



Anthracnose of Avocado

The EU approval period for use of Prochloraz will end at end-December 2023. This means the EU MRL for Prochloraz will be adjusted down to 0.01 mg/kg, and growers will not be able to rely on this post-harvest treatment to manage diseases such as anthracnose. Management must start on-farm with a combination of cultural practices.

Background

Anthracnose is one of the most severe and widespread post-harvest diseases. Fungi in the *Colletotrichum gloeosporioides* species complex cause anthracnose in a wide range of tropical plant species including avocado. Anthracnose affects fruit appearance; damaged areas discolour to produce a sour flavour. Decay of infected fruit reduces shelf-life and income.

Symptoms

Anthracnose symptoms can develop on fruits, leaves, shoots, and flowers. Most fruit damage does not develop until after harvest.

Fruit

Pre-harvest

Pre-harvest anthracnose occurs mainly on fruit that has suffered mechanical or insect damage. It takes the form of small, dark, and disfiguring spots which sometimes occur around the lenticels (natural openings) in the fruit skin.

Post-harvest



Figure 1: Anthracnose lesions on ripe avocado fruit.

Brown to black lesions < 5 mm diam. develop around lenticels. Lesions appear just after ripening on green fruit with visible blemishes (Figure 1). Lesions difficult to see on ripe dark skin 'Hass' fruit.



Figure 2: Sunken grey lesion – a sign of anthracnose.

Lesions darker, larger, and increasingly sunken (Figure 2). Lesions spread over entire fruit surface and throughout the pulp. Lesion centre slightly sunken and may develop cracks.



Figure 3: Large avocado anthracnose lesions with masses of pinkish-coloured spores.

Lesions produce pinkish, moist masses of fungal spores as they age (Figure 3). As fruit ripens, infection spreads rapidly into the flesh causing a greenish black, firm decay.



Figure 4: 'Hass' avocado fruit cut in half with hemispherical anthracnose lesions.

When the fruit is cut in half through one of the lesions, rot extending into the flesh exhibits a hemispherical pattern (Figure 4). Decayed pulp is initially firm but becomes soft as decay advances.

Pathogen infection and survival

Fungal spores (conidia) are mainly spread by water (rain/dew), which moves spores from infected branches, twigs (alive or dead) or leaves to fruits. Spores germinate within 7 hours when fruits are wet. Fruits are susceptible from fruit set to harvest. Optimal conditions for infection are temperatures above 20°C and periods of extended rainfall and/or high relative humidity (63- 96%). After the fungus penetrates the fruit skin via lenticels, it remains inactive until the fruit ripens. The brown areas that develop from latent infections on the avocado skin, are inhibited by anti-fungal chemical compounds in the unripe fruit skin. The fungus can also penetrate via entry portals created by other fungi e.g. Cercospora spot.

Control

Control anthracnose primarily with good cultural practices in the orchard and proper post-harvest fruit handling.

Cultural practices

- Use windbreaks in windy areas to reduce fruit scarring and reduce penetration points for fungi.
- Prune out and dispose of dead wood and old fruit away from trees before flowering to reduce wind damage and remove spores.
- Prune low branches at least 0.5 m above the ground to promote air circulation thereby reducing humidity and dampness within the tree canopy that would promote fungal growth i.e., increase tree skirt height.
- Prune and harvest only during dry conditions to minimise fruit contamination and injury.
- Prune out dead limbs and twigs where fungi can sporulate. If many dead leaves are trapped in the canopy, knock them out of the tree and mulch them with pruned branches.
- Keep calcium and nitrogen levels in balance. A healthy tree and good mineral nutrient status improve fruit resistance to anthracnose.
- A good spray programme using copper-based fungicides and/or other registered products is key to controlling post-harvest development of anthracnose.

Fungicides registered for anthracnose control

- Cyprodinil
- Fludioxonil
- Azoxystrobin
- Copper-based products
- Benomyl and carbendazim: *NB: must not be used in orchards producing fruit for export.*

Because copper-based fungicides are protective, apply these at the right time to ensure they are most effective for anthracnose control. The first spray is especially important. The number of sprays depends on the cultivar planted, the disease pressure in the area, and individual orchard history of Cercospora and pepper spot. As a guideline, the number of copper sprays per season is as follows:

Cultivar	Number of sprays
Fuerte	4
Ryan	3
Pinkerton	3
Hass	1
Maluma Hass	2

In wet years, or in orchards with a history of anthracnose, additional sprays may be required.

Picking and Post-harvest

- Avoid picking when temperatures are high i.e. >30°C especially with late season fruit.
- Avoid picking during or shortly after rain. Lenticels can be damaged resulting in more decay.
- Keep fruit in a cool place, out of the sun; high temperatures can impact ripening and increase decay.
- Minimise delays from time of harvest to cooling.
- Cool fruit to the recommended shipping temperature ($\pm 5.5^{\circ}\text{C}$) as soon as possible after harvest.
- Apply a registered post-harvest fungicide.

References

Freeman, S., Katan, T. & Shabi, E. 1998. Characterization of *Colletotrichum* species responsible for anthracnose diseases of various fruits. *Plant Dis.* 82, 596–605.

Menge, J.A. & Ploetz, R.A. 2003. Diseases of avocado. p. 35–71 in: Ploetz, R.C. (ed.). Diseases of tropical fruit crops. CABI Publishing, Cambridge, Mass. 527 p.

Hartill, W.F.T., Everett, K.R. & Pak, H.A. 2002. Stem-end rots: the infection portal. *NZAGA Ann. Res. Rep.* 2.

Nel, A., Krause M. & Khelawanolall, N. 2003. A Guide for the Control of Plant Diseases Department of Agriculture, South Africa, p 48.

Ohr, H.D., Coffey M.D. & McMillan, R.T. Jr. (primary collators). Diseases of avocado (*Persea americana* Miller). American Phytopathological Society. www.apsnet.org/online/common/names/avocado.asp (Last update 4/8/03)

Prusky, D. & Keen, N. T. 2011. Involvement of preformed antifungal compounds in the resistance of subtropical fruit to fungal decay. *Plant Dis.* 77, 114–119.

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