

## **Testing Avocados For Maturity**

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Under new regulations introduced last year, in Australia, avocado growers who market immature fruit could face considerable financial loss. A test developed at Wollongbar (provided it is done on a representative sample of fruit) can help growers to judge more accurately whether their avocados are ready for harvest.

### **Why is maturity so important?**

Maturity is a major component of avocado quality and a prime factor in palatability. Prior to regulations introduced in June 1979, however, no minimum standards were imposed on the quality of avocados marketed in New South Wales. The market generally presented a wide range of fruit varying from very poor to very high quality. Frequently all qualities commanded the same price. Not uncommonly, early season low-quality fruits enjoyed higher prices than later fruits of much higher quality. As a result the industry as a whole suffered, since new consumers often equated the unpalatability of lowest quality avocados with that of avocados generally. Many potential consumers were thus lost to the industry.

Because of these anomalies, the industry sought regulations on maturity and grading standards. A minimum standard for maturity, it felt, would correct these irregularities. Also, a minimum standard would lead to greater consumer confidence with obvious long-term benefits for the industry. Subsequently a research team, headed by Dr. C. E. Lewis at Wollongbar, centered attention on developing an objective test for maturity.

### **How can maturity be measured?**

Dr. Lewis and his research team have shown that as an avocado matures its oil content increases. At the same time, its dry matter content and level of acceptance by a taste panel increase. (Dry matter is the quantity of dried flesh remaining after complete removal of its moisture.) Within an acceptable range, oil content and dry matter content are closely related. Testing for either is a reliable test for maturity, and regulations in U.S.A. and Israel are based on oil content tests. However, it is far easier to test for dry matter than oil content and regulations recently gazetted in New South Wales stipulate a minimum maturity test of 21 per cent dry matter content. If immature avocados (that

is, those below 21 percent dry matter) are packed for sale, they may be seized and destroyed. Repeated offenses risk heavy legal penalties.

A critical period for harvesting mature fruit is early in the season when fruit are at various stages of maturity. Some will be above 21 per cent dry matter, some below. A grower marketing quality fruit early will make good returns.

If, however, his fruit doesn't pass the test, he stands to lose the entire consignment and therefore a lot of money. What happens if the consignment is a mixture of both mature and immature fruit? If most of the fruit are mature, inspectors may recommend that the fruit be re-sorted, and only the mature fruit offered for sale. The immature fruit will be impounded and destroyed. (The cost of tests required for re-sorting will be charged to the grower.) On the other hand, if most of the fruit are immature, the entire consignment is likely to be impounded. This could represent a big financial loss!

### **Judging maturity**

How can the grower be confident that the early fruit he selects for market is mature? Here are a few pointers: When sampling for dry matter testing, select fruit typical of those intended for market. Note that mature fruit generally have the following characteristics:

- Fruit is generally larger (but not necessarily).
- The skin is dull and lustreless with a powdery appearance rather than shiny.
- The fruit stalk is large and swollen with a distinct yellowing, rather than green.
- The seed coat on opening the fruit will be dark, dry, and shrivelled rather than pale or whitish.

It is worth emphasizing that if you are running your own tests, you must be reasonably sure that fruit you pick for market are characteristically the same as those you test at 21 per cent dry matter content.

With experience in comparing outward features of maturity with dry matter testing results, you will gain valuable skills and confidence.

### **The dry matter test**

The testing method involves weighing a sample of finely shredded avocado flesh both before and after drying. From the difference between the two weights the percentage of dry matter content is calculated.

For testing the fruit, you will need:

- A domestic oven (gas, electric, slow combustion, or microwave)
- A set of scales capable of weighing to .01 grams

- A household vegetable shredder
- An oven thermometer (scale 0°C to 150°C)
- A set of drying dishes with close-fitting lids.

### **Method**

1. Cut the fruit lengthwise into quarters, removing the seed, seedcoat, and skin. (Use only hard fruit.)
2. Finely shred two diagonally opposite quarters. The shreds should be as fine as possible, and less than 1 mm in thickness. Regulations specify a grater with 5 cutters per square centimeter.
3. Mix all the shredded flesh thoroughly.
4. Set the scales to zero, weigh drying dish and lid and record the weight. (Set dish in lid for convenience.)
5. Add roughly 10 grams shredded flesh to drying dish (in lid). Remove dish and lid from scales and spread sample evenly. Replace dish and lid with sample on scale and adjust weight to exactly 10.00 grams by adding or removing shreds. Record combined weights of drying dish, lid, and flesh.
6. Place uncovered dish and lid centrally in preheated oven set at 106°C for 5 hours. (Regulations also allow the use of a microwave oven with an output of 500 watts at 2450 MHz. Using this oven, samples must be dried to constant weight (complete drying). This usually takes 10 to 12 minutes.)
7. Remove from oven, replace lid, and cool for 5 minutes. Weigh and record weight.
8. Calculate the per cent dry matter.

*Example:*

Weight of drying dish & lid	83.62 g	
Weight of undried flesh	<u>10.00 g</u>	
	<u>93.62 g</u>	
Weight of oven-dried flesh & drying dish & lid	86.15 g	
Less weight of drying dish & lid	<u>83.62 g</u>	
Dry matter =	<u>2.53 g</u>	
Percentage dry matter =	$\frac{2.53 \times 100}{10}$	= 25.3

## Preparing a conventional oven for drying

Ideally, an oven temperature of 105°C for 4 hours is required for complete drying. However, in practice, domestic ovens even at their optimum setting will fluctuate around this temperature. Therefore, aim at a working temperature within the range of 100°C to 110°C for 5 hours.

1. Place the oven rack in middle position in oven.
2. Put thermometer bulb close to the position where fruit is to be dried and where it can easily be read.
3. Switch oven on and set temperature at 105°C for 20 minutes.
4. After 20 minutes quickly read thermometer. If temperature is above 110°C or below 100°C, turn setting down or up as required. Leave for a further 10 minutes at the adjusted setting, and read again. Make further adjustments if necessary. In this way, stabilize the oven temperature within the required range. Then leave the fruit in a central position for 5 hours. Avoid opening oven unnecessarily as drying will be delayed.
5. Trial and error will tell you the best setting for your particular oven, but always check the temperature before each drying.
6. Up to six samples may be dried at any one time by clustering them around the central oven position on the one shelf.

## Watch the following points

- Use only dry, clean dishes.
- Weigh each sample immediately after shredding and mixing. (Moisture is lost rapidly from the shredded sample leading to incorrect dry matter results.)
- Drying on hot days may require slightly lower oven settings than on cold days. Always check your thermometer.
- When drying avocado flesh, don't use the oven for any other purpose. Cooking other foods at the same time will seriously affect results.
- Microwave ovens must contain a vessel of water when drying samples.
- It is advisable to keep a record of your maturity tests, including weights, calculations, dates, and varieties.

*[Editorial note: This paper originally appeared in an Australian publication. It has been reprinted in this Yearbook because of its applicability to avocado quality standardization everywhere.]*