

Root Rots Can Stunt Young Grapevines

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Ten years ago, the idea that root rotting fungus could seriously damage young grapevines was not widely accepted. But more recently it has become evident that rotting fungus diseases can do serious damage to the roots of grapevines.

The symptoms of the disease are not obvious – often the vine continues to grow, but poorly, and often the grower accepts the poor level of growth as "just one of those things". In severe cases, leaf scorch occurs, leading to the death of the shoot, starting at the tip. In serious cases the vines may simply collapse and die back to ground level.

Investigation of the root system is the easiest and quickest way to see if root rots are occurring. Start by digging the soil away from one side of the vine. Dig about 20 cm (8") away from the base of the young vine. Dig down about 45 cm (18") deep to start with, and a few spades wide. Then start flicking the soil away from the soil face, gradually exposing the roots back to the base of the rootling or cutting. (A pocket knife is handy for this job). If you see a dark patch, narrower than the root tip, it suggests a root rot problem. These dark patches are the infected parts of the root. They are very fragile and slough off easily, leaving a stringy fibrous centre of the root. The damage may simply be a small spot a few mm long, or a very long, extensive section. If the root tip is affected, it will be dark coloured and the tip will be pointy, rather than rounded.

If you see these symptoms, it is a strong indication of root rot.



The extent of the damage can be startling. It is not uncommon to see vines with quite long shoots but a with root system that has almost completely rotted away. Hence, although not obvious from the shoot, the extent of damage and the cost to the grower can be very serious. Root rots cause substantial loss of growth in the first season and the inevitable loss of early crop. In later years, the fungus can become increasingly virulent and may continue to reduce growth and yield.

To avoid root rots, and to deal with them, it is impor-

tant to understand them. The common root rots are widespread in native grasslands, in pastures, and in broadacre and horticultural crops. Their spores live for decades, germinating at the right moment to attack a wide range of organic matter. Spores are also found in irrigation water. As they are so widespread, tough and long-living, it is almost impossible to eliminate root rots. The key is to keep the spore numbers too low to cause damage.

The things that allow root rots to flourish are abundant unrotted organic matter, occasional high levels of soil moisture, and warmth. Root rots thrive on dead material, and often attack the living tissue of most plants, grapevines included. Although the fungi enjoy wet conditions, they do not require waterlogged soil, and can grow and survive in surprisingly dry conditions. Fluctuating wet and dry conditions (such as under drip emitters) suit root rots very well. When conditions become harsh, or when growing on living material, they produce spores which are often more virulent than the original infection.

A typical pattern of an outbreak of root rots may begin with the incorporation of a large quantity of unrotted organic matter in the soil. Drip irrigation then encourages growth because the drip zone provides almost ideal conditions – warm and occasionally wet. The fungi growing on live roots produce spores, and their spores germinate. Some of the new generation are inevitably better adapted to the host plant, and attack the host plant even more strongly.

The key to avoiding outbreaks therefore comes back to using sound principles during soil preparation – never plant into soil with large levels of unrotted organic matter! Secondly, be very careful not to overwater. Prolonged periods of wetness will encourage outbreaks of root rots. Irrigation must be based on accurate knowledge of soil moisture content in the exact zone where the roots are growing. Soil moisture sensors should be placed exactly in the actual root zone – not off to the side. For young vines this will be only a few cm below the bottom of the vine. As the root system grows, sensors may have to be relocated.

When an outbreak does occur, it may be reflected by a sudden decline in growth. This may go unnoticed if growth is not being monitored – one of many good arguments in favour of a proper monitoring program! On seeing an unexpected decline in growth, or finding another reason to suspect root rots, the root system should be examined to check for any visible signs of the fungi. Regular weekly or monthly examination also has a lot to recommend it. Early response to the problem is fundamentally important to successful treatment, because the load of spores in the soil and the virulence of the disease increases daily.

The first action is to check the irrigation system and soil moisture levels to ensure that the soil is not being over watered. Secondly, samples of roots and a small quantity of soil (pieces about the size of a large pea) need to be taken, making sure that samples are taken from healthy vines (if any) as well as sick ones. These samples should be placed in

plastic bags, labelled clearly with the date and location in the vineyard, and sent to a pathologist to establish which fungi are doing most of the damage. Once the samples are sent off, chemical fungicides can be applied without destroying important information about what is causing the disease.

If the disease is severe, it may be desirable to apply a fungicide even before identifying it. A good bet in this situation is phosphorous acid. It is not expensive and is effective against two of the most common root rots (*Pythium* and *Phytophthora*). This approach has paid off in at least one situation I know of. The application rate used was 2.3ml of product (400 g/l active ingredient) per vine applied through the drip system.

When the fungus causing the problem has been identi-

fied, a fungicide specific to that disease can be applied. Some fungicides are very expensive to use in this way (eg Ridomil).

To sum up, root rots can be very costly. Prevention by wise soil management practices is by far the best option. If there is an outbreak, practical remedies are possible with chemical fungicides, but depending on the particular fungus, they can be very expensive.

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