

Getting to know your citrus postharvest diseases

BROWN ROT



Catherine Savage

Brown rot is the term we tend to give to any number of brownish rots, simply based on the colour, and we never look further to correctly identify the disease. Unfortunately, from QC reports or pictures, it is not always easy to tell what the cause is and so it gets the generic name "brown rot". Other decays covered earlier can also be brown but have other distinguishing features, eg diploдия, alternaria, phomopsis, etc.

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Wilma du Plooy

Phytophthora - The "real" brown rot

Many citrus diseases are called brown rot, but the most common is *Phytophthora* brown rot, caused by its namesake pathogen *Phytophthora* spp., either *P. citrophthora* or *P. nicotianae*. The rot is usually light-brown and remains firm and leathery rather than having the rind go soft and sunken. Only under certain circumstances will a white mycelial growth form on the rind. One of the key features to identify *Phytophthora* brown rot is a characteristic sweetish, but unpleasant, rotting odour. This feature is helpful to distinguish it from anthracnose, which can also have a light-brown leathery appearance, although anthracnose tends to be more silvery in colour.

Phytophthora is best controlled with a pre-harvest treatment in the orchard as none of our commonly used packhouse treatments have an effect on infected fruit. Some of the newer fungicides, azoxystrobin and fludioxonil, are showing promise as

packhouse treatments against brown rot but the registration process is still on-going. If *Phytophthora* brown rot is not controlled, leading to decayed fruit in the carton, it easily spreads to the neighbouring fruit. *Phytophthora* is primarily a soil borne pathogen and needs a high level of moisture to move around. This is why rain splash, flooding or over irrigation is such a problem if you are trying to control this brown rot. Prolonged periods of wetness always leave untreated citrus trees, and thus their fruit, at risk of *Phytophthora* infection. If it has rained just after you apply a pre-harvest treatment for *Phytophthora*, it will need to be re-applied. Skirting trees is an excellent way to reduce potential *Phytophthora* infections because you reduce the risk of mud and water splash onto the low hanging fruit.

Fusarium - The "pink" brown rot

Fusarium brown rot is described almost identically to *Phytophthora* brown rot, i.e. it is a light-brown rind rot with a leathery



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Figure 1



Fig 1: *Phytophthora* brown rot infection comes from the soil (left) and results in rotten fruit in the carton (right)

Figure 2



Fig 2: Low-hanging fruit that gets splashed with mud is at risk of being infected with brown rot

Figures 3 and 4



Fig 3: Pink discoloration of *Fusarium* brown rot. Fig 4: Typical dense green spores of *Trichoderma* brown rot.

appearance. A key difference between the two is that *Fusarium* leads to the affected area being sunken, whereas the *Phytophthora* infection is the same firmness and on the same plane as the healthy

tissue. Many *Fusarium* species produce colour pigments, so another giveaway in identification is a pink or red hue of the fungus itself, or internal tissue of the fruit. It is important to note, however, that some

Fusarium species produce white spores and mycelium just like *Phytophthora*.

Luckily *Fusarium* brown rot is one of the less common decay problems and only really occurs once the fruit is very old. *Fusarium* is also a latent pathogen, spreading with water and wind from plant debris and dead wood in the tree. This means that this type of brown rot can be controlled along with all the other types of latent pathogens with orchard sanitation and pruning out of all dead wood.

***Trichoderma* - The "green" brown rot**

Similar to the previous two pathogens, *Trichoderma* brown rot starts out as a light-brown, firm, leathery rot. However, over time, the infected area gets darker and the albedo becomes discoloured. The mycelium and spores are usually key to identifying this rot as it produces dense white mycelium with yellow and dark green spores. The multi-coloured, patchy look of *Trichoderma* is a sure characteristic. *Trichoderma* also produces a coconut-like smell which can help identify it.

Trichoderma sp. are a very common group of decay causing agents, and are found in almost all soils. This brown rot can be controlled by following the same measures as for *Phytophthora* brown rot i.e. preventing contact with the soil, particularly in conjunction with moisture. Preventing injuries also helps to prevent the infection from establishing. *Trichoderma* grows easily on wood and paper, so cleaning, sanitising, or even avoiding wooden bins and crates is helpful in controlling this pathogen. Once a fruit is infected, the disease can spread to neighbouring fruit, fruit wrappers, the carton and even onto the pallet. 🍌