California Avocado Society 1921-22 Yearbook 8: 40-51

A COMPARISON OF THE COMPOSITION OF STANDARD VARIETIES OF AVOCADOS GROWN IN THE SAME ORCHARD

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The writer wishes to express appreciation for suggestions concerning the work and criticism of the manuscript by Mr. E. M. Chace.

In a joint paper read before your Association at the last annual meeting by Mr. Chace, a series of data were presented showing the variation in composition at different stages of maturity of the eight varieties of avocados standard at that time.

After a thorough consideration of these data and discussion of plans for the present season's work, it seemed most desirable to make a study of the composition of all the present standard varieties grown under conditions as near alike as possible. This plan was finally adopted and a co-operative arrangement entered into with the officers of your Association. Considerable difficulty was experienced in obtaining an orchard with all the necessary varieties in good healthy condition along with the advantage of accessibility and freedom from liability to theft. After numerous trips to different groves, we were finally able to locate the trees on the ranch of J. M. Elliott at North Whittier Heights.

The four varieties covered in this work are the Fuerte, the Sharpless, the Spinks and the Dickinson. Unfortunately it was not possible to secure a representative of the Puebla variety and the data will be incomplete to that extent.

In the selection of trees for the work, the same plan used in the previous experiments was followed. One representative healthy tree of each variety was set aside exclusively for the experiment, the tree bearing in all cases a normal crop. Samples of four to six fruits were picked every month in person and carried immediately to the laboratory where they were divided into subsamples of equal number, size and appearance. One was analyzed immediately and the other stored until it reached the degree of softness required for eating purposes. The stored or soft sample was also analyzed and a comparison of the two analyses gives an idea of the changes which take place during storage.

In storing samples in this work, a little departure from the method previously used was made, and consisted of placing the wrapped fruit in an incubator maintained at a constant temperature of 77-79 degrees F. A pan of water was kept in the incubator all the time to maintain humid air and prevent undue shrinkage of the fruit. The object of these changes, of course, was to make the storage conditions for all the samples uniform, and thus admit of more comparable results. Heretofore the fruit has been held

at ordinary room temperatures, varying according to the season from 59-77 degrees F., till it softened.

The physical analysis consisted of the following estimations: Specific gravity before and after storage, weight of whole fruit, and per cent of pulp, skin and seed. The methods used were described in a previous paper and need not be repeated here. The pulp was prepared for chemical analysis by passing it three times through a fine cutting food grinder. The constituents determined were moisture, protein, fat and total sugars, and the methods followed were those of the Association of Official Agricultural Chemists. Inasmuch as the previous work indicated small ash and crude fiber differences, it was decided to eliminate the former altogether and only determine the latter at long intervals.

In considering the data on these four varieties, it will be necessary to bear well in mind the extremely cold weather which has characterized the past winter. In spite of the altitude at Mr. Elliott's ranch, the foliage of some of the trees was touched by the low temperatures and it is within the range of possibility that the composition of the fruit was also affected. As a matter of fact, after the coldest spell, the Spinks trees, which were on a lower level than the other varieties, dropped both their leaves and fruit. The only exception was the tree bearing our tags and, while this stood up well, it could not be positively stated that changes in the composition of the fruit had not been brought about by the exceptionally cold weather. In this respect, the season's work has been disappointing.

In addition to the data presented on the standard varieties in Tables 1, 2 and 3, there is included the accumulation of results obtained from a series of fruits from Guatemalan importations by the United States Department of Agriculture in Table 4, and likewise the miscellaneous samples (Table 5) not reported previously to your Association. All of these samples are reported in United States Department of Agriculture Bulletin No. 1073 shortly to be issued.

An examination of the analytical results on the Fuerte will, it is believed, lead to the conclusion that the fruit was sufficiently mature for marketing, even at the first sampling in December.

Very little change is seen in the specific gravity from month to month though a slight tendency downward is noted. In five out of six samples, the specific gravity is greater after storage than before, the only one to decrease being the January sample.

As a usual thing the average weight will increase as the fruit matures. In this case, however, no increase was noted until the May picking. For the rest of the period there was a slight decrease in weight, indicating that the fruit stood still so far as physical growth was concerned.

This fruit apparently reached its maximum development in May when the percentages of pulp and skin decrease slightly, and the per cent of seed increases. The chemical data indicates that the changes in this direction are practically at a standstill, as shown by a comparison of the May results with those of April.

The differences between the unstored and stored samples are somewhat variable with regard to moisture, being minus in December, March, April and May, and plus in January and February. In every case the fat is higher in the stored than the unstored

samples, though in January and February the differences are slight and this may have been due to the low temperatures. The protein manifests a tendency to increase slightly, especially in the first three months. It is to be noted that the sugar differences grow smaller with the advance of maturity and in the last three samplings the amounts are so small as to be practically negligible; in fact, in May the results are just reversed. This very seldom happens and may be due to a sampling error.

A glance at the results on the Sharpless reveals the fact that the fruit was very immature at the first picking and had not reached its optimum at the time of the May picking. The average weight in ounces increased from approximately 11 to 17, a gain of six ounces and indicating a steady growth.

The specific gravity tends to become higher with each picking, except the May, but the changes are slight and scarcely form any criterion for maturity. In every case the gravity is lower after storage than before. Both these changes are the reverse of what occurs in the Fuerte.

The figures on pulp vary upward and downward, and do not disclose any steady change, though there is a decrease of 3.5 per cent between the March and April pickings. The percentage of skin first increases from December to February, and then decreases, and the variations in per cent of seed are small except in the April sample where the high percentage may be due to individual deviation. It is possible that increases in pulp and corresponding decreases in skin and seed are not noticeable except at later stages of growth.

The chemical data, confirming the findings on the other varieties, reveal increases in fat and a decrease in moisture and sugars. The protein remains practically unchanged. Storage changes, with the exception of moisture, are in the same general direction as those in the Fuerte, but of greater degree. The percentages of moisture are uniformly higher on the stored samples, but this is not the case with the Fuerte, where the variations are first in one direction and then in the other.

The Spinks fruit, like the Sharpless, increased steadily in weight from 11.6 ounces to 15.4 ounces, a net gain in the four months of over 3.5 ounces.

The specific gravity rises and falls alternately from month to month, though the deviation is not great, and no definite relation appears to exist between this factor and maturity. In every case but two the specific gravity is lower after storage than before, and in this respect is similar to the Sharpless.

Only slight increases in the percentages of pulp and simultaneous decreases in skin and seed are recorded, so that evidence of continued development in this respect is not as positive as with the Fuerte.

The chemical data indicate that very apparent changes connected with the maturity of the fruit are taking place in the usual directions. The moisture and sugars steadily decrease, while the fat just as steadily increases and the protein remains practically unchanged.

It will be readily seen also that changes in the chemical composition occur on storage of the fruit. In every sample, the moisture increased though not as much in the later ones as in the earlier. In connection with this must be considered the fact that the fruit

actually lost weight on storage. The changes in fat are in the same direction as the moisture, and the general tendency of the protein is to increase, but the differences are not nearly as pronounced; in fact, in three cases there are slight decreases. When the total sugars are considered, striking differences between unstored and stored samples are noted, in all cases being a decrease of 50 per cent or over. From the data presented it would appear that the Spinks samples were practically mature in April, although the fat in the May sample is about 1 per cent higher.

Like the Sharpless, the Dickinson was very immature when the work began, and the average weight continuously increases as the season advances, gaining about 4.0 ounces, practically the same as the Sharpless and the Spinks. The specific gravity seems to be a variable factor and, as in the case of the Spinks, shows no relation to maturity. On storage this factor decreases in all except one sample, and in this respect resembles the Sharpless and the Spinks. There is no question about the decrease of pulp and corresponding increases of skin and seed, and the figures on this variety are more positive than in the case of the Sharpless.

When it comes to results on chemical data, the Dickinson follows in a general way those of the other varieties, both as to maturity and storage. The trend of the moisture and sugars is downward, though not to such an extent as in the other three varieties. The percentages of fat reach higher levels with each successive picking and the protein just about stands still.

On storage the moisture and fat increase quite perceptibly. The protein differences are positive in every case, but are so slight, in any event, that it can be said practically no change takes place. The percentages of sugar drop very decidedly on storage, and this, it is believed, is an indication of immaturity. From these results we would conclude that the Dickinson samples were not mature in May.

Table 2 is a compilation of the data obtained by storing the fruit in the incubator described in the earlier part of the paper. Under "remarks" is given our opinion, based on taste, as to marketability or maturity.

The first picking of the Fuerte in December required 7 days to soften, and the last one in May, 5 days. The corresponding remarks to these dates indicate that the fruit was marketable or mature from the beginning. With the Sharpless and Spinks, these figures are not so positive, as the time alternately increases and decreases, though not to such an extent in the latter as in the former. The Dickinson picked in December required 17 days to soften, while the time necessary in April amounted to 10 days, but increased again in May to 16 days. The remarks confirm the other data as to the immaturity of these samples. The decrease was steady and showed no variation like the Sharpless and the Spinks.

Further work along this line is needed before positive statements can be made, but the data at hand indicate the possibility of developing a practical means of determining maturity.

At this point it was thought that it would prove interesting to compare the fat content of this season's samples with that obtained on the same varieties in 1919-1920, and these data are brought together in Table 3. Figures for every month on all the varieties are not

available, but in every comparable case the results of the 1919-1920 season are considerably higher than those of this season. For instance, the December Fuerte is 10 per cent higher in fat in 1919 than for the same month this season, but in May this difference has dwindled to less than 4 per cent. Similar differences are noted in the Sharpless and the Spinks, but are not so evident in the Dickinson. Whether or not they are due to stock, environment or season, it is impossible to say, and perhaps as the season advances, such differences will be eliminated.

To summarize the results of the work on the four standard varieties:

The data confirm in almost every particular that which was obtained in 1919-1920

With the advance of maturity, the following changes in the fruit are noted:

Increase in total weight.

Percentage increases in the pulp and corresponding decreases of skin and seed in the Fuerte. The reverse is true, in a modified way, of the Sharpless and the Dickinson. The Spinks remains practically the same. Further samples of the Sharpless, the Spinks and the Dickinson may give different results in this respect.

The specific gravity is apparently not correlated with maturity.

Increase in the percentage of fat and decreases in the percentage of moisture and sugars. It is believed that the decreasing sugars are almost as good an indication of maturity as increasing fat. Certainly both appear to be intimately connected with the maturing of the fruit.

Practically no change in the protein.

Under conditions of storage previously outlined, there is a loss in weight of ½ to 2 ounces and in every variety except the Fuerte a lowering of the specific gravity.

The storage samples, generally speaking, increase in moisture and fat, and decrease in sugars; the tendency, if any, is for the protein to increase. These differences, particularly in the moisture, fat and sugars, become smaller as the fruit matures.

The time required to soften the fruit under uniform conditions appears to decrease with maturity.

The fat content of this season's fruits compared with that for the same month in 1919-1920, is lower in every case.

In view of the interest manifested in the Guatemalan varieties imported by the U. S. Department of Agriculture, it was thought that a tabulation of the analytical data concerning them would prove to be interesting and valuable. This information will be found in Table 4.

Most of the varieties were picked in May or June, 1921, and some were quite obviously immature, as pickings only a month later gave evidence of being more mature.

The weight of the softened fruit varied from approximately 10 ½ to 28 ounces, the Cabnal being the smallest and the Panchoy the largest. The Pankay, Mayapan, Cantel, Lamat, Chilean Seedling and Benik fall in the class of 5/8 to 1 Ib. fruits, while the Tertoh and Nimlioh are 1 to 1 ½ Ibs. fruits, and the Panchoy registers 1 ¾ pounds. The Tertoh,

Chilean Seedling, Panchoy and Cantel all yielded, either in the May or June samples, 75 per cent or over of pulp or edible matter, and the lowest were a Pankay and a Cabnal. Corresponding figures on skin or seed, or both, were lower or higher, depending of course upon the amount of pulp. The skin of the Nimlioh and Panchoy consistently amounted to less than 15 per cent; the Tertoh varied from 10.3 to 17.1, the Benik from 13.2 to 15.8 and the Cantel from 14.8 to 15.9. The skin of the Pankay, Mayapan and Cabnal amounted to approximately 20 per cent or more, and the Lamat about 17 per cent. The August Chilean Seedling and the May Tertoh both show less than 10 per cent of seed, and the Panchoy, May Mayapan and both Cantels have only 10 per cent or very close to that figure, while the others range as high as 16.1 per cent. The lowest percentage of fat is found in the Tertoh and there seems to be no doubt that this variety was still very immature. The Pankay, Benik and Cabnal contain more than 20 per cent of fat though it is "worthy of note that the Cabnal No. 2 is about 4% less than this, or about 16%. The other varieties fall in the class containing 15 to 20% of fat.

Only one variety, the Panchoy, contains over 2% of protein, but the Chilean Seedling is very close to it with 1.99%, and the remaining varieties vary from 1.05% in the Nimlioh to 1.75% in the Cantel.

With the exception of the Tertoh, which was quite immature, practically all the June samples may be considered commercially marketable or mature, though this could only be definitely determined by continued sampling at later dates. The Chilean Seedling was evidently much more mature in August than in May, showing 18.57% or an increase of more than 5% in fat.

Table 5 is a compilation of data on miscellaneous varieties not previously reported to your association. In this table the largest fruit is Mr. Hoff’s America Seedling, which weighs nearly 1½ Ibs, and Mr. Spinks' Alexandria is a close second to it. The Knight, Seedling No. 1 and Seedling No. 2 of Mr. Spinks are all over a pound, as are Mr. Gage's Seedling, Mr. Hamburg's Quaker Seedling and Mr. Dickey's Prince. Mr. Schrader's Delicious Seedling, Mr. Hoff's Harvey Spencer Seedling, Mr. Whedon's Perfectos and Mr. Elliott's Hansen Seedling range from 9 to 13 ounces in weight.

When pulp or edible matter is considered, there are five varieties containing over 75%: The Prince, the Quaker Seedling, the America Seedling, the Alexandria Seedling and Seedling No. 3. Those falling between 70 and 75% are the Seedling No. 1, Seedling No. 2 and Hansen Seedling. The Knight, the Harvey Spencer Seedling and the Perfecto are a trifle under 70%, while the Delicious Seedling and the Gage Seedling approximate 65%. Those with high percentages of edible matter are, of course, correspondingly low in skin or seed or both, and vice versa.

Only two varieties, the Seedling No. 3 and the Gage Seedling, containing 22.7% and 25.23% respectively, passed the 20% mark in fat content, although the Delicious Seedling and the Quaker Seedling were close to it, both showing over 19%. Those with 15 to 16.60% of fat include the Knight, the Alexandria Seedling, the Harvey Spencer Seedling and the Prince, while the. Seedling No. 2 and the Hansen Seedling only fall 1 point blow 15%. The America Seedling, Seedling No. 1 and the Perfecto range from 11.34 to 12.76%.

The percentage of protein on all the miscellaneous varieties seems to be comparatively

high. The five varieties containing over 2% are the Knight, Delicious Seedling, America Seedling, Gage Seedling and the Prince, the two last named having only a little less than 3%. The other varieties fall between 1.34 and 1.96%, and if the Perfecto samples were averaged, barely one variety would be listed below 1.50%.

Practically all the results are from one sample of each variety and must not be considered conclusive, as other samples may present variations from these.

Let me again repeat that it is a matter of keen regret that the cold weather of this past season has been of such an extreme character as to have possibly affected the fruit and in this way thrown some shadow of doubt upon the results obtained.

In conclusion we wish to express our appreciation of the splendid cooperation rendered by your association, and to thank all the individual growers who have contributed fruit or information.

TABLE I. ANALYTICAL DATA ON STANDARD VARIETIES OF AVOCADOS

Month Picked	Analyzed	Aver. Wt. oz.	Sp. Gr.	Pulp %	Skin %	Seed %	Moisture %	Fat %	Protein %	Total Sugars %
				SPINKS						
Dec.	Immed.	.....	9856	.....	.....	.....	83.98	5.87	1.12	3.47
Dec.	After storage	11.6	.9802	64.9	10.6	24.2	85.82	6.04	1.48	1.75
Jan.	Immed.	.....	1.0069	.....	.....	.....	83.59	6.41	1.28	3.56
Jan.	After storage	12.8	.9864	66.9	11.2	21.5	85.68	8.03	1.16	1.46
Feb.	Immed.	.....	.9849	.....	.....	.....	81.13	7.94	1.20	3.50
Feb.	After storage	15.8	.9839	65.2	9.3	24.8	83.50	9.26	1.40	1.15
March	Immed.	.....	.9817	.....	.....	.....	80.16	9.14	1.22	2.92
March	After storage	14.2	.9885	65.4	9.6	24.9	81.93	10.20	1.53	1.18
April	Immed.	.....	.9814	.....	.....	.....	78.52	12.12	1.53	1.72
April	After storage	15.2	.9774	66.6	10.7	22.6	78.64	14.31	1.46	0.61
May	Immed.	.....	.9724	.....	.....	.....	76.11	14.30	1.95	1.17
May	After storage	15.4	.9842	66.6	9.7	23.5	76.91	15.21	1.72	0.59
				DICKINSON						
Dec.	Immed.	.....	1.0091	.....	.....	.....	85.49	3.66	1.12	4.29
Dec.	After storage	7.3	.9465	74.9	16.4	8.7	87.00	5.60	1.48	0.32
Jan.	Immed.	.....	.9886	.....	.....	.....	85.64	3.34	1.05	4.26
Jan.	After storage	8.6	1.0015	73.8	16.4	9.1	88.23	5.22	1.14	1.26
Feb.	Immed.	.....	1.0163	.....	.....	.....	83.42	4.46	1.06	4.28
Feb.	After storage	8.8	.9934	72.8	16.6	10.5	86.31	7.16	1.14	0.42
March	Immed.	.....	1.0133	.....	.....	.....	83.36	4.95	0.88	3.84
March	After storage	9.7	1.0013	73.2	15.0	11.6	86.20	7.11	1.23	0.37
April	Immed.	.....	1.0081	.....	.....	.....	81.40	7.51	1.00	3.22
April	After storage	10.9	1.0066	69.9	17.2	12.5	84.39	8.73	1.10	0.36
May	Immed.	.....	1.0036	.....	.....	.....	81.99	6.87	1.05	3.13
May	After storage	11.1	.9986	70.4	16.1	13.1	83.16	9.87	1.25	0.40

ANALYTICAL DATA ON STANDARD VARIETIES OF AVOCADOS (Continued)

Month Picked	Analyzed	Aver. Wt. oz.	Sp. Gr.	Pulp %	Skin %	Seed %	Moisture %	Fat %	Protein %	Total Sugars %
				FUERTE						
Dec.	Immed.	.....	.9948	.....	.....	.....	76.23	13.73	1.74	1.75
Dec.	After storage	11.6	1.0088	73.4	7.9	18.4	74.26	16.95	2.38	0.34
Jan.	Immed.	.....	1.0199	.....	.....	.....	73.10	17.18	2.16	1.15
Jan.	After storage	9.5	.9988	77.6	6.4	15.8	74.89	17.69	2.30	0.35
Feb.	Immed.	.....	.9758	.....	.....	.....	68.86	20.67	1.23	0.86
Feb.	After storage	10.9	.9893	81.3	5.7	12.8	70.42	20.86	2.08	0.39
March	Immed.	.....	.9817	.....	.....	.....	68.95	20.58	1.99	0.68
March	After storage	10.3	.9898	80.1	6.4	13.5	68.35	22.82	1.97	0.54
April	Immed.	.....	.9683	.....	.....	.....	68.47	22.15	2.21	0.65
April	After storage	10.7	.9774	81.0	6.3	12.2	67.61	24.56	2.24	0.39
May	Immed.	.....	.9766	.....	.....	.....	67.88	23.61	2.29	0.18
May	After storage	13.5	.9814	78.7	5.5	15.4	67.04	24.42	2.12	0.49
				SHARPLESS						
Dec.	Immed.	.....	.9946	.....	.....	.....	85.50	4.66	1.53	3.27
Dec.	After storage	10.9	.9043	80.9	7.6	11.5	86.25	7.02	1.51	0.87
Jan.	Immed.	.....	1.0055	.....	.....	.....	84.64	6.00	1.12	3.22
Jan.	After storage	13.2	.9627	81.6	8.3	10.2	86.60	7.79	1.35	0.63
Feb.	Immed.	.....	1.0000	.....	.....	.....	83.19	7.09	1.36	3.10
Feb.	After storage	12.9	.9658	80.4	9.3	10.4	85.09	8.96	1.27	0.65
March	Immed.	.....	.9883	.....	.....	.....	81.51	8.83	1.14	2.87
March	After storage	15.2	.9631	81.3	8.2	10.5	83.66	10.01	1.42	0.65
April	Immed.	.....	.9965	.....	.....	.....	81.28	9.92	1.54	1.82
April	After storage	16.1	.9849	77.3	7.8	14.7	83.89	11.16	1.42	0.35
May	Immed.	.....	.9912	.....	.....	.....	80.24	11.04	1.65	1.79
May	After storage	16.8	.9734	79.5	7.7	12.7	81.75	11.95	1.84	0.27

TABLE II.
RELATION BETWEEN MATURITY AND TIME REQUIRED TO SOFTEN FRUIT AFTER PICKING

Month Picked	Variety	Time required to soften-days	Remarks
December	Fuerte	7	Very fair—commercially mature.
December	Sharpless	10	Immature. Unmarketable.
December	Spinks	10	Immature. Unmarketable.
December	Dickinson	17	Immature. Unmarketable.
January	Fuerte	7	Fine marketable condition.
January	Sharpless	13	Not yet marketable.
January	Spinks	11	Immature. Unmarketable.
January	Dickinson	17	Immature. Unmarketable.
February	Fuerte	7	Mature.
February	Sharpless	10	Fair. Trifle immature.
February	Spinks	8	Fair. Trifle immature.
February	Dickinson	17	Immature. Unmarketable.
March	Fuerte	6	Mature.
March	Sharpless	7	Fair. Somewhat immature.
March	Spinks	6	Fair. Somewhat immature.
March	Dickinson	14	Immature. Unmarketable.
April	Fuerte	6	Mature.
April	Sharpless	10	Trifle immature but marketable.
April	Spinks	7-10	Trifle immature but marketable.
April	Dickinson	10	Immature. Unmarketable.
May	Fuerte	5	Well matured.
May	Sharpless	6-9	Commercially mature.
May	Spinks	6	Commercially mature.
May	Dickinson	16	Immature. Unmarketable.

TABLE 3.

COMPARISON OF MATURITY OF THIS SEASON'S SAMPLES WITH FORMER SAMPLES

Content of Fat

Variety	December		January		February		March		April		May	
	1919	1921	1920	1922	1920	1922	1920	1922	1920	1922	1920	1922
Fuerte	26.99	16.95	26.62	17.69	.....	20.86	29.74	22.82	29.93	24.56	28.06	24.42
Sharpless	.....	7.02	.....	7.79	.....	8.96	.....	10.01	15.68	11.16	18.41	11.95
Spinks	12.22	6.04	.....	8.03	.....	9.26	17.23	10.20	18.53	14.31	18.37	15.21
Dickinson	.....	5.60	6.84	5.22	7.20	7.16	7.80	7.11	9.68	8.73	10.96	9.87

TABLE 4.

ANALYTICAL DATA ON GUATEMALAN AVOCADOS (Importations by U. S. Department of Agriculture

No.	Variety	S. P. I. No.	Month Picked	Analyzed	Aver. Wt. oz.	Sp. Gr.	Pulp %	Skin %	Seed %	Moisture %	Fat %	Protein %	Total Sugars %
145	Tertoh	44856	May	Immed. soft	20.0	.9328	79.9	10.3	9.5	88.34	4.38	1.60	0.47
170	Tertoh		June	After storage	14.8	.9314	71.0	17.1	11.9	83.46	8.34	1.25	.....
147	Pankay	44785	May	Immed. hard	10.9	1.0058	59.1	26.6	14.0	73.23	14.24	1.11	1.55
146	Pankay		May	Immed. soft	10.7	.9202	62.2	22.0	15.9	69.53	20.38	1.24	0.81
175	Pankay		June	Immed.	8.8	.9955	52.5	26.9	20.2	71.34	16.35	1.44	.....
176	Pankay		June	After storage	11.5	.9944	64.5	22.1	13.1	71.06	18.59	1.64	.....
148	Benik	44626	May	After storage	13.5	.9948	70.6	15.8	13.5	70.64	21.10	1.52	0.80
177	Benik		June	Immed.	14.7	.9854	68.5	17.0	14.3	68.49	22.47	1.54	.....
178	Benik		June	After storage	16.6	1.0057	72.8	13.2	14.0	68.34	23.16	1.60	.....
150	Mayapan	44680	May	Immed.	12.1	.9980	65.1	20.3	14.5	75.30	14.46	1.40	1.44

TABLE 4 (Cont'd)

No.	Variety	S. P. I. No.	Month Picked	Analyzed	Aver. Wt. oz.	Sp. Gr.	Pulp %	Skin %	Seed %	Moisture %	Fat %	Protein %	Sugars %
149	Mayapan		May	After storage	9.7	.9770	69.2	19.9	10.5	75.60	16.66	1.09	0.40
173	Mayapan		June	Immed.	11.3	.9948	67.8	19.9	12.0	73.58	17.45	1.22	.....
174	Mayapan		June	After storage	13.6	1.0000	69.0	18.3	12.5	72.78	18.11	1.62	.....
151	Cantel	44783	May	Immed.	11.8	.9773	69.8	19.2	10.6	78.14	12.12	1.08	2.74
152	Cantel		May	After storage	11.8	.9175	75.1	14.8	10.1	77.19	14.34	1.75	0.27
168	Cantel		June	Immed.	10.5	.9704	65.3	19.4	10.4	73.28	17.82	1.31	.....
169	Cantel		June	After storage	11.9	.9518	72.6	15.9	11.3	74.18	17.34	1.22	.....
153	Nimlioh	44440	May	Immed.	24.4	.9744	67.6	14.3	17.9	79.47	11.15	0.94	3.10
154	Nimlioh		May	After storage	16.5	.9702	70.3	13.5	16.1	82.68	11.13	1.71	0.70
164	Nimlioh		June	Immed.	23.9	.9756	72.4	15.1	11.8	76.06	15.84	0.83	.....
165	Nimlioh		June	After storage	20.9	.9723	71.8	12.9	15.2	78.80	13.88	1.05	.....
156	Lamat	43476	May	Immed.	12.3	.9823	68.2	21.1	10.2	78.27	13.25	0.93	1.49
155	Lamat		May	After storage	11.9	.9107	67.4	17.8	14.9	79.61	12.84	1.12	0.27
166	Lamat		June	Immed.	10.6	.9919	71.2	19.9	8.7	73.43	18.38	1.44	.....
167	Lamat		June	After storage	13.0	.9538	71.4	17.3	11.3	78.24	14.02	1.27	.....
158	Cabnal	44782	May	Immed.	14.7	.9790	68.7	18.9	12.4	70.49	21.98	1.42	0.56
157	Cabnal		May	Immed. soft	16.8	.9806	65.9	19.8	13.5	70.19	20.89	1.70	0.53
179	Cabnal Tree No. 1		June	Immed.	10.0	1.0125	59.0	26.6	14.2	70.69	21.48	1.38	.....
180	Cabnal Tree No. 1		June	After storage	11.9	.9983	63.7	20.8	15.2	71.32	21.06	1.27	.....
171	Cabnal Tree No. 2		June	Immed.	9.5	1.0143	55.8	27.6	16.7	75.98	15.92	1.29	.....
172	Cabnal Tree No. 2		June	After storage	10.4	1.0103	60.8	24.5	14.3	75.23	16.26	1.29	.....
159	Chilean Seedling	43475	May	After storage	10.8	.9197	68.4	18.0	13.7	79.20	13.21	1.66	.....
201	Chilean Seedling		Aug.	After storage	13.9	1.0089	77.3	15.1	7.6	73.30	18.57	1.99	.....
208	Panchoy	44625	Dec.	Immed. soft	27.8	1.0032	75.2	14.6	10.0	71.77	18.21	2.34	.....

The majority of these samples were obtained through the courtesy of W. A. Spinks, Duarte. The others were from H. J. Kramer, La Crescenta, A. R. Rideout, Whittier, and T. F. Sheddon, Monrovia.

TABLE 5.

ANALYTICAL DATA ON MISCELLANEOUS AVOCADOS

No.	Variety	Month Picked	Analyzed	Aver. Wt. oz.	Sp. Gr.	Pulp %	Skin. %	Seed %	Moisture %	Fat %	Protein %	Total Sugars %
181	Knight	June	Immed.	16.9	.9642	70.6	12.1	17.2	77.18	14.88	2.54	.....
182	Knight	June	After storage	16.9	.9742	68.4	13.4	17.9	77.20	15.06	2.28	.....
183	Seedling No. 1	June	Immed.	21.5	.9954	61.4	22.0	16.2	73.74	17.46	1.71	.....
184	Seedling No. 1	June	After storage	17.5	.9814	70.3	13.2	16.2	79.70	12.76	1.71	.....
185A	Seedling No. 2	June	Immed.	19.2	.9771	71.1	13.2	15.8	80.66	13.14	1.20	.....
186A	Seedling No. 2	June	After storage	18.5	.9679	74.7	10.4	14.6	80.04	14.10	1.54	.....
187B	Seedling No. 3	June	Immed.	18.5	.9762	73.3	9.2	17.3	68.25	23.31	2.38	.....
188B	Seedling No. 3	June	After storage	13.6	.9942	76.0	9.1	14.9	68.98	22.70	1.88	.....
189	Alexandria Seedling	June	Immed.	27.7	.9739	80.5	8.7	10.7	78.06	16.68	1.88	.....
190	Alexandria Seedling	June	After storage	22.2	.9906	81.2	7.8	11.0	79.13	15.14	1.49	.....
160	Delicious Seedling	June	After storage	9.1	.9728	64.8	13.3	20.6	71.69	19.79	2.26	0.85
161	America Seedling	June	Immed. soft	22.8	.9272	86.6	6.3	6.7	81.34	11.34	2.20	0.87
163	Gage Seedling	June	After storage	16.2	.9882	66.3	11.1	22.5	62.94	25.23	2.98	.....
200	Harvey Spencer Seedling	Aug.	After storage	12.0	1.0089	69.2	8.8	21.7	74.01	16.59	1.96	.....
202	Quaker Seedling	Sept.	After storage	16.5	.....	81.1	8.3	10.4	72.92	19.53	1.90	.....
203	Prince	Oct.	After storage	20.0	.9654	77.6	13.6	8.7	74.61	15.07	2.69	.....
213	Perfecto	Jan.	After storage	11.5	1.0036	68.2	7.5	23.7	81.59	11.66	1.82	0.62
218	Perfecto	Feb.	After storage	10.8	1.0100	67.4	8.8	23.7	81.21	11.59	1.59	1.01
223	Perfecto	March	After storage	13.3	1.0144	68.2	6.9	24.7	81.21	12.71	1.34	0.61
228	Hansen Seedling	April	After storage	11.5	.9805	72.1	17.2	10.4	78.47	14.20	1.84	0.28

The Knight, Seedlings Nos. 1, 2 and 3 and Alexandria Seedling were furnished by W. A. Spinks, Duarte; the Delicious Seedling by George Schrader, Pasadena; the America and Harvey Spencer Seedlings by J. E. Hoff, Hollywood; the Gage Seedling by Earl D. Gage, Fullerton; the Quaker Seedling by Chas. H. Hamburg, Whittier; the Prince by A. R. Rideout, Whittier; the Perfectos by J. T. Whedon, Yorba Linda, and the Hansen Seedling by J. M. Elliott, North Whittier.