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Characterization of Eleven Late-Maturing Selections of Avocado *(Persea americana* Mill.)

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[The author's original English-language manuscript has been edited by Dr. Mary Lu Arpaia, University of California at Riverside, to allow its presentation here in American-idiomatic English for easier comprehension by Yearbook readers. Care was taken to preserve the substance of the original paper, and all tables and figures are presented as originally submitted.]

Introduction

Mexico is the leading producer of avocado in the world. The 'Hass' and 'Fuerte' are the main cultivars grown in commercial orchards. Although fruit production is very high from the two cultivars, it does not provide an adequate year around supply of fruit.

The Scientific and Technological Research Center of Avocado in the State of Mexico has established plots with seedlings of 'Hass', 'Fuerte', 'Boyce', 'Colin V-101', and especially of 'Colin V-33'. From 'Colin V-33' seedlings, a number of promising selections have been obtained which exhibit good quality and that are considered as late-maturing because they can be harvested in July and the beginning of August.

This work evaluates different late-maturing selections that are considered to have good characteristics for marketing when the supply of quality 'Hass' and 'Fuerte' is insufficient.

Material and Methods

Fruit from Coatepec Harinas, State of Mexico, were harvested at the beginning of July, 1987. Twenty fruit were obtained from the following selections: '53 PLC' ('Coatepec' seedling), '325 PJ' (Mexican race "criollo" named 'Toliman 5'), '172 PLC', '287 PLC', '39 Me', '50 PMe', and '175 PLS' (all 'Colin V-33' seedlings), and were compared to late season 'Hass' and early season 'Fuerte'.

The following quality parameters were measured: weight loss, pulp and skin color, fruit shape, pulp + skin:seed ratio, pulp darkening, dry matter content, and taste.

The average weight loss during ripening was measured for each selection and is presented as the percent weight loss.

Pulp and skin color were measured using a Hunter colorimeter. Values are reported as L*A*B as recommended by the International Comission of Eclairage (ICE).

Variability in fruit shape was determined by collecting longitudinal impressions of cut

fruit and classified as described by Barbosa (1933).

Pulp darkening was rated using longitudinally-cut fruit after 2 or 4 hours, using the scale in Table 1.

Table 1. Scale to measure enzymatic darkening, its alteration and acceptability of avocado fruit pulp.

Number	Alteration description	Acceptability
1	Without alteration	Very good
2	Vascular tissue with incipient darkening	Good
3	Vascular tissue with intense darkening	Still acceptable
4	Pulp with incipient darkening	Not acceptable
5	Pulp with intense darkening	Bad
6	Black pulp	Very bad

The Pulp + skin:seed ratio was calculated by comparing seed weight to the total fruit weight.

The dry matter content was determined by placing pulp samples at 65 °C for 48 hours in an oven and comparing the weight of the dried sample to the pulp fresh weight.

Two taste panels were conducted using a randomized block design. The fruit were evaluated for internal and external fruit color, taste, fruit size, seed size, fiber, form, and acceptability. Fruit were rated using a 1-4 scale where l=bad, 2=average, 3=good, and 4=very good.

Results

The fruit with the greatest weight at harvest was the '39 PMe', which weighed 542.10 g, followed by '175 PLS' (527.14 g). The smallest fruits were obtained from '235 PJ' and 'Hass' (Table 2).

Table 2. **Weight in grams of avocado fruits** [Persea americana Mill.]

Selection or cultivar	Weight (g)	Selection or cultivar	Weight (g)
39 PMe	542.10	172 PLC	339.46
175 PLS	527.14	Fuerte	233.88
137 PLS	477.74	287 PLC	322.56
50 PMe	456.88	53 PLC	320.16
131 PLS	440.42	54 PLS	296.84
30 PS	373.97	Hass	142.98
		Toliman 5	54.76

Fruit of the '172 PLC' and '137 PLS' showed the greatest amount of weight loss during ripening, losing 20.65% and 14.27% of their initial weight, respectively (Fig. 1). The three selections which lost the least amount of weight were 'Hass' (5.29%), '175 PLS' (6.26%), and '30 PLS' (8.46%).

The values for the pulp and skin color of the avocado fruit which were measured from physiological (harvest) maturity to consumption (edible stage) maturity are presented in Tables 3, 4, and 5.

In relation to intensity of pulp darkening, it was found that at harvest the 'Fuerte' cultivar had the smallest darkening index, showing vascular tissue with incipient darkening. '172 PLC', '287 PLC', '53 PLC', '50 PMe', 'Hass', and 'Fuerte' were the worst in terms of vascular tissue with incipient darkening after 4 hours. The other selections had alterations of the vascular tissue with intense darkening and pulp with incipient darkening. Acceptability according to appearance ranged from "still acceptable" to "not acceptable." The results are presented in Table 6.

Seed weight varied between selections (Table 7), and ranged from 18.16 g ('Hass') to 71.70 g ('131 PLS'). Only two specimens had seeds which weighed on the average less than 20 g, six were found with seed weights between 30 and 40 g, one between 40 and 50 g, several between 50 and 60 g, and one above 70 g.

At physiological maturity, the pulp + skin: seed ratio did not vary much among the selections (Table 7). The specimen '325 PJ' had a pulp + skin percentage of 65.89% and a seed percentage of 34.11%. The selection '39 PMe' had a pulp + skin percentage of 90.40% and a seed value of 9.60%.

At the edible stage, no significant changes in the relationships among the selections were observed; however, it can be seen that there was generally a decrease in the pulp + skin percentage and an increase in the seed percentage.

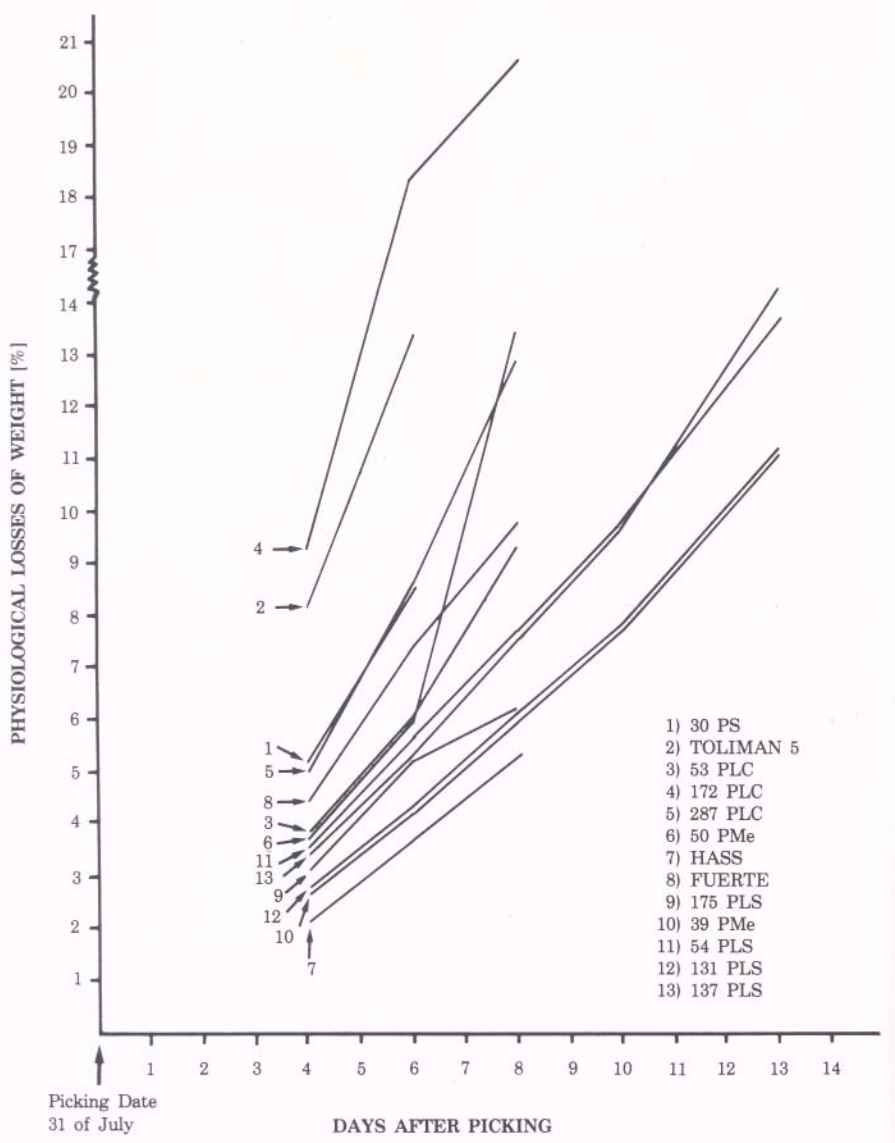

*Fig. 1. Physiological losses of weight (%) in avocado fruits (*Persea americana *Mill.)*

Table 3. Evaluation of avocado pulp color near to the skin.

Selection or cultivar	Color	L	a	b
3/July/87				
53 PLC	Yellow	28.90	2.39	28.96
172 PLC	Yellow	20.24	4.73	62.49
287 PLC	Yellow	26.30	1.21	39.14
39 PMe	Yellow	26.10	0.17	39.39
50 PMe	Yellow	27.76	2.42	37.61
30 PS	Yellow	30.35	1.74	31.75
Hass	Yellow	26.01	3.10	42.15
54 PLS	Yellow	24.83	3.04	34.20
325 PJ	Yellow	26.45	5.13	43.66
Fuerte	Yellow	26.10	1.71	36.39
131 PLS	Yellow	24.70	0.89	56.23
137 PLS	Yellow	29.26	-0.041	39.27
175 PLS	Yellow	28.01	2.41	37.11
6/July/87				
325 PJ	Yellow	7.95	5.92	41.29
30 PS	Yellow	60.75	-11.14	34.73
7/July/87				
53 PLC	Yellow	56.80	-19.86	35.69
172 PLC	Yellow	69.72	-14.54	46.66
287 PLC	Yellow	73.38	-12.13	37.56
39 PMe	Yellow	67.34	24.16	42.49
50 PMe	Yellow	54.89	-18.55	36.68
Hass	Yellow	55.07	-18.32	33.96
54 PLS	Yellow	72.94	-38.41	43.00
Fuerte	Yellow	60.78	-21.60	99.00
131 PLS	Yellow	69.57	-23.79	49.14
137 PLS	Yellow	69.17	-22.64	45.60
175 PLS	Yellow	53.94	-16.98	37.07
13/July/87				
39 PMe	Yellow	58.95	-13.20	33.09
54 PLS	Yellow	56.48	-11.71	29.93
131 PLS	Yellow	54.48	-13.60	34.73
137 PLS	Yellow	57.60	-11.56	32.79

Table 4. Evaluation of avocado pulp color near to the seed.

Selection or cultivar	Color	L	a	b
3/July/87				
53 PLC	Yellow	33.09	4.36	37.16
172 PLC	Yellow	30.76	5.88	31.97
287 PLC	Yellow	37.43	3.33	32.36
39 PMe	Yellow	36.33	1.98	35.79
50 PMe	Yellow	36.18	3.95	34.49
30 PS	Yellow	36.48	-4.56	34.71
Hass	Yellow	35.10	2.06	35.33
54 PLS	Yellow	37.30	3.25	28.39
325 PJ	Yellow	26.45	5.13	43.66
Fuerte	Yellow	36.14	3.62	29.57
131 PLS	Yellow	34.19	3.03	69.73
137 PLS	Yellow	36.29	3.13	36.19
6/July/87				
325 PJ	Yellow	7.95	5.92	41.29
30 PS	Yellow	62.56	-9.26	34.16
7/July/87				
53 PLC	Yellow	66.86	-19.86	36.52
172 PLC	Yellow	75.86	-14.54	49.32
287 PLC	Yellow	77.32	-7.63	40.26
39 PMe	Yellow	79.12	-15.06	43.33
50 PMe	Yellow	63.97	-13.46	37.25
Hass	Yellow	62.57	-16.14	35.66
54 PLS	Yellow	80.07	-8.52	44.46
Fuerte	Yellow	68.66	-18.25	37.31
131 PLS	Yellow	78.60	-16.94	51.36
137 PLS	Yellow	75.77	-16.75	47.32
175 PLS	Yellow	63.34	-11.71	36.62
13/July/87				
39 PMe	Yellow	63.52	-8.26	33.80
54 PLS	Yellow	63.24	-5.99	27.40
131 PLS	Yellow	59.94	-9.18	37.25
137 PLS	Yellow	61.53	-7.45	34.05

Table 5. Evaluation of skin color on avocado fruits.

Selection or cultivar	Color	L	a	b
3/July/87				
53 PLC	Green	33.77	-5.1(	13.95
172 PLC	Green	36.31	-7.16	18.58
287 PLC	Green	31.94	-0.116	10.57
39 PMe	Green	33.18	-4.65	11.76
50 PMe	Green	33.45	34.66	10.42
30 PS	Green	29.16	0.17	8.86
Hass	Green	32.30	-6.46	9.75
54 PLS	Green	35.36	-8.09	16.77
325 PJ	Green	36.57	-4.97	16.43
Fuerte	Green	39.69	-12.46	26.98
131 PLS	Green	33.84	-7.88	14.32
137 PLS	Green	33.26	-9.77	24.49
175 PLS	Green	29.81	-6.76	10.46
6/July/87				
325 PJ	Green	35.30	1.80	7.05
30 PS	Green	33.90	0.05	7.54
7/July/87				
53 PLC	Green	32.96	11.66	10.67
172 PLC	Green	35.61	-8.17	16.13
287 PLC	Green	28.14	1.84	5.62
39 PMe	Green	34.46	-4.20	12.03
50 PMe	Green	29.74	-4.17	11.44
Hass	Green	29.74	0.22	1.93
54 PLS	Green	35.49	-7.57	15.97
Fuerte	Green	38.13	-11.24	22.52
131 PLS	Green	34.25	-7.70	14.34
137 PLS	Green	31.46	-6.35	10.76
175 PLS	Green	32.17	-5.57	10.49
13/July/87				
39 PMe	Green	32.74	-5.58	12.44
54 PLS	Green	32.90	-4.83	12.26
131 PLS	Green	33.31	5.79	13.49
137 PLS	Green	29.59	-4.97	9.22

Table 6. Evaluation of enzymatic darkening, alteration, and acceptability on fruits of avocado [Persea americana Mill.]

	2 hours		4 hours	
	Alteration	Acceptability	Alteration	Acceptability
3/July/87				
53 PLC	2	Good	3	Still acceptable
172 PLC	2	Good	3	Still acceptable
287 PLC	2	Good	4	Not acceptable
39 PMe	2	Good	4	Not acceptable
50 PMe	2	Good	3	Still acceptable
30 PS	1	Very good	2	Good
Hass	2	Good	4	Not acceptable
54 PLS	2	Good	3	Not acceptable
325 PJ	2	Good	3	Still acceptable
PPs Fuerte	2	Good	2	Good
131 PLS	3	Still acceptable	4	Not acceptable
137 PLS	2	Good	4	Not acceptable
175 PLS	2	Good	4	Not acceptable
6/July/87				
30 PS	2	Good	3	Still acceptable
325 PJ	3	Still acceptable	3	Still acceptable
7/July/87				
172 PLC	2	Good	2	Good
287 PLC	2	Good	2	Good
54 PLS	2	Good	2	Good
8/July/87				
53 PLC	2	Good	2	Good
39 PMe	3	Still acceptable	3	Still acceptable
50 PMe	2	Good	2	Good
Hass	2	Good	2	Good
PPs Fuerte	2	Good	2	Good
131 PLS	3	Still acceptable	3	Still acceptable
137 PLS	2	Good	2	Good
175 PLS	2	Good	4	Not acceptable
13/July/87				
39 PMe	3	Still acceptable	4	Not acceptable
54 PLS	3	Still acceptable	4	Not acceptable
131 PLS	3	Still acceptable	4	Not acceptable
137 PLS	3	Still acceptable	4	Not acceptable

Table 7. Physical composition and relative percentage on fruits of avocado [Persea americana Mill.]

	Pulp-skin (g)	%	Seed (%)	%	Total (%)
3/July/87					
53 PLC	314.16	88.82	39.54	11.18	353.80
172 PLC	241.22	88.00	32.75	12.00	273.97
287 PLC	261.47	89.55	30.50	10.45	291.97
39 PMe	375.98	90.40	39.94	9.60	415.92
50 PMe	412.15	88.53	53.40	11.47	465.55
30 PS	318.46	84.35	59.08	15.65	377.54
Hass	144.58	88.57	18.66	11.43	163.24
54 PLC	225.90	86.96	33.86	13.04	259.76
325 PJ	37.56	65.89	19.44	34.11	57.00
Fuerte	186.28	83.77	36.10	16.23	222.38
131 PLS	311.02	81.26	71.70	18.74	382.72
137 PLS	346.84	86.51	54.06	13.49	400.90
6/July/87					
30 PS	288.28	84.23	53.96	15.77	342.24
325 PJ	25.88	54.56	21.55	45.44	47.43
7/July/87					
172 PLC	192.17	86.80	29.20	13.20	221.37
287 PLC	253.92	83.03	31.30	10.97	285.22
54 PLC	229.78	83.90	44.08	16.10	273.86
8/July/87					
53 PLC	274.34	88.32	36.26	11.68	310.6
39 PMe	464.65	91.24	44.63	8.76	509.28
50 PMe	336.02	84.90	59.78	15.10	395.80
Hass	114.78	84.76	20.64	15.24	135.42
Fuerte	171.94	81.49	39.04	18.51	210.98
131 PLS	348.79	84.35	64.73	15.65	413.52
137 PLS	398.14	90.10	43.72	9.9	441.86
13/July/87					
39 PMe	416.32	86.39	65.60	13.61	481.92
54 PLS	221.90	86.54	34.50	13.46	256.40
131 PLS	306.78	79.39	84.58	21.61	391.36
137 PLS	342.32	83.59	67.24	16.41	409.50

At physiological (harvest) maturity, the highest dry matter content (Table 8) was 48.77% for the '325 PJ' selection. Selections '131 PLS' and '53 PLC' had the lowest percentages: 27.68% and 24.36%, respectively.

At the edible stage, the 'Hass' cultivar had 41.14% dry matter, which was the highest amount. The selections '53 PLC' and '50 PMe' had the lowest dry matter contents, 15.63% and 17.32%, respectively.

The results of the first taste panel (Table 9) showed that there are significant differences

in color among the various selections. The '287 PLC' was graded comparably with the 'Hass', although the Hunter L*A*B values showed that the 'Hass' (29.74, 0.22, 1.93) tended to be darker than the selection '287 PLC' (28.00, 14, 1.84). There were no significant differences detected among the various selections with regard to form, size, and acceptability. The '287 PLC' received the highest grades. It was rated higher than 'Hass' in size and acceptability, but was comparable to 'Hass' with respect to form.

When the panel evaluated seed size, 'Hass' obtained the highest grade (Table 10). This is consistent with the data reported in Table 7. The '287 PLC' obtained the lowest grade. With respect to pulp color and acceptability, there were no significant differences detected between the selections. The '287 PLC' selection received the highest grade in pulp evaluation, and the '137 PLS' had the highest acceptability.

The results of the taste panels demonstrate that there were no significant differences among the studied individuals (Table 11) pertaining to taste, fiber content, and acceptability. When the taste panels evaluated the entire fruit, the 'Hass' cultivar was surpassed by the '287' selection. When longitudinally-cut fruit were analyzed, the 'Hass' surpassed the seedlings due to its small seed. 'Hass' was surpassed by '287 PLC' when evaluated for pulp color and by '54 PLS' in terms of fruit acceptability. 'Hass' was not surpassed by any selection when flavor, fiber content, and acceptability were evaluated.

Highly significant differences were found by the second taste panel (Table 12) in the following whole fruit characteristics: color, form, size, and acceptability. Although the '30 PS' was rated to have the best color, it was not significantly different from 'Hass', 'Toliman 5', and 'Fuerte'. The Hunter L*A*B values (33.90, 0.05, 7.54) show that after ripening the '30 PS" selection is not as "green" as the others and tends to be darker than the 'Hass', 'Fuerte', and 'Toliman 5'.

The '39 PMe' received the highest grade with regard to form, although there were no significant differences detected among the selections except for 'Toliman 5', which was rated the lowest. The 'Toliman 5' also differed significantly from the other selections when rated for size and acceptability of whole fruit and cut fruit (Table 13).

Table 8. Dry matter percent in fruits of avocado [Persea americana Mill.]

Cultivar or selection	3/July/87			6/July/87			13/July/87		
	F. W.	D. W.	% D.M.	F. W.	D. W.	% D.M.	F. W.	D. W.	% D.M.
30 PS	32.11	7.82	32.09	29.67	8.1	27.30			
325 PJ	26.70	10.35	48.77	12.28	4.38	35.57			
53 PLC	27.75	9.95	24.36	56.43	8.82	15.63			
172 PLC	38.42	12.84	39.43	23.55	7.7	32.75			
287 PLC	31.78	9.0	40.36	25.42	9.02	35.44			
50 PMe	31.12	9.98	28.37	49.07	8.5	17.32			
Hass	15.10	6.76	46.15	15.41	6.34	41.14			
Fuerte	20.66	8.62	32.39	22.29	5.36	24.05			
175 PLS	11.32	5.32	29.91	33.52	8.12	24.22			
39 PMe	15.38	.82	33.58	34.64	10.13	29.24	31.44	8.44	26.84
54 PLS	31.82	8.82	42.45	26.72	9.92	36.88	24.78	9.12	36.83
131 PLS	30.98	9.02	27.68	29.63	7.45	25.15	24.54	5.44	22.15
137 PLS	26.21	7.42	28.93	25.13	7.04	28.02	29.84	8.14	27.21

F. W. : Fresh weight. D.W. : Dry weight. D.M. : Dry matter.

Table 9. Evaluation of different characters on complete fruits of avocado [Persea americana Mill.]. **Experiment 1.**

Cultivar or selection	Color	Form	Size	Acceptability
Hass	3.8 a*	3.4 a	3.2 a	3.2 a
287 PLC	3.8 a	3.4 a	3.4 a	3.6 a
54 PLS	2.2 b	3.2 a	3.0 a	3.0 a
137 PLS	3.0 ab	3.2 a	3.2 a	3.0 a
131 PLS	2.2 b	3.0 a	3.0 a	2.8 a
'F' value	**	NS	NS	NS
C.V.	19.7%	24.6%	22.1%	24.5%

* Values with the same letter are statistically equal according to Tukey's Test at 5%.
** Highly significant; NS : Not significant.
C.V. Coefficient of variability.

Table 10. Evaluation of different characters on fruits cut longitudinally. Experiment 2.

Cultivar or selection	Seed size	Pulp color	Acceptability
Hass	3.8 a*	3.0 a	3.2 a
287 PLC	2.2 b	3.2 a	3.0 a
54 PLS	3.2 ab	2.8 a	3.4 a
137 PLS	2.4 b	2.8 a	3.0 a
131 PLS	3.2 ab	3.0 a	2.8 a
'F' value	*	NS	NS
C.V.	23%	17.5%	27.3%

* Values with the same letter are statistically equal according to Tukey's Test at 5%.
** Significant; N.S. : Not significant.
C.V. Coefficient of variability.

Table 11. Evaluation of palatability of avocado fruits. Experiment 1.

Cultivar or Selection	Taste	Fiber	Acceptability
Hass	3.4 a+	4.0 a	3.4 a
287 PLC	2.4 a	3.8 a	2.4 a
54 PLS	3.0 a	3.6 a	3.0 a
137 PLS	2.6	3.4 a	2.4 a
131 PLS	2.2 a	3.2 a	2.2 a
'F' value	NS	NS	NS
C. V.	33.5%	13.1%	33.5%

+ Values with the same letter are statistically equal according to Tukey's test at 5%.
NS Not significant.
C.V. Coefficient of variability.

Table 12. Evaluation of different characters on complete fruits of avocado [Persea americana Mill.]. Experiment 2.

Cultivar or selection	Color	Form	Size	Acceptability
53 PLC	1.8 c+	2.5 ab	2.8 a	2.5 a
50 PMe	2.6 bc	2.7 ab	2.5 a	2.7 a
30 PS	3.6 a	3.3 a	2.7 a	3.1 a
Hass	3.3 ab	3.1 a	2.6 a	2.6 a
Toliman 5	2.8 ab	1.8 b	1.1 b	1.5 b
Fuerte	2.8 ab	3.3 a	3.2 a	3.1 a
175 PLS	2.6 bc	3.1 a	3.1 a	3.0 a
39 PMe	3.0 ab	3.4 a	8.1 a	3.4 a
'F' value	**	**	**	**
C. V.	25.3%	27.8%	28.5%	25.5%

+ Values with the same letter are statistically equal according to Tukey's test at 5%.
** Highly significant.
C.V. Coefficient of variability.

Table 13. Evaluation of diverse characters of avocado fruits cut longitudinally. Experiment 2.

Cultivar or selection	Seed size	Pulp color	Acceptability
53 PLC	2.7 a+	2.6 a	2.4 b
50 PMe	3.0 a	3.1 a	2.9 ab
30 PS	3.4 a	3.3 a	3.4 a
Hass	3.3 a	3.3 a	2.6 ab
Toliman 5	1.3 b	2.7 a	1.3 c
Fuerte	2.8 a	2.5 a	3.0 ab
175 PLS	3.2 a	3.0 a	3.1 ab
39 PMe	3.1 a	3.3 a	3.3 ab
'F' value	**	*	**
C.V.	23.2%	23.9%	25.1%

* Values with the same letter are statistically equal according to Tukey's test at 5%.
** Highly significant; + : significant
C.V. Coefficient of variability.

Table 14. Evaluation of palatability of avocado fruits. Experiment 2.

Cultivar or selection	Taste	Fiber	Acceptability
53 PLC	3.2 a[+]	3.3 a	3.0 a
50 PMe	2.8 a	2.9 a	2.4 ab
30 PS	2.7 a	3.3 a	2.6 a
Hass	2.8 a	2.3 a	3.1 a
Toliman 5	2.5 a	3.1 a	2.6 a
175 PLS	2.7 a	3.6 a	3.0 a
39 PMe	3.0 a	3.4 a	2.9 a
'F' value	NS	**	**
C.V.	26.3%	18.6%	20.8%

[+] Values with the same letter are statistically equal according to Tukey's Test at 5%.
** Highly significant; NS = Not significant.
C.V. Coefficient of variability.

With respect to pulp color, there were no significant differences among the selections, although the 'Hass', '30 PS', and '39 PMe' obtained the highest grades. Though the '30 PS' received the highest grade for acceptability, it did not significantly differ from the '50 PMe', '175 PLS', '39 PMe', 'Fuerte', and 'Hass'.

Table 14 presents the results regarding fruit palatability. There were no significant differences in flavor detected, although the '53 PLC' seedling and the '39 PMe' seedling were rated the highest. The 'Toliman 5' selection was found to have a significantly greater amount of fiber as compared to the other selections. There were highly significant differences among the evaluated individuals as compared with the 'Toliman 5' and the '50 PMe' in terms of acceptability.

Discussion

The seedlings and cultivars studied were chosen for their promising marketing characteristics. All seedlings except 'Toliman 5' had fruits larger in size than 'Fuerte' and 'Hass'.

According to Figure 1, the weight losses in 'Hass' and the '175 PLS' were 5.29% and 6.26%, respectively, after eight days of storage at 19°C (60% R.H.) during which time ripening occurred. The '39 PMe' and the '131 PLS' lost 11.10% and 11.14%, respectively, of their harvest weight and ripened after 13 days. It is possible that the slight delay in ripening may be of value if one is considering the export market.

If one considers the pyriform shape of the 'Fuerte' and 'Hass' as typical, it was noted that a little more than half of the selections had fruits that were similar in shape. Oval, spherical, and elliptic shaped fruit can be attractive and could enhance fruit handling during packing and transportation.

An important factor to consider is the rate of enzymatic darkening of cut fruit, since it detracts from quality and therefore could influence marketing. The results indicate that

the '172 PLC', '287 PLC', '53 PLC', and '50 PMe' were similar to 'Hass' and 'Fuerte'. The potential for enzymatic darkening in avocado fruit is directly related to polyphenoloxidase activity and to the presence of phenols (Kahn, 1975; Golan, Kahn and Sadowski, 1977).

The pulp:skin + seed ratio determines the percentage of the edible part of the fruit. Three selections, '39 PMe', '287 PLC', and '53 PLC' had a higher percentage of pulp and skin than 'Hass' and 'Fuerte' at harvest. The '50 PMe' and '175 PLS' were very close to the 'Hass'. After ripening, the '175 PLS', '287 PLC, '53 PLC', and '172 PLC' had higher pulp:skin + seed ratios than 'Hass' and 'Fuerte'.

At harvest, the '325 PJ' had a higher dry matter content than 'Hass'. After ripening, however, no seedling selection surpassed 'Hass'; although '54 PLS', '325 PJ', and '278 PLC' could be considered as fair, since they were slightly below 'Hass' with respect to chemical composition having the highest oil proportion and lowest moisture content [Harkness (1954), Pearson (1955), and Slater et al. (1975)]. There are, however, other references where it is affirmed that there exists a correlation between the pulp moisture content and the oil proportion being conversely proportional [de Arriola, Menchu and Holy, 1976].

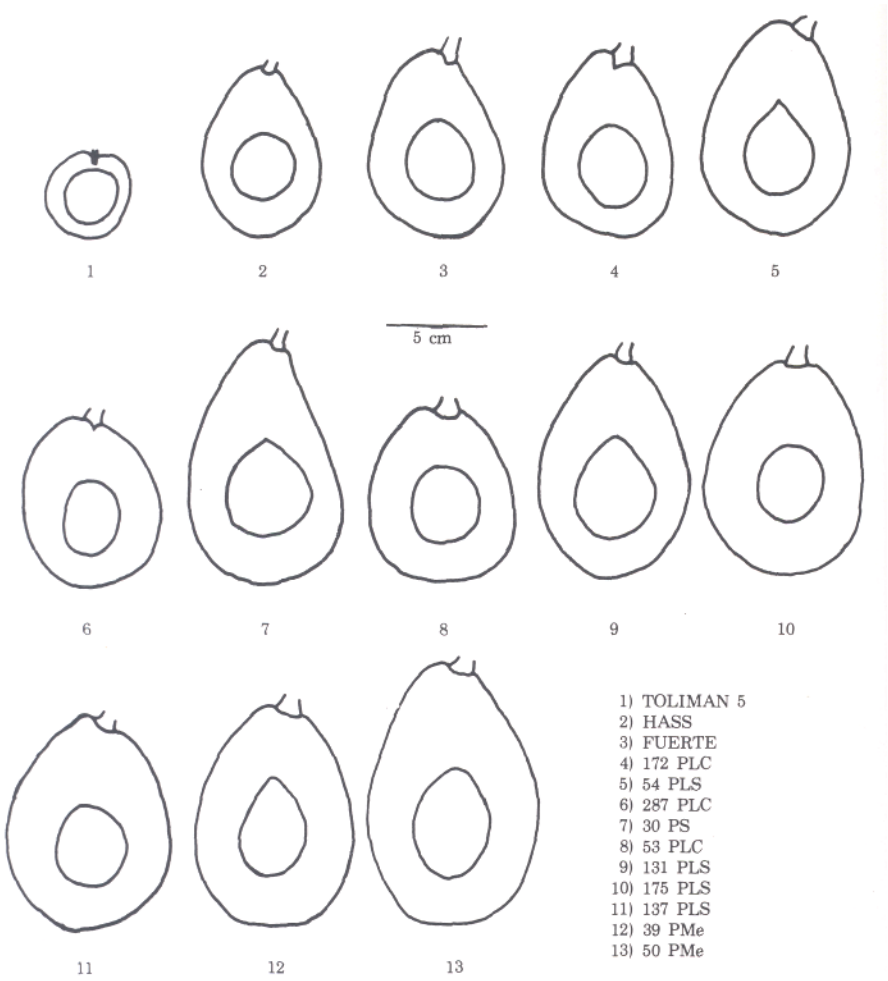

Fig. 2. Fruit form of avocado cultivars and selections from Coatepec Harinas, State of Mexico.

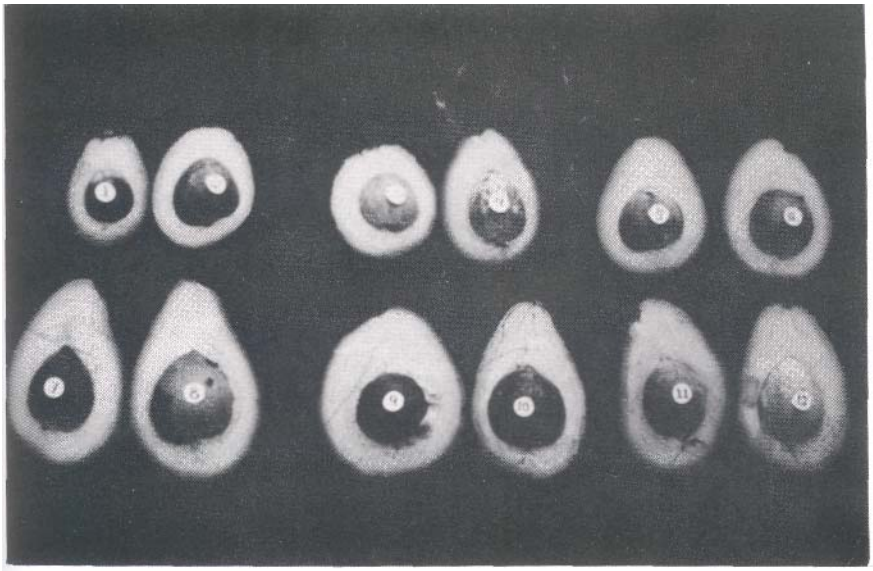

Fig. 3. Studied avocado fruits; 1-HASS, 2-FUERTE, 3-287 PLC, 4-172PLC, 5-54PLS, 6-53PLC, 7-39PMe, 8-131 PLS, 9-137PLS, 10-30PS, 11-50PMe, 12-175 PLS. Toliman 5 is not included in the photograph.

Results of the first taste panel indicated that the '287 PLC' was the most outstanding when evaluated as a whole fruit. When longitudinally-split fruit and palatability were evaluated, the '54 PLS' was rated as the most outstanding. In spite of these evaluations, the new selections did not surpass 'Hass' in quality, although they were very close.

The second taste panel found when whole fruit, longitudinally-split fruit, and palatability factors were evaluated, that the '30 PS', '39 PMe', and '175 PLS' surpassed the ‘Fuerte' and could possibly commercially compete with 'Hass'.

The most promising selections appear to be '172 PLC' and '287 PLC', since they show favorable characteristics. These selections had better acceptability than '287 PLC', '54 PLS', '30 PS', '39 PMe', and '175 PLS', all of which received equal or better grades than 'Hass'.

This study demonstrates that some seedling selections have better fruit characteristics than 'Hass' and ‘Fuerte' and indicates that it is possible to obtain cultivars of equal or better quality at a time when the production of 'Hass' and 'Fuerte' is scarce and of questionable quality.

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