76
13B	1	1-10-31	2-6-31	Soft	499.7	28.92	09.08	62.00	0.96	69.32	0.9328	17.85	57.64
14A	1	1-31-31	2-2-31	Hard	399.5	15.69	12.53	71.78	0.63	73.15	0.9184	14.41	53.70
14B	1	1-31-31	2-28-31	Soft	446.6	28.25	09.00	62.75	0.79	68.30	0.9524	20.61	64.94
15A	1	2-22-31	2-27-31	Hard	445.4	13.54	10.32	76.14	1.17	70.33	0.9184	16.08	54.18
15B	1	2-22-31	3-16-31	Soft	424.4	20.20	10.40	62.06	0.85	71.40	0.9532	17.80	62.30

* Never Ripened.
\# Spoiled.

TABLE II

LULA AVOCADO ANALYSES

Homestead, Florida -- 1930-31

Fruit No.	No. Fruit	Date Picked	Date Tested	Days to Soften	Condition of Fruit	Total Weight (Gms.)	% Seed	% Skin	% Pulp	Specific Gravity	% Moisture	% Oil & Fat	
												Green Basis	Dry Basis
1A	8	4-29-30	5-2-30		Hard	051.12	11.21	20.74	68.05	1.0407	80.34	0.70	3.56
*1B		4-29-30											
2A	12	5-31-30	6-2-30		Hard	227.92	08.54	29.21	62.25	1.0228	87.92	0.57	4.72
*2B		5-31-30											
3A	4	7-1-30	7-3-30		Hard	370.00	22.86	21.48	55.66	1.0054	88.20	1.25	10.54
*3B		7-1-30											
4A	1	8-2-30	8-5-30		Hard	197.50	16.61	19.44	63.95	1.0400	85.30	1.20	8.10
*4B		8-2-30											
5A	1	8-30-30	9-2-30		Hard	350.40	20.59	12.93	66.48	0.9839	83.33	6.68	40.09
5B	1	8-30-30	12-13-30	104	Soft	220.59	34.01	16.64	49.35	0.7194	77.16	11.41	49.96
6A	1	10-1-30	10-4-30		Hard	498.60	25.03	12.98	61.99	0.9646	80.61	08.86	45.67
†6B		10-1-30											
7A	1	11-1-30	11-3-30		Hard	524.8	19.91	14.15	65.94	0.8978	77.81	09.96	44.89
7B	1	11-1-30	1-2-31	63	Soft	285.8	32.09	09.52	58.39	0.8166	73.90	14.42	55.23
8A	1	11-29-30	12-3-30		Hard	526.0	17.73	13.06	69.21	0.9053	75.85	08.16	33.78
8B	1	11-29-30	1-10-31	41	Soft	504.0	24.25	08.33	67.42	0.9692	73.04	09.89	36.69
9A	1	1-1-31	1-3-31		Hard	583.2	19.78	12.62	67.60	0.9170	71.00	09.30	32.08
9B	1	1-1-31	2-6-31	36	Soft	512.9	25.24	08.41	66.35	0.9159	71.26	16.82	58.52
10A	1	1-31-31	2-3-31		Hard	574.2	30.56	10.76	58.68	0.9261	76.69	13.93	59.77
10B	1	1-31-31	2-28-31	28	Soft	592.0	30.98	08.21	60.81	0.9250	68.98	14.85	61.23

* Never Ripened.

† Analysis Lost.

TABLE III

TAYLOR AVOCADO ANALYSES - LAKE PLACID, FLORIDA -- 1930-31

Fruit No.	No. Fruit	Date Picked	Date Tested	Condition of Fruit	Total Weight (Gms.)	% Seed	% Skin	% Pulp	% Ash	% Moisture	Specific Gravity	% Oil & Fat		% Total Sugar	% Protein
												Green Basis	Dry Basis		
1A	37	5-3-30	5-6-30	Hard	187.1	12.2	22.9	64.9	0.11	86.53	1.0278	1.67	12.40	1.76	1.25
*1B	35	5-3-30													
2A	13	5-24-30	5-26-30	Hard	180.1	13.45	27.65	58.90	0.12	85.83	1.0330	0.70	04.93	2.04	1.42
*2B	14	5-24-30													
3A	5	6-14-30	6-16-30	Hard	312.3	17.64	30.67	51.69	0.31	87.34	1.0140	1.26	10.03	2.46	1.40
*3B	5	6-14-30													
4A	3	7-5-30	7-7-30	Hard	392.3	15.72	23.51	60.77	0.34	87.28	1.0005	0.85	06.67	2.02	1.48
*4B	3	7-5-30													
5A	3	7-26-30	8-1-30	Hard	345.8	20.30	21.70	58.00	0.54	83.42	1.0014	1.55	09.38	1.98	1.52
5B	3	7-26-30	8-27-30	Soft	132.5	18.34	21.37	60.29	0.54	83.42	0.8384	1.55	09.38	1.02	2.92
6A	1	8-16-30	8-20-30	Hard	240.4	19.80	19.16	61.04	0.31	83.86	0.9909	4.66	28.88	1.02	1.66
6B	1	8-16-30	10-29-30	Soft	218.3	27.95	25.17	46.88	0.61	76.07	0.6411	8.90	37.13	0.97	1.98
7A	1	9-6-30	9-9-30	Hard	378.4	17.82	22.69	59.49	0.36	83.74	0.9919	11.27	69.32	1.42	1.78
7B	1	9-6-30	12-21-30	Soft	371.7	26.14	24.93	48.93	0.40	75.01	0.7044	9.19	36.55	1.56	1.85
8A	1	9-27-30	9-29-30	Hard	263.4	26.56	15.72	57.72	0.59	78.38	0.9810	10.33	47.80	1.08	1.83
8B	1	9-27-30	12-13-30	Soft	269.4	29.74	17.78	52.48	0.71	72.33	0.7442	15.69	55.19	1.08	1.95
9A	1	10-18-30	10-20-30	Hard	228.5	20.59	22.66	56.75	0.59	81.54	0.9909	7.99	43.24	0.75	1.80
9B	1	10-18-30	12-2-30	Soft	187.4	32.99	19.19	47.82	0.35	73.50	0.7207	9.65	36.22	0.64	2.10
10A	1	11-8-30	11-11-30	Hard	277.7	23.16	14.06	62.78	0.76	79.50	0.9626	10.79	52.67	0.97	1.88
10B	1	11-8-30	12-22-30	Soft	207.5	28.94	18.31	52.75	0.61	77.31	0.8465	9.10	40.17	0.87	2.05
11A	1	11-29-30	12-1-30	Hard	261.3	24.10	19.53	56.37	0.75	79.14	0.9772	11.77	56.20	0.84	1.90
11B	1	11-29-30	1-10-31	Soft	197.3	25.69	19.20	55.11	0.87	77.30	0.8911	11.49	51.19	0.96	1.95
12A	1	12-10-30	12-13-30	Hard	279.5	15.15	18.58	66.27	0.74	77.58	0.9658	13.27	59.21	0.81	1.48
12B	1	12-10-30	1-26-31	Soft	296.0	25.16	11.98	62.86	0.80	75.61	0.8579	13.33	54.63	0.40	1.48
13A	1	1-10-31	1-12-31	Hard	370.8	26.78	13.51	59.71	0.61	75.61	0.9733	16.98	69.64	0.44	1.52
13B	1	1-10-31	1-22-31	Soft	307.2	21.32	14.75	63.93	0.65	74.98	0.9365	16.63	66.20	0.45	1.61
14A	1	1-31-31	2-2-31	Hard	283.0	21.70	18.16	60.14	0.70	75.22	0.9759	16.47	66.45	0.72	1.98
14B	1	1-31-31	3-2-31	Soft	146.7	20.58	22.64	56.78	0.80	73.10	0.9248	16.50	65.08	0.94	2.01
15A	1	2-22-31	2-25-31	Hard	296.3	24.50	26.00	49.50	0.90	72.42	0.9943	19.59	71.00	0.85	0.98
15B	1	2-22-31	3-20-31	Soft	249.5	21.30	14.70	64.00	0.89	72.33	0.8798	15.68	55.20	0.90	1.16

* Never Ripened.

TABLE IV

TAYLOR AVOCADO ANALYSES — HOMESTEAD, FLORIDA -- 1930-31

Fruit No.	No. Fruit	Date Picked	Date Tested	Condition of Fruit	Total Weight (Gms.)	% Seed	% Skin	% Pulp	% Ash	% Moisture	Specific Gravity	% Oil & Fat Green Basis	% Oil & Fat Dry Basis	% Total Sugar	% Protein
1A	260	4-26-30	4-30-30	Hard	96.20	#	#	#	0.56	84.34	1.0289	0.48	03.24	2.40	0.98
*1B	200	4-26-30													
2A	14	5-17-30	5-20-30	Hard	111.85	12.92	28.30	58.78	0.48	84.82	1.0301	1.43	09.44	2.70	1.24
*2B	14	5-17-30													
3A	6	6-7-30	6-9-30	Hard	130.70	14.69	44.76	40.50	0.10	87.66	1.0171	1.83	14.80	2.10	0.53
*3B	6	6-7-30													
4A	4	6-28-30	6-30-30	Hard	283.60	18.61	20.73	60.66	0.45	88.37	1.0035	1.39	12.40	1.78	0.72
*4B	4	6-28-30													
5A	2	7-19-30	7-22-30	Hard	204.9	19.66	18.14	62.20	--	87.36	1.0110	0.80	04.49	1.94	0.91
*5B	2	7-19-30													
6A	2	8-9-30	8-11-30	Hard	328.5	20.98	16.54	62.48	0.58	84.74	1.0021	0.91	11.04	1.76	0.65
*6B	2	8-9-30													
7A	2	8-31-30	9-1-30	Hard	366.9	21.42	16.63	61.95	0.51	85.22	0.9968	3.77	25.97	1.84	0.97
7B	2	8-31-30	10-30-30	Soft	412.4	30.07	12.19	57.74	--	82.21	0.9928	6.10	34.27	1.65	1.34
8A	1	9-20-30	9-27-30	Hard	324.6	21.42	14.57	64.01	0.86	85.62	0.9759	14.50	41.85	1.80	1.24
8B	1	9-20-30	12-1-30	Soft	290.2	30.57	15.91	53.52	0.82	78.18	0.7423	9.02	41.35	1.20	1.26
9A	1	10-11-30	10-13-30	Hard	314.4	18.16	15.33	66.51	0.84	80.28	0.9716	8.67	44.14	1.32	1.08
9B	1	10-11-30	12-20-30	Soft	311.5	26.61	11.41	61.98	0.96	76.43	0.8256	12.68	54.08	0.94	1.27
10A	1	11-1-30	11-4-30	Hard	439.2	17.64	09.58	72.78	0.75	83.83	0.9325	9.84	61.17	1.10	1.21
10B	1	11-1-30	1-2-31	Soft	375.7	19.28	08.43	72.29	1.09	81.43	0.7674	11.52	55.70	0.84	1.50
11A	1	11-22-30	11-26-30	Hard	375.2	15.62	11.06	73.32	1.22	78.71	0.9422	13.12	61.65	1.25	1.25
11B	1	11-22-30	1-9-31	Soft	347.1	19.50	07.73	72.87	1.24	74.04	0.8747	14.20	55.45	0.95	1.32
12A	1	12-15-30	12-18-30	Hard	360.0	15.50	12.46	72.04	1.08	74.51	0.9549	16.13	63.24	1.02	1.02
12B	1	12-15-30	1-14-31	Soft	365.9	15.52	07.76	76.72	0.92	75.84	0.8778	16.17	66.92	0.96	1.03
13A	1	1-3-31	1-6-31	Hard	391.3	16.69	09.08	74.23	1.07	75.14	0.9317	15.11	62.44	0.94	1.02
13B	1	1-3-31	2-6-31	Soft	363.5	23.49	08.22	68.29	1.03	69.62	0.8334	20.20	66.51	0.71	1.34
14A	1	1-24-31	1-29-31	Hard	407.8	21.09	11.75	67.16	1.02	73.68	0.9268	16.37	62.22	1.18	1.40
14B	1	1-24-31	2-28-31	Soft	339.8	18.59	07.94	73.47	1.04	72.33	0.9188	20.02	72.29	0.69	1.08
15A	1	2-16-31	2-18-31	Hard	331.0	18.19	13.81	68.00	1.27	74.39	0.9438	17.12	66.83	1.32	1.11
15B	1	2-16-31	4-4-31	Soft	317.5	19.53	08.32	72.15	1.21	73.66	0.9018	16.35	62.20	1.25	1.49

* Never Ripened.
# Too small to differentiate.

TABLE V

COLLINSON AVOCADO ANALYSES

Homestead, Florida -- 1930 - 31

Fruit No.	No. Fruit	Date Picked	Date Tested	Days To Soften	Condition of Fruit	Total Weight (Gms.)	% Seed	% Skin	% Pulp	Specific Gravity	% Moisture	% Fat & Oil Green Basis	% Fat & Oil Dry Basis
1A	12	5-31-30	6-2-30		Hard	135.5	13.68	33.06	53.26	1.0182	87.74	0.80	6.61
*1B	12	5-31-30											
2A	4	7-1-30	7-4-30		Hard	259.0	15.53	23.86	60.45	1.0080	87.73	2.06	16.13
*2B	4	7-1-30											
3A	1	8-2-30	8-6-30		Hard	260.8	17.97	17.20	64.82	1.0085	87.00	1.87	14.41
*3B	1	8-2-30											
5A	1	8-30-30	9-2-30		Hard	404.1	19.28	13.41	67.30	0.9963	87.27	3.95	31.03
5B	1	8-30-30	12-16-30	107	Soft	393.8	29.42	17.22	53.35	0.9746	81.99	7.72	42.94
6A	1	10-1-30	10-5-30		Hard	485.8	12.19	14.13	73.68	0.9303	81.84	9.47	52.11
6B	1	10-1-30	1-8-31	100	Soft	531.9	19.64	16.20	64.16	0.7481	77.26	10.35	45.54
7A	1	11-1-30	11-5-30		Hard	583.4	15.73	12.28	72.00	0.9581	82.77	09.48	55.00
7B	1	11-1-30	12-30-30	60	Soft	574.9	24.26	11.87	63.88	0.8014	76.48	14.59	63.31
8A	1	11-29-30	12-3-30		Hard	705.0	15.81	12.86	71.33	0.9216	76.55	15.01	64.12
8B	1	11-29-30	1-16-31	48	Soft	701.0	17.03	09.56	77.39	0.8276	73.89	18.03	66.22
9A	1	1-1-31	1-3-31		Hard	809.9	15.52	11.26	73.22	0.9331	74.08	14.92	56.49
9B	1	1-1-31	2-6-31	37	Soft	821.6	17.03	07.95	75.02	0.8549	72.90	16.71	61.64

* Never Ripened.

TABLE VI

WALDIN AVOCADO ANALYSES

Homestead, Florida -- 1930-31

Fruit No.	No. Fruit	Date Picked	Date Tested	Days to Soften	Condition of Fruit	Total Weight (gms.)	% Seed	% Skin	% Pulp	Specific Gravity	% Moisture	% Oil & Fat	
												Green Basis	Dry Basis
1A	10	4-29-30	5-2-30		Hard	37.73	12.29	18.87	68.84	1.0217	84.39	1.75	8.05
*1B	10	4-29-30											
2A	6	5-31-30	6-2-30		Hard	186.3	13.20	19.27	67.53	1.0253	83.49	1.37	8.30
*2B	6	5-31-30											
3A	4	7-1-30	7-4-30		Hard	297.4	21.04	16.36	62.60	1.0001	86.36	2.42	17.79
*3B	4	7-1-30											
4A	1	8-2-30	8-6-30		Hard	209.8	13.23	26.16	60.61	0.9964	86.14	2.43	17.54
*4B	1	8-2-30											
5A	1	8-30-30	9-3-30		Hard	376.2	27.21	11.45	61.34	0.9955	84.00	5.17	32.31
5B	1	8-30-30	11-30-30	90	Soft	398.9	22.40	10.84	66.76	0.9755	84.22	6.91	43.81
6A	1	10-1-30	10-5-30		Hard	412.4	30.08	12.15	57.74	0.9928	82.22	6.10	34.27
6B	1	10-1-30	12-22-30	82	Soft	426.7	23.12	11.19	75.69	0.8901	81.65	8.35	45.50
7A	1	11-1-30	11-3-30		Hard	530.1	24.83	09.66	65.51	0.9753	81.27	8.62	46.05
7B	1	11-1-30	1-3-31	64	Soft	542.1	31.96	08.52	59.52	0.9608	77.57	8.76	39.01
8A	1	11-29-30	12-6-30		Hard	554.0	16.61	12.08	71.31	0.9739	77.41	10.54	46.68
8B	1	11-29-30	12-16-30	16	Soft	585.0	27.97	09.78	62.25	0.9219	77.10	14.95	65.29

* Never Ripened.

TABLE VII

POLLOCK AVOCADO ANALYSES

Homestead, Florida -- 1930-31

Fruit No..	No. Fruit	Date Picked	Date Tested	Days to Soften	Condition of Fruit	Total Weight (Grms.)	% Seed	% Skin	% Pulp	Specific Gravity	% Moisture	% Oil & Fat	
												Green Basis	Dry Basis
1A	8	4-29-30	5-2-30		Hard	40.62	13.98	17.82	68.20	1.0545	85.15	1.22	7.94
*1B	8	4-29-30											
2A	12	5-31-30	6-2-30		Hard	300.35	17.13	25.98	56.89	1.0182	83.97	1.50	11.15
*2B	12	5-31-30											
3A	4	7-1-30	7-4-30		Hard	482.3	22.71	13.06	64.23	1.0021	87.89	1.12	9.23
*3B	4	7-1-30											
4A	1	8-2-30	8-4-30		Hard	353.2	17.47	13.25	69.28	1.0342	88.34	1.91	16.42
*4B	1	8-2-30											
5A	1	8-30-30	9-4-30		Hard	609.9	15.21	08.95	75.84	0.9506	88.33	3.43	29.45
5B	1	8-30-30	10-3-30	32	Soft	535.7	16.64	10.04	73.32	0.9744	85.59	4.97	34.54
6A	1	9-1-30	9-5-30		Hard	925.4	13.78	09.01	77.21	0.9455	84.40	5.21	33.39
6B	1	9-1-30	9-20-30	20	Soft	859.1	11.97	4.40	83.63	0.9568	87.52	3.05	24.42

* Never Ripened.

TABLE VIII

SIMMONS AVOCADO ANALYSES

Lake Placid, Florida -- 1930-31

Fruit No.	No. Fruit	Date Picked	Date Tested	Days to Soften	Condition of Fruit	Total Weight (Gms.)	% Seed	% Skin	% Pulp	% Ash	Specific Gravity	% Moisture	% Oil & Fat Green Basis	% Oil & Fat Dry Basis	% Total Sugar	% Protein
1A	500	3-26-30	3-28-30		Hard	#	#	#	#	#	1.000	83.99	0.61	03.81	2.51	0.94
*1B	500	3-26-30														
2A	7	5-24-30	5-27-30		Hard	182.1	19.34	25.98	54.68	--	1.0179	85.45	0.94	06.46	2.40	1.10
*2B	7	5-24-30														
3A	3	6-14-30	6-17-30	*	Hard	386.3	20.53	16.45	63.02	0.40	1.0121	85.16	3.52	24.44	2.56	1.18
*3B	3	6-14-30														
4A	2	7-5-30	7-11-30		Hard	631.6	19.59	12.83	67.58	0.25	1.0016	87.03	1.36	10.53	2.12	0.98
4B	2	7-5-30	9-20-30	75	Soft	479.6	20.90	12.90	66.20	0.50	0.8773	84.74	3.88	25.36	1.59	1.10
5A	1	7-26-30	7-28-30		Hard	586.8	22.90	10.00	67.10	0.15	1.0005	87.83	2.64	21.20	1.94	1.32
5B	1	7-26-30	8-28-30	30	Soft	530.4	17.70	09.00	73.30	0.21	0.9222	87.55	2.64	21.20	1.04	1.35
6A	1	8-16-30	8-19-30		Hard	670.3	16.30	10.70	73.00	0.29	0.9461	85.10	2.55	17.13	1.98	1.58
°6B	1	8-16-30														
7A	1	9-8-30	9-9-30		Hard	609.3	12.10	09.00	78.90	0.45	0.9244	64.31	14.86	41.60	1.04	1.40
°7B	1	9-8-30														
8A	1	9-27-30	9-29-30		Hard	457.4	15.30	10.10	74.60	0.70	0.9070	78.26	11.51	54.96	1.26	1.91
8B	1	9-27-30	11-2-30	35	Soft	466.0	--	--	--	0.60	0.8219	85.56	06.44	44.63	0.91	2.07
9A	1	10-18-30	10-21-30		Hard	497.8	06.0	09.4	84.60	0.88	0.8833	81.85	09.61	53.82	1.11	1.73
9B	1	10-18-30	12-2-30	42	Soft	509.4	--	--	--	1.48	0.9347	73.78	13.17	50.24	0.68	1.81

*Never Ripened.

#Too small for separation.

°Fruit Spoiled.

TABLE IX

LINDA AVOCADO ANALYSES

Homestead, Florida -- 1930-31

Fruit No.	No. Fruit	Date Picked	Date Tested	Days to Soften	Condition of Fruit	Total Weight (Gms.)	% Seed	% Skin	% Pulp	Specific Gravity	% Moisture	% Oil & Fat Green Basis	% Oil & Fat Dry Basis
1A	9	4-29-30	5-2-30		Hard	51.00	8.03	18.04	73.92	1.0303	87.90	0.46	2.41
*1B	9	4-29-30											
2A	12	5-31-30	6-2-30		Hard	249.85	9.55	22.91	67.54	1.0113	83.70	0.42	2.55
*2B	12	5-31-30											
3A	4	7-1-30	7-4-30		Hard	462.8	7.67	17.54	74.78	1.0006	89.10	0.66	6.05
*3B	4	7-1-30											
4A	1	8-2-30	8-4-30		Hard	303.0	5.56	17.05	77.40	1.0134	88.01	0.72	6.00
*4B	1	8-2-30											
5A	1	8-30-30	9-2-30		Hard	490.8	8.32	13.90	77.77	0.9883	87.25	2.86	22.46
5B	1	8-30-30	12-11-30	102	Soft	540.0	7.63	10.91	81.46		87.32	3.21	25.33
6A	1	10-1-30	10-4-30		Hard	715.7	8.35	11.73	79.92	0.9714	86.55	4.96	36.85
6B	1	10-1-30	1-9-31	100	Soft	470.0	13.01	15.73	71.26	0.8781	85.94	3.59	25.33
7A	1	11-1-30	11-5-30		Hard	535.7	10.22	16.64	73.32	0.9744	85.59	4.97	34.54
7B	1	11-1-30	12-23-30	53	Soft	467.75	10.96	13.44	75.60	0.9465	86.31	6.63	48.17
8A	1	11-29-30	12-4-30		Hard	734.0	08.54	14.50	76.96	0.9919	77.92	11.26	50.79
8B	1	11-29-30	1-26-31	57	Soft	723.0	12.12	11.26	76.62	0.9618	80.62	9.08	46.91
9A	1	1-1-31	1-3-31		Hard	844.4	11.67	15.22	73.11	0.9661	83.91	8.14	50.60
9B	1	1-1-31	1-31-31	30	Soft	879.6	13.38	13.08	73.54	0.9339	77.04	13.68	59.71

* Never Ripened.