South African Avocado Growers' Association Research Report for 1978. 2:54-58

SOME ASPECTS OF THE OIL AND MOISTURE CONTENTS OF AVOCADO FRUIT

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OPSOMMING

Edranol vrugte hetmeeras 17% massa verloor vanaf pluk tot op eetsag stadium, fernyl Fuerte en Mass sowat 11% verlies getoon het. Wanneer die vrugte gewaks en in sellofaan toegedraai is, is die massaverlies by Edranol beperk tot 7,83%. Die vrugte aän die noord-oostelike kant van borne het die neiging getoon om 'n hoër olie inhoud te he as die vrugte aan die suidelike kam. Hierdie bevinding mag van belang wees aan die begin van die plukseisoen.

INTRODUCTION

There is a growing need to introduce maturity standards for the export of avocado fruit. Early in the season there is the danger that immature fruit is exported which does not become soft, but rubbery. There is a considerable variation in fruit maturity in the same orchard and even on a tree which further complicates the issue. The oil content of the fruit is accepted as an indication of fruit maturity. When the moisture content is known, oil content can be determined indirectly as there is a relationship between moisture and oil content (Swarts 1976; Holzapfel and Kuschke 1977).

The following aspects were investigated in this report:

1. The percentage loss in fruit mass from time of picking until edible at different storage times and temperatures.
2. The effect of packhouse treatments on the percentage loss in fruit mass and the oil and moisture content values.
3. The percentage oil, moisture and loss in fruit mass from time of picking until edible.
4. The variation of oil content on a tree.

METHODS AND MATERIALS

Fruit samples: The fruit of three avocado cultivars, namely Fuerte, Edranol and Hass, was used in these investigations.

Moisture determinations: The Ultra-X infra red moisture analyzer (Holzapfel and Kuschke, 1977) and the conventional oven method (Swarts, 1976) were used.

Oil determinations: A fast extraction method with chloroform as described by Holzapfel and Kuschke (1977) was used.

RESULTS

1. The percentage loss in fruit mass from time of picking until edible, at different storage temperatures

Fuerte, Edranol and Hass avocados were picked and divided into two groups of 15 fruit for each variety. One group of fruit was kept at 5°C for 14 days and then left at room temperature until soft. The other group was kept at 20°C until soft (Fig. 1). Each fruit was weighed immediately after picking and again at intervals to determine the loss of mass (Figs. 2 and 3). When soft, the fruit was finally weighed and direct oil and moisture determinations were carried out.

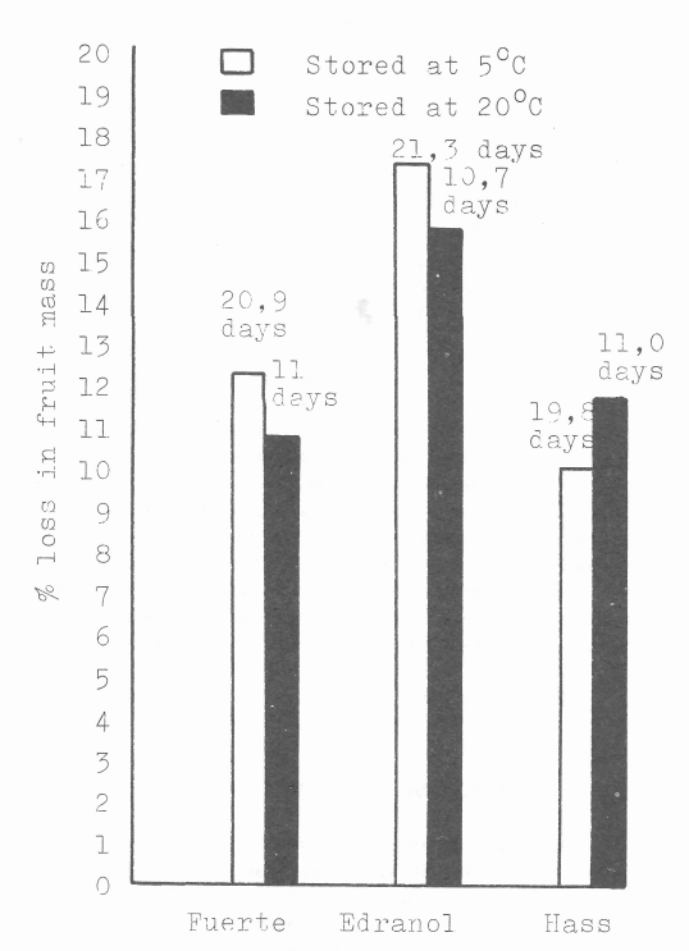

FIG. 1: Percentage loss in fruit mass of three avocado cultivars stored at: 5°C for 14 days and then left at room temperature until soft, and 20°C until soft

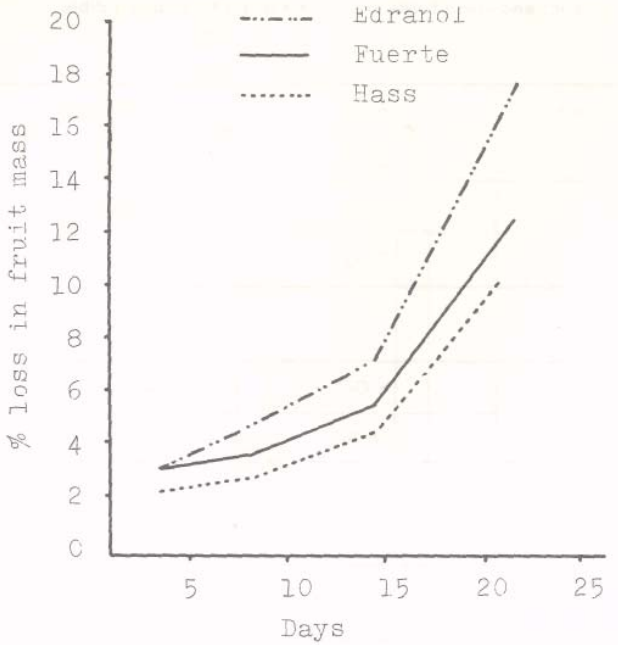

FIG. 2: Percentage loss in fruit mass of three avocado cultivars, stored at 5°C for 14 days and then left at room temperature until soft

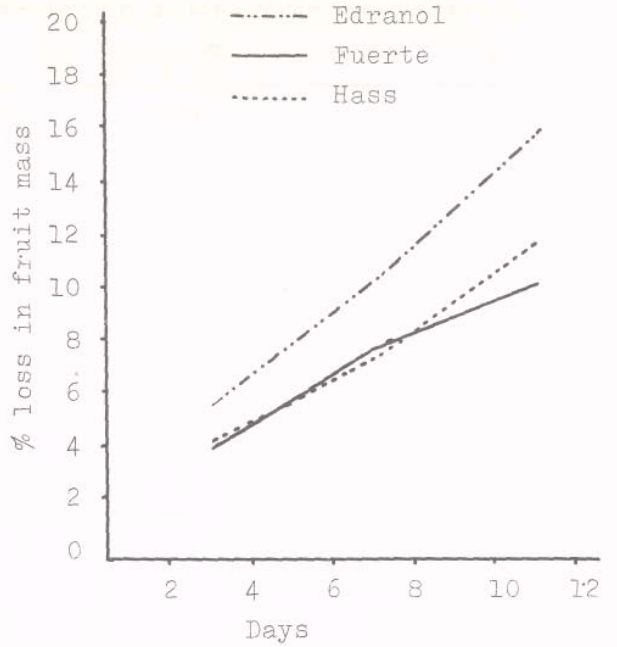

FIG. 3: Percentage loss in fruit mass of three avocado cultivars stored at 20°C until soft

2. The effect of packhouse treatments on the percentage loss in fruit mass and the oil and moisture content values

Edranol fruit was used in this experiment as Fuerte was not available at the time. Four treatments were compared: (a) untreated control; (b) waxed; (c) wrapped in cellophane; (d) waxed and wrapped in cellophane. Ten fruits were used per treatment. The fruit was weighed immediately after picking and at intervals until edible. When the avocados became edible direct oil and moisture determinations were carried out (Fig. 4).

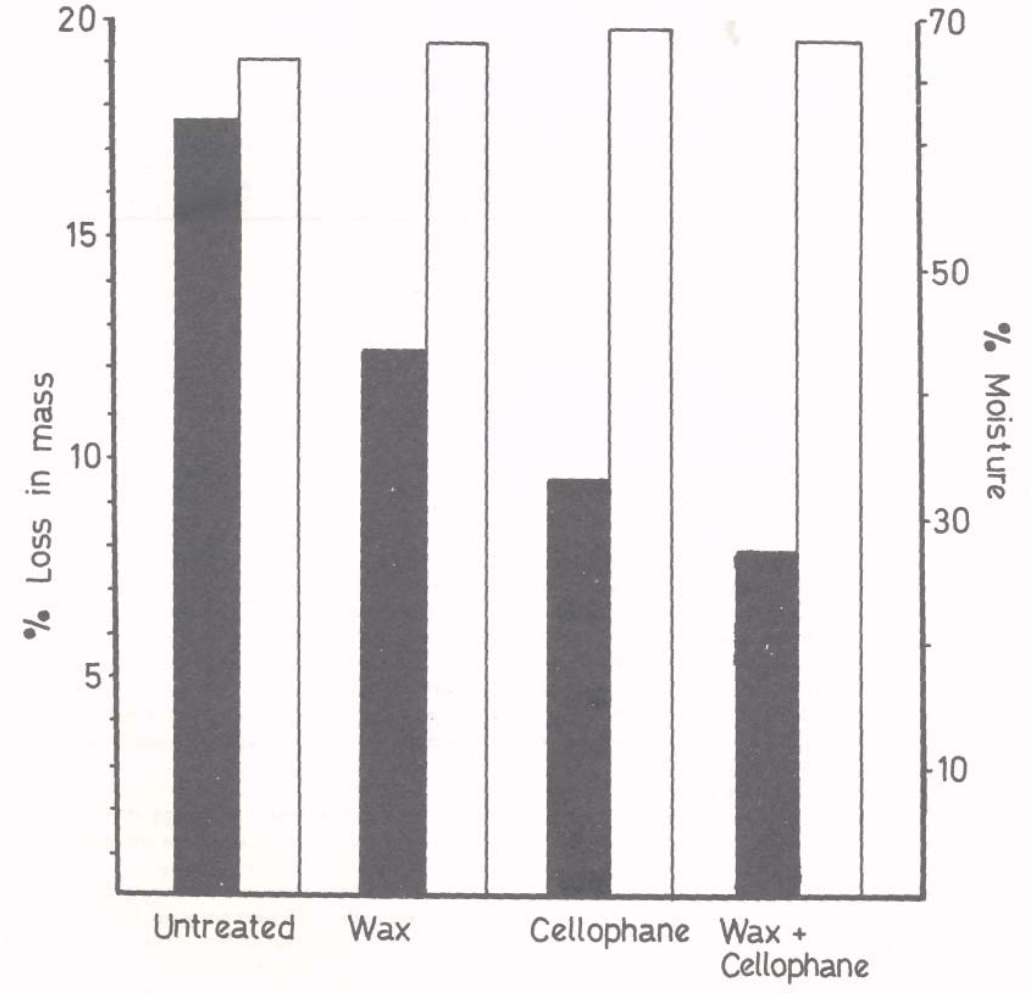

FIG. 4: The percentage loss in mass and the moisture content of edible Edranol fruit when untreated, waxed, wrapped in cellophane and wrapped in cellophane and waxed

3. The percentage oil, moisture and loss in mass of fruit from the time of picking until edible

Edranol, Mass and late season Fuerte fruits were used in this experiment. The fruits were weighed immediately after picking. Oil and moisture determinations were carried out on the first group of fruit. Each group consisted of nine fruits. The remaining Fuerte and Edranol fruits were kept at 20°C until edible (14 and 11 days respectively). The Mass avocados were stored at 5°C for 14 days and then kept at room temperature until edible (28 days). The fruits were weighed at intervals to determine loss in mass and direct oil and moisture determinations were carried out (Fig. 5).

FIG. 5: The percentage oil, moisture and loss in mass of Fuerte, Edranol and Hass fruits from time of picking until edible

A. Fuerte

Storage temperature	Days after picking	% loss in mass	% Oil*	% Moisture*
20°C	0	0	23,31	64,70
"	7	7,60	22,36	65,93
"	14	15,41	23,52	65,16

B. Edranol

Storage temperature	Days after picking	% loss in mass	% Oil*	% Moisture*
20°C	0	0	18,76	72,66
"	5	6,56	21,72	71,36
"'	11	11,29	20,24	69,43

C. Hass

Storage temperature	Days after picking	% loss in mass	% Oil*	% Moisture*
5°C	0	0	18,18	67,76
"	4	1,44	18,57	67,89
"	10	4,35	20,46	65,03
"	20	7,72	21,92	63,66
Room temp	23	11,44	24,13	63,62
Room temp	28	14,50	23,88	63,46

*Values directly determined

Oil and moisture determinations were carried out on edible fruits in other experiments as shown in Figs. 6, 7 and 8.

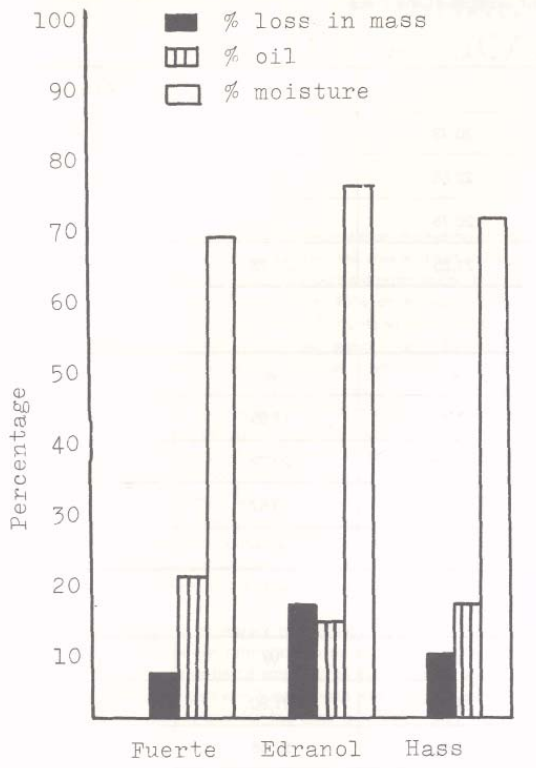

FIG. 6: The percentage loss in mass and the oil and moisture content of three avocado cultivars when the fruit was kept at 5°C for 14 days and then left at room temperature until edible

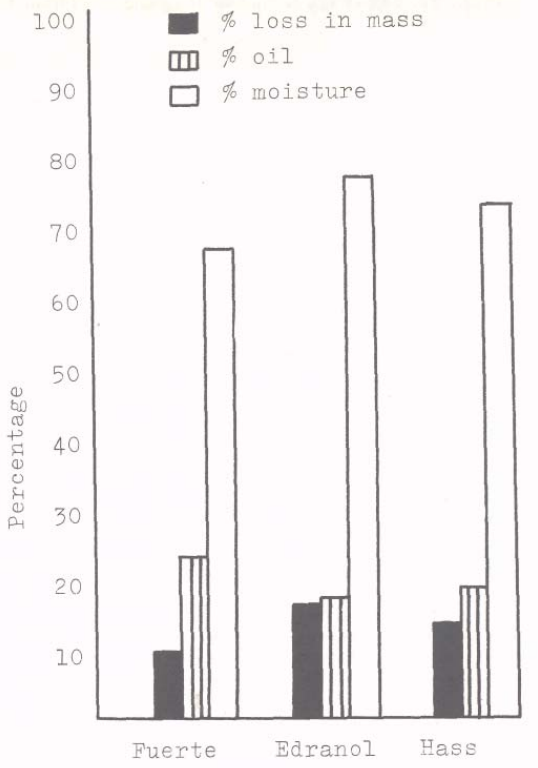

FIG. 7: The percentage loss in mass and the oil and moisture content of three avocado cultivars when the fruit was kept at 20°C until edible

FIG. 8: The percentage loss in mass and the oil and moisture content of Edranol fruit from the time of picking until edible when untreated, waxed, wrapped in cellophane and wrapped in cellophane and waxed

Treatment	% loss in fruit mass after:			% Oil*	% Moisture*
	4 days	7 days	9 days		
Untreated control	9,87	15,12	17,70	22,75	67,06
Wax	5,06	8,31	12,42	22,88	68,26
Cellophane	4,62	7,94	9,94	23,00	69,56
Wax and Cellophane	3,96	6,52	7,83	19,65	68,73

*Values directly determined

4. The variation of oil content on a tree

This investigation was carried out on Fuerte, Edranol and Mass cultivars. Trees were divided into four quarters — north, south, east and west. Three trees were used per variety and seven fruits were picked at random from each quarter of the trees. Moisture determinations were carried out and the oil content was indirectly calculated (Fig. 9).

FIG. 9: The percentage oil content of avocado fruit from different aspects of the trees

A. Fuerte — picked 30 May 1978

Tree	N	S	E	W	Av/tree
1	20,50	19,74	20,33	20,03	20,15
2	22,75	17,85	22,66	21,16	21,11
3	20,13	20,76	20,75	24,15	21,44
Av/aspect	21,13	19,44	21,25	21,78	

B. Edranol — picked 12 July 1978

Tree	N	S	e	w	Av/tree
1	19,96	16,62	17,43	17,95	17,99
2	20,34	19,29	21,34	20,72	20,42
3	20,04	19,64	18,24	20,57	19,62
Av/aspect	20,11	18,52	19,00	19,75	

C. Hass — picked 9 August 1978

Tree	N	S	E	W	Av/tree
1	24,00	22,64	24,90	21,90	23,26
2	25,43	21,33	22,81	20,66	22,56
3	22,38	21,76	21,33	24,71	22,54
Av/aspect	23,96	21,91	23,01	22,42	

DISCUSSION

From the time of picking until the fruits became edible, the loss in mass was greatest for the Edranol cultivar. During this period the Edranol fruit lost between up to 17 percent of the original fruit mass. The Fuerte and Mass cultivars showed little difference in loss of mass. It took all the cultivars about 11 days to become soft when stored at 20°C, while fruit stored at 5°C for 14 days and then kept at room temperature took about 20 days to become soft. There was little difference in loss of mass between the two treatments. The average difference of the two storage times and temperatures for all three cultivars being only 0,95%.

Edranol fruit lost significantly more mass from time of picking until edible when waxed and wrapped in cellophane. Fruits that were waxed and wrapped in cellophane only lost 7,83% in mass, while untreated fruit lost 17,70% in mass.

The differences in the oil content of fruit between the various quarters of the trees were not great, but there was a regular tendency for a lower oil content on the southern aspect of the trees in all three the cultivars. It appears that harvesting of fruit from the north-eastern aspect of the trees would be advisable when oil content is marginal for export, but more work is needed to make definite conclusions. The possibility also exists that the oil content could vary on a vertical basis — i.e. fruit are sampled from tree tops to ground level.

Reference

HOLZAPFEL, WH & EILEEN KUSCHKE, 1977. Oliebepalings as aanduiding van die rypheid van avokados. Handelinge van die SAAKV Tegniese Komitee. 1977, pp. 29 - 34.