

PROTOCOLS FOR REDUCING LENTICEL DAMAGE

In today's competitive market, small, seemingly insignificant things can make the difference between one consignment of avocados being sold in preference to another. The level of competition on the European market can be likened to that in a pro golf tournament, where a single stroke over three 18-hole rounds can mean the difference between winning and taking second place. But the difference is that in the avocado game, second place does not pay well.

Lenticel damage is a disorder of the peel of avocados that manifests itself as brown or black spots on the fruit skin. This disorder occurs when the fruit skin is damaged in the region around the lenticels. Lenticels are the openings through which transpiration takes place and are visible as the light speckles on the fruit surface. When the fruit skin is fully turgid (turgid is the opposite of wilted), the lenticels become very sensitive and are highly susceptible to handling damage. Lenticel damage usually only becomes apparent once after the fruit has been placed in cold storage.

In years past, lenticel damage was mainly perceived to be a problem in Fuerte, where brown or black speckles are unsightly on a fruit that stays green when ripe. Hass, it was felt, was less of a problem because the lenticel damage is hardly visible once the fruit has coloured up and ripened. However, things have changed. Nowadays, there is a lot more competition on the market, and more than likely, the buyer will not buy Hass with lenticel damage as there is usually fruit that does not have lenticel damage. The situation is simple: Clean fruit you win, lenticel damage you lose. Growers and Packhouse managers must do all they can to prevent lenticel damage from occurring. The following protocols for orchard and packhouse should be followed to minimise the occurrence of lenticel damage.

IN THE ORCHARD

1. **Ensure that windbreaks are in place.** Damage and scarring by wind contribute to damage to lenticels.
2. **Ensure that leaf nitrogen (N), calcium (Ca), magnesium (Mg) and boron (B) levels are optimal.** Both high N leaf levels and low leaf B levels are likely to lead to increased lenticel damage.

Leaf N norms	Leaf Ca norms	Leaf Mg norms	Leaf B norms
Hass: 2.2-2.3% Fuerte: 1.7-1.9% Others: 1.9-2.2%	1.2-2.0%	0.7-1.0%	50-80 ppm

- **Avoid having a high N orchard.** Although the aim may be to increase yields, the result is increased sensitivity to lenticel damage as fruit produce larger cells with thinner walls.
- Try to **ensure that fruit skin B levels exceed those of leaf B levels.** In resistant orchards, fruit skin B content was often 114% to 142.9% higher than leaf B levels.
- **Minimize stress.** Stress factors inhibit photosynthetic output, reducing the availability of Perseitol (a critical carrier of B during phloem transport), thus preventing effective B translocation to the fruit skin, which weakens fruit skin integrity.
- A **combined foliar spray of Ca, B, and Si applied 3 months before harvest** could reduce total incidence of lenticel damage by approximately 13%, even in high N orchards.
- **Avoid late-season foliar applications of calcium nitrate** ($\text{Ca}(\text{NO}_3)_2$) in low N orchards. This increases fruit skin N but not Ca leading to higher susceptibility to lenticel damage and anthracnose.
- Using penetrators such as WetCit and PANAF1 can improve the absorption of B and Si into the fruit skin but are ineffective for increasing Ca absorption.

- Since avocado fruit only have stomata during the first 7 weeks of development (before they convert to lenticels), this is the only window for effective accumulation of Ca and B.

3. Do not pick wet fruit

Wet fruit is more turgid and a turgid fruit's skin is extremely sensitive.

If the fruit is wet because of dew, wait until the fruit has dried before commencing picking. As soon as the dew has evaporated, the fruit will begin losing water through its skin and become less turgid and therefore less sensitive.

4. Avoid picking fruit from orchards with soils at field capacity (Tensiometer reading of 0-5 kPa), as this will increase the fruit's susceptibility to lenticel damage.

- For medium texture soils, consider only irrigating at tensiometer readings of 40-55 kPa.
- For heavy clay soils, allow these to dry further (tensiometer readings of 70-80 kPa) to ensure skin hardening.

5. Ensure that optimal irrigation is applied, especially during the first 6-7 weeks of fruit development.

Suboptimal irrigation will limit root uptake of Ca and B during transpiration, influencing fruit skin integrity and increasing sensitivity to lenticel damage. Over-irrigation will leach soil of these nutrients.

6. Handle each fruit as if it were an egg

Even though an avocado is hard when picked, its skin is easily damaged. Damage because of rough handling is seldom immediately visible. Lenticel damage usually becomes visible in cold storage.

7. Make sure that picking bags are clean

8. Make sure that lug boxes are free of sand and grit

9. Consider box-picking. Fruit will suffer less damage than moving through the packline.

10. Grade your roads and check trailer tyre pressures to make sure that the fruit has a smooth ride to the packhouse.

11. Minimize the distance to a packhouse. Fruit packed 80 km away will suffer more vibration-related damage than fruit packed 7 km away.

12. Train labour to handle full lug boxes carefully

Good supervision is also required. Make it as easy as possible for labour to load and offload lug boxes. When people become tired, rough handling is inevitable.

AT THE PACKHOUSE

(Information supplied by Springfield packhouse, which had a lenticel damage problem in past seasons, but now is one of the packhouses with the least lenticel damage)

1. **Handle lug boxes carefully at offloading.** The same principles apply here as for on-farm handling.
2. **Full lug boxes should stand on the floor for a few hours or overnight before packing.** This allows the fruit to lose some moisture, which makes it less susceptible to lenticel damage.
3. **Minimise the use of roller brushes in the packline.** Where roller brushes are required for washing, drying and waxing, limit the number of roller brushes. Between 6 and 8 brushes per function are usually sufficient. Any additional brushing can damage the fruit. Soft, dense brushes should be used. Brushes used for waxing will need to be harder than brushes used for drying.
4. **Clean waxing brushes daily.** Keep two sets of brushes for the waxing machine, so that each day can be started with a clean set. Waxing brushes that have stood overnight become hard and will damage the fruit skin more than clean brushes. Brushes can be cleaned by soaking in a 200 L drum of water, and then had washing with soap powder.
5. **Check packline and modify it if there are areas where fruit is turned and rolled unnecessarily.**

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