

Annexure L: Principles for avocado fruit maturity standards

Avocado Harvesting – Fruit Maturity Testing:

One of the most important requirements of fruit quality is that fruit meet the minimum maturity standards as set out by the SA Department of Agriculture, Land Reform and Rural Development (DALRRD).

Although not indicated by the DALRRD regulations, determining the dry matter content of individual fruit (content determination of each of the 10 fruit) and calculating an average will give a better understanding of fruit maturity in an orchard. Remember that all fruit tested must have a dry matter content that is equal to or greater than the minimum specified in the maturity standards.

Fruit maturity testing should take place immediately after the sample to be tested has been picked. This is in order to prevent excessive moisture loss from the fruit prior to testing, which in turn results in misleading or false interpretation of fruit maturity.

Dry matter content is determined using the microwave oven technique. It is important that the procedure is strictly adhered to, to ensure accurate results.

- Take a sample of 10 fruit (small and large).
- Fruit should not be sunburnt, have brown stalks (pedicels) or be picked from trees suffering from drought stress.
- Fruit should be picked at shoulder height, from four sides of the tree. Note: fruit picked from sun-exposed sides of the tree (top of the canopy, east and west) are likely to accumulate dry matter faster and have a higher dry matter content than fruit picked from shaded sides of the tree (middle and inside of the canopy, north and south) (Shezi et al., 2020; Ullah & Joyce, 2024).
- Fruit should be picked from the inside and outside of the tree canopy.
- Cut each of the 10 fruits in half longitudinally.
- Discard the halves in which pips remain.
- Remove the peel from the remaining 10 halves.
- Remove all the skin of the pip that is still stuck to the inside of the fruit.
- Grate approximately two tablespoons of each fruit by using an ordinary kitchen grater, with the cut surface of the fruit facing the grater, to obtain a representative portion (inside and outside section) of the avocado.
- Place the approximately 2 tablespoons of grated avocado in a bowl and mix thoroughly.
- Place a Petri-dish (approximately 90 mm or 150 mm in diameter) on the scale. A microwave safe saucer or side plate can also be used.
- Measure off exactly 10 gram of the grated avocado and record the mass reading.
- Spread the inspection sample evenly in the dish and place in a microwave oven.
- Remove from the microwave every 3 minutes to determine and record the mass until there is no change in mass, i.e. until the sample has been fully dried out.
- This procedure should take 12-15 minutes.
- When the loss in moisture has ceased, the dish and its contents are removed and the mass determined.
- The difference in mass between the “wet” and “dry” sample indicates the loss in moisture and is expressed as a percentage of the 10g sample.

- When three tests are done of the same sample, the results between tests should not vary by more than 0.5%.

As an example: you are considering harvesting an orchard block of Hass to take advantage of market prices in the coming week.

- Following the protocol above, you determine the dry matter content for all 10 fruit. All fruit must have a dry matter content of 23% or more. If any 1 fruit tested has a dry matter content of 22% or less, then the orchard block is not ready for harvesting.
- If you decide to selectively pick fruit that are sun-exposed and would likely have a higher dry matter content, follow the same protocol but selectively pick from the sun-exposed sides of the tree. All fruit must have a dry matter content of 23% or more. If any 1 fruit tested has a dry matter content of 22% or less, then you cannot selectively pick from the orchard block and the block is not ready for harvesting.

Dry matter content levels at maturity differs between cultivars. Dry matter content and maximum moisture content levels have therefore been determined for cultivars generally produced in South Africa and are depicted in the table below.

Cultivar	Dry matter content	Maximum moisture content
Hass	23%	77%
Maluma Hass	22%	78%
Fuerte, Pinkerton and Ryan	20%	80%
Lamb Hass	27%	73%
Any other cultivars	25%	75%

Note that dry matter contents above have been determined in a lab using freeze drying (Lembe Magwaza, pers. comm.), and that drying using an oven above 60 °C could result in the fat getting burnt which affects the dry matter content calculation. It is also unknown what effect a microwave oven has, and how readings from these compare with those from a moisture meter. A project under Asanda Mditshwa is underway to determine which method would practically be most accurate.

Also note that diurnal changes and time since irrigation can also influence dry matter content, and therefore maturity.

For more information, consult the [SAAGA Maximum maturity guidelines](#).

Practical considerations

1. Microwaves differ in power output and samples burn easily. It is better to use a lower setting than to use a higher setting. Higher settings will dry out the sample more quickly, but you run the risk of burning the sample. Accurate results cannot be obtained from burnt samples.
2. If you have a conventional oven with a fan, it will work as well but will take longer.

3. The scale should not be exposed to any wind. Make sure there is no wind movement in the room while tests are being conducted.
4. Small fruit is not necessarily immature. On the contrary, smaller fruit are often more mature because the seed coat has died, and the fruit reached maturity sooner. Colour is a better norm, and in most cases light green skin and shiny fruit is a good indication of immature fruit if you want to remove them by means of visual selection.
5. It is sometimes better to test individual fruit at the beginning of the season than taking the average of 10 fruit. There may be a range of dry matter content e.g. 74% - 78%, but the average would be 76%. Having a specific reading for ten individual fruit gives you a better picture of fruit maturity in the orchard, and management practices could be changed accordingly.
6. Taking a bigger sample than 100g is a good practice, as a 1g error on 100g is an error of 1%, but on 200g, it is only a factor of 0.5%. Use larger Petri-dishes for larger samples as this speeds up the drying process.
7. The Petri-dish and the operator's hands should be dry to ensure no extra moisture is added.

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