

Leafroll viruses – what you need to know

The AWRI has been approached by regions with concerns about grapevine leafroll virus type 3 (GLRaV-3). As reports of virus-affected vines become more frequent in Australia, there is a need to better understand the insect vectors involved in their spread and the levels of virus infection at which action needs to be taken. To date, most research has been undertaken in countries which have a longer history of problems caused by viruses, including New Zealand, South Africa and the United States. The findings from this work provide useful guidelines; however, because the growing conditions, virus virulence and insect vectors in those countries may be different, Australian research is also needed.

What do leafroll virus symptoms look like?

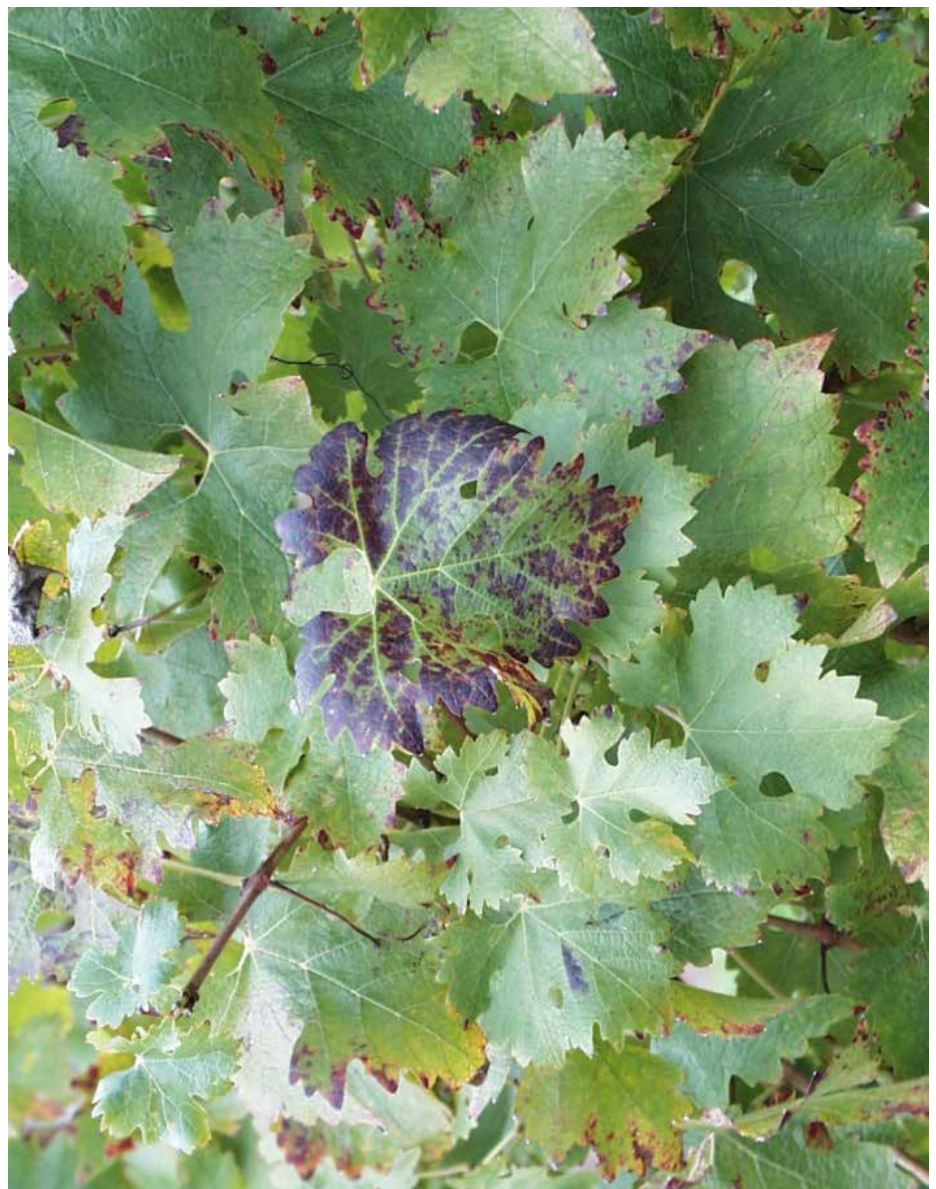
In some grape varieties virus symptoms can be very obvious, while others can show very few (if any) signs. Typical symptoms on foliage for leafroll viruses include downward rolling of leaves and reddening (in red varieties) or yellowing (in white varieties) of the leaf tissue between the main veins, which may remain green. The discolouration may be less obvious in white varieties and some nutrient deficiency symptoms can look similar to virus symptoms. Other physical symptoms of affected vines may include smaller canopies and reduced cane pruning weight. Reductions in yield and delayed maturity have also been seen. Fruit may have reduced colour, aromas and sugars and increased titratable acidity.

If I think that I have a virus present in my vineyard, what should I do?

If a grower suspects a virus infection or just wants to assess the virus status of a vineyard, the most reliable course of action is to send samples for diagnostic testing. Even if vines do not appear to have adverse impacts from the virus, a virus presence can still be a significant liability as the block can act as a source of inoculum which can spread to other susceptible varieties. If vines are showing the symptoms listed above, they should be the target of initial testing.

How are viruses spread?

Leafroll viruses are not known to be transmitted on pruning equipment or harvesters; however, insect vectors can be carried within and between blocks on vineyard machinery, so sanitation of equipment is important. Field spread of GLRaV-1, -3, and -4 has been observed



Symptoms of grapevine leafroll virus.

in Australia. GLRaV-1, -3, and -4 can be transmitted by mealybugs and by scale insects. All GLRaV species are transmitted through vegetative propagation and grafting. Transmission of viruses through grafting can occur from rootstock to scion and vice versa.

If virus infection is confirmed, what should I do?

Records should be kept of the locations of the infected vines. The whole of the infected vines, including as much root tissue as possible, should be removed



(rogued) and burned. Leafroll virus has been detected in root remnants years after a vine's removal, and soil vectors such as mealybug and nematodes could infect new plantings from infected root remnants. After removal of the infected vines, monitoring should be conducted in the location where the vines were removed, as well as of the new plantings to see if the virus is spreading.

If mealybugs are present on infected vine roots, it may be prudent to use a systemic insecticide on the vine prior to removal to reduce the mealybug population in the soil before replanting. The use of an insecticide soil drench on infected vines to aid in the control of mealybugs prior to roguing is a recommended strategy in New Zealand. Researchers in New Zealand investigated the effectiveness of using herbicide to reduce the capacity of roots to carry the virus. Treatments of glyphosate, metsulfuron or triclopyr applied to the cut stump did not consistently reduce the incidence of GLRaV-3 in remnant roots relative to the control and after 12 months

virus was detected in root remnants of all treatments.

If the incidence of virus in a block is high, it may be prudent to replant the whole block rather than manage the replanting and care of individual vines located sporadically throughout the vineyard. In New Zealand the threshold for replanting has been calculated at 20% virus incidence. Anecdotal evidence in Australia suggests that vineyards can remain economically viable with this level of infection, but this will depend on several factors including variety and the impact of virus presence on yield and quality.

Why might virus testing results differ between laboratories and what should I do to get the most accurate results?

Tissue samples taken at different times of the year may return different virus detection results. For instance, samples taken in summer or on very hot days may have reduced virus present such that the levels are undetectable. To

assess the virus status of a vineyard, it is recommended that five vines are selected at random from every 1000 vines in the block. One cutting from each vine is collected, either from dormant canes in winter or green shoots during the growing season. This will give a rough idea of the health status of the vineyard block. Collecting more samples will give a more accurate result. Canes for virus testing can be stored at 4°C for up to two weeks. Another reason for differences in reported virus detection results is that there is a range of methods of varying sensitivities. If laboratories are using different methods, the results could reflect this. For example, PCR methods are more sensitive than ELISA.

For more information on leafroll viruses or any other grapegrowing and winemaking technical matters, contact the AWRI helpdesk on helpdesk@awri.com.au or 08 8313 6600.



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