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LEAFROLL CONTROL STRATEGY

12. REPLACING WHOLE, HIGHLY LEAFROLL INFECTED VINEYARDS WITH NEW HEALTHY VINEYARDS

It is not uncommon in South Africa that after 10 to 12 years vineyards are 100 % infected by leafroll (Fig. 1), followed a few years later by unacceptable yield and grape quality losses. Such vineyards are therefore often replaced 15 to 18 years after planting, a significant financial cost.



Figure 1: Example of a vineyard in the Western Cape, South Africa, completely infected with leafroll disease. (Image: G. Pietersen, ARC-PPRI)

Some circumstantial evidence has been obtained in South Africa (Fig. 2), as well as in New Zealand, that grapevine leafroll-associated virus 3 (GLRaV-3) may spread from an old, highly infected vineyard to the newly established vineyard via viruliferous (virus carrying) mealybugs which, 1) either survive in the soil on remnant GLRaV-3 infected roots from the old vineyard, or 2) on volunteer hosts of the old vineyard, growing within the new vineyard.

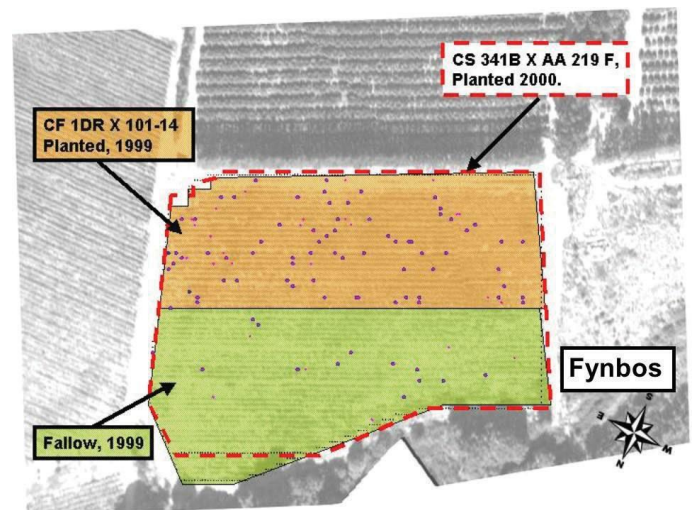


Figure 2: Aerial view of a vineyard planted in 2000 to a homogeneous source of Cabernet Sauvignon on a 101-14 MGT rootstock (red dashed line). The block was previously planted to Cabernet franc. In 1999, the grapevines in the lower section were removed and the area left fallow for one year. The grapevines in the top section were only removed before the new grapevines were planted in 2000. The newly established vineyard had a significantly ($P < 0.01$) greater number of leafroll infected grapevines, randomly distributed, in the upper half of the young vineyard. No obvious adjoining source of infection could be identified and the distribution within the affected half did not have a significant disease gradient. However, the distribution correlated spatially with the previous Cabernet franc vineyard that had a high incidence of leafroll infected grapevines, whereas the less affected half was spatially correlated with an area that had lain fallow for a season. This provides some circumstantial evidence that the new vineyard may have become infected with Leafroll from the previously highly infected vineyard at that site. (Image: G. Pietersen, ARC-PPRI)

This mode of spread would be due to the carry-over of viruliferous mealybugs between the removal of the old vineyard and re-establishment of the new one at that site. They could have survived on some residual grapevine roots or on volunteer grapevines, not properly removed, especially in the case of a short period between removal and replanting in the soil.

To control this mode of Leafroll spread a number of interventions are required, each reducing the chances of leafroll spread.

- Mealybugs from the old vineyard, carrying the virus, must be eliminated or their numbers at least drastically reduced, prior to removal of the old vineyard. Do this by applying Imidacloprid (a systemic insecticide) to the entire old vineyard as early after harvest as possible in the season prior to removal of the vineyard.
- All plant material from the old vineyard, carrying the virus, must be removed prior to planting the new vineyard. This requires the very thorough removal of old, infected grapevines and their roots (Fig. 3). Pulling out the grapevine is best achieved when the soil is wet as fewer roots break off and stay behind. Earlier it was recommended that the old grapevines be killed with herbicide prior to removal, but experiments have shown that grapevines are not effectively killed (up to their roots) by these treatments.



Figure 3: After removal of grapevines' trunks and aerial parts, ensure that the minimum root material stays behind. Remove this material or get it to desiccate by bringing it to the surface through tillage. (Image: G. Pietersen, ARC-PPRI)

- Make use of a fallow period (a time in which no grapevines are planted on a site), to get rid of any volunteer hosts (grapevine material from the old vineyard) that may be sprouting (Fig 4).



Figure 4: During a fallow period (no grapevines planted on the site) remove all volunteer rootstock (red circles) and cane material remaining from the old vineyard that is sprouting. (Image: G. Pietersen, ARC-PPRI)

- Make use of the fallow period to also remove any residual root material remaining from the old vineyard.
- The length of the fallow period is less important than the actual ability to remove this material in this time.
- When establishing the new block, do so with certified planting material.
- Treat the newly planted grapevines with a systemic insecticide, followed by annual rouging (to control the spread of leafroll through infected planting material) (Fig 5).



Figure 5: Treat all grapevines in the newly established vineyard with a soil drench of Imidacloprid (a systemic insecticide) to prevent any potentially leafroll infected grapevines that are not showing symptoms (circled) from serving as a source of secondary spread (arrows) to surrounding grapevines. Annually rogue any grapevines showing leafroll symptoms. (Image: G. Pietersen, ARC-PPRI)

- Dig out and remove all volunteer rootstock and scion material coming up in the new vineyard. The rootstock material may not show symptoms but is likely to be infected with leafroll, having come from a highly infected old vineyard (Fig 6).



Figure 6: After establishment of the new vineyard, ensure that all sprouting volunteer rootstock and scion material (red circle) from the previous vineyard at that site are removed annually. (Image: G. Pietersen, ARC-PPRI)

- When planning on doing whole vineyard replacement of multiple vineyards over a defined period (for example when planning a replant across the whole wine estate), start by removing the vineyards upwind first and then successive vineyards bordering them.
- Retain a running buffer zone between replanted new vineyards and the old infected vineyards (Fig. 7).



Figure 7: Example of phased whole vineyard replanting to replace multiple leafroll infected vineyards (red) with young leafroll managed vineyards (green) using a rolling buffer. If boundaries of vineyards are not immutable, the small plantings of buffer zones are not required. (Image: G. Pietersen, ARC-PPRI)

- The buffer zone, free of *Vitis*, is maintained to prevent infection from surrounding vineyards and should be a minimum of 10 meters (or three rows) but anything wider will reduce leafroll intrusion more effectively.
- During the interim phases where highly leafroll infected vineyards and healthy replanted vineyards exist on the same estate, ensure that measures to avoid spread from surrounding vineyards and external sources is conducted.

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Department of Viticulture and Oenology, Stellenbosch University
Author: Prof Gerhard Pietersen, University of Pretoria / ARC-PPRI