RIPENING OF RYAN AVOCADO FRUITS

I. INTRODUCTION

The Ryan variety of avocado is usually marketed from July onwards and it has been claimed that it does not ripen properly if allowed to become too mature, this period being from about the end of September. It was decided to investigate the changes in the respiration rate that occur in the fruit of this variety with respect to maturity and to use this pattern as a measure of the progress of ripening (Biale 1947). The effect of added ethylene on the respiration rate was also studied at various maturities.

II. METHODS AND MATERIALS

The respiration rate was measured by the Pettenkofer method as described by Turner (1949).

The respiration chambers consisted of 6 in. x 6 in. specimen jars clamped to steel plates fitted with rubber gaskets and were similar in type to although smaller than the one illustrated by Biale and Shepherd (1941). The volume of each was approximately 5·5 l. Excessive withering of the fruit was prevented by the inclusion of a humidifier and carbon dioxide was removed from the air by a caustic soda bubbler. A rate of flow of 80 ml/min of the ventilating air was measured by a manometer-type flow-meter which was calibrated by the method of Meuron (1941). The flow rate was adjusted when necessary by a screw clip to each manometer.

The fruit was selected from two trees on a property in the Redlands area. Picks were made at intervals commencing on July 21, 1959. In all seven picks were made, but because of breakdowns Picks 1, 3 and 6 were abandoned before results could be completed. Actual picking dates were: Pick 1, July 21; Pick 2, August 12; Pick 3, September 3; Pick 4, September 28; Pick 5, October 19; Pick 6, November 9; Pick 7, November 16.

In all cases the fruit was picked and placed in the respiration chambers on the same day. Measurements of respiration rates were commenced the following day. At each pick the respiration rates of 6 fruits were measured while treated with 1,000 p.p.m. of ethylene in the ventilating air stream and the rates of a further 6 were measured in CO_2 free air. At Pick 7, 8 fruits were measured in air and 4 in air with ethylene. The rates were measured each day Monday to Friday. This proved quite satisfactory although some difficulty occurred when the climacteric peak occurred during the week-end.

The results of Biale (1946) showed that temperatures of 25°C and 5°C gave non-typical climacteric curves. This author recommended a temperature of 15°C (59° ± 1°F), and this was used in this investigation.

III. RESULTS

All fruit gave a typical climacteric curve as described by Biale (1946, 1947). In all ethylene-treated fruit the peak of the climacteric curve was reached in 4-7 days (generally 5), but with other fruit the time was somewhat variable. The lengths of time to reach the climacteric peak are shown in Table 1.

Table 1

TIME TO REACH CLIMACTERIC PEAK (DAYS)

Pick No.	Air		Ethylene	
	Tree 1	Tree 2	Tree 1	Tree 2
2	14, 15, 13	—, 16, 17	5, 7, 7	4, 4, 4
4	19, 26, 26	—, 18, 17	5, 5, 5	5, 6, 5
5	19, 17, —	12, 21, 12	5, 5, 5	6, 5, 5
7	29, 25, 19, 29	25, 22, 34, 24	5, 4	5, 5

All fruit softened satisfactorily and reached a satisfactory eating-ripe stage. With ethylene-treated fruit this was 2 days after the peak of the climacteric. With other fruit, softening did not occur until 3 or 4 days after the climacteric.

IV. DISCUSSION

It will be seen from the results that over the maturities used the variety ripened satisfactorily. Whenever ethylene was not used rather a long time was required to reach eating ripeness. This could be one of the reasons for the reported non-ripening of the variety.

Ripening would be considerably hastened at atmospheric temperatures, which would be somewhat higher than those used experimentally. It is possible that atmospheric temperatures are high enough to disrupt the ripening mechanism, but this requires further investigation. Further evidence that temperature may be important is given by the fact that the non-ripening is supposed to occur late in the season when atmospheric temperatures are rising to a maximum. Under atmospheric conditions, dehydration would be quite severe and may be sufficient to disturb normal ripening.

In this investigation, despite the high humidity used and the length of time required for the climacteric to occur, fungal infections did not cause any premature loss. However, it is possible that fungal attack could be important in the ripening of fruit under atmospheric conditions where temperatures would be higher than those used experimentally.

In view of the results obtained with ethylene it seems that ripening could be hastened and a more attractive product marketed by the use of this gas. Not only would the fruit be more attractive because of the shorter time it was held but it would be possible to guarantee when fruit would be edible because of the more even ripening.

Fruit picked on August 12 reached a climacteric peak after 15 days. This length of time may be taken as normal. The following pick was made on September 28 and at this time the tree was flowering heavily and growing vigorously. The time for this pick to reach the climacteric was 21 days. The next pick was made on October 19, when the heavy flowering had finished and the initial burst of heavy growth had almost finished. The time for this pick to reach the climacteric was 16 days. The final pick was made on November 16. At this stage the trees had ceased to show vigorous growth, another burst of which occurred shortly after this date. The time for this pick to reach the climacteric was 26 days.

In view of the above evidence it is suggested that the time taken for fruit to reach the climacteric may in some way be connected with the vegetative state of the tree. It is also suggested that the "non-ripening" may be caused by picking the fruit at or just prior to a period of reproductive or vegetative growth. It seems, therefore, that care should be taken to avoid picking the fruit at this time. Further work would be required to clear up this point.

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