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STELLENBOSCH
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LEAFROLL CONTROL STRATEGY

11. CONTROL OF LEAFROLL SPREAD BY REMOVING INDIVIDUAL INFECTED GRAPEVINES (ROGUING)

The most prevalent means of spread of grapevine leafroll disease in South Africa is by far the disease spreading from an infected grapevine in a vineyard to grapevines immediately surrounding it. This spread **within** a vineyard is known as secondary spread (Fig. 1).

and more of their roots can be removed, as they have not yet penetrated deeply into the soil.

As a control strategy, roguing is most effectively applied in red-berried cultivars where leafroll disease symptoms are obvious in autumn. It can be used on white-berried cultivars and rootstocks when combined with grapevine leafroll-associated virus 3 (GLRaV-3) ELISA tests.

11.1 Roguing protocol

Visually identify leafroll infected grapevines in red-berried cultivars annually as late as possible in autumn, before leaf drop (Fig. 2). This is when symptoms are the most obvious.

Mark the trunk of infected grapevines with a polyvinyl acetate (PVA) paint diluted 1:5 with water in an insecticide knapsack sprayer (Fig. 2). Record the number of marked grapevines and their position (at least in which row number they occur) for ease of returning to them.

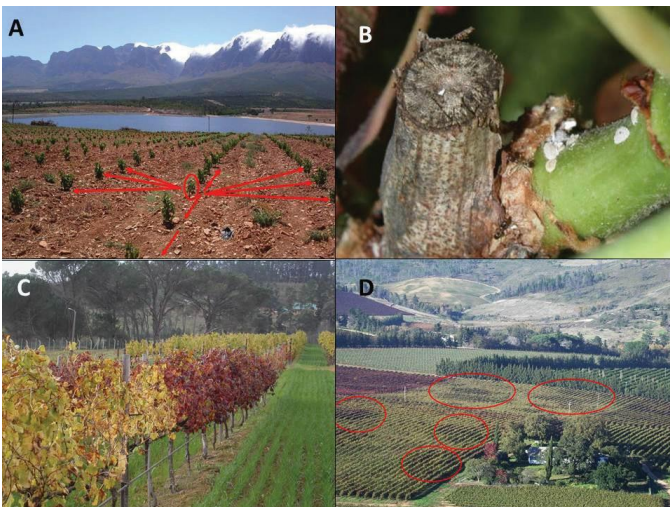


Figure 1: Secondary spread from an infected grapevine to surrounding grapevines (A) by virus-carrying mealybugs (B), resulting in runs of infected grapevines in rows (C) and eventually to foci (clusters) of infection (D). (Images: Gerhard Pietersen, ARC-PPRI)

Timeous removal of the infected grapevines, a process known as roguing, has been proven to be a very effective means of preventing further spread, especially when combined with successful mealybug control.

Roguing can be applied in vineyards of all ages; however it is best applied from as early in the lifetime of a vineyard as possible, before secondary spread has taken place. This ensures that the minimum number of grapevines needs to be removed. It is also easier to remove young grapevines



Figure 2: Monitor for leafroll symptoms in late autumn and mark the trunk with PVA in order to remove the grapevine once the ground is softer, after winter rains. (Image: G. Pietersen, ARC-PPRI)

If evidence of mealybug infestation is present on the grapevine, apply a contact insecticide to kill what are likely to be virus-carrying (viruliferous) mealybugs and in this way prevent them from moving to and infecting adjoining grapevines.

If evidence of the occurrence of secondary spread is found (two or more infected grapevines occur next to each other or in clumps), mark all the grapevines showing symptoms for removal and treat one or two grapevines on either side of the marked grapevines with a systemic insecticide. This is done because a number of these grapevines are likely to also have been infected by GLRaV-3 due to secondary spread of the virus but are not showing symptoms yet. They may be supporting viruliferous mealybugs which could spread GLRaV-3 further. Monitor and remove those insecticide treated grapevines that do develop symptoms of leafroll in subsequent seasons.

After leaf drop and when the soil is moist due to winter rains, completely remove all marked grapevines, making an effort to remove as many roots as possible. Remnant roots can survive in the soil for a long time and may serve as sources for mealybugs to acquire GLRaV-3 again.

Remove the rogued grapevine material from the vineyard and do not decompose or store in close proximity to other vineyards. This is done to prevent viruliferous mealybugs on this material moving to healthy grapevines.

11.2 Limitations to roguing

Roguing is not expected to be equally effective under all conditions. It will be most effective when mealybug numbers in the vineyard are also controlled.

Roguing is only effective against secondary spread but will not prevent primary spread of GLRaV-3 (that which brings the virus **into** the vineyard).

Roguing is also not effective if the numbers of latent leafroll infections (no symptoms visible but plants are infected already) are excessive, in which case stringent mealybug control over the whole vineyard must also be applied.

If you do not achieve a 50 % reduction in numbers of infected grapevines annually over two or three years following roguing, make sure you are controlling mealybug effectively and determine whether primary infection is not occurring. A sign of primary infection is the presence of infected grapevines primarily from the edges of vineyards.

Roguing may also not be effective in cultivars with long latent infection periods if using visual assessment of symptoms. For example green-berried cultivars such as Chardonnay, Semillon, and Cape Riesling do show leafroll symptoms but will have long latent phases in which the disease is not observed.

Roguing on white cultivars and rootstocks that do not show symptoms must be supported by laboratory tests for GLRaV-3 to identify infected grapevines.

11.3 Replant

Replanting of new, healthy, young grapevines can be successfully achieved in the positions left after roguing leafroll infected grapevines, especially in the first two or three seasons of a vineyard and when whole foci (clumps) are replaced in older vineyards (Fig. 3).



Figure 3: Replanting of young grapevines in clumps where leafroll infected grapevines were rogued (circled in aerial image) (Image: G. Pietersen, ARC-PPRI)

It is more difficult to replant single grapevines within old vineyards as these newly planted grapevines are subject to severe competition from the older adjacent grapevines and special measures must be implemented for the young grapevines to survive, including:

- Replanted grapevines must be provided with more water than the competing neighbors, including in the post-harvest period.
- Replanted grapevines must have vine guards to protect them from herbicide application used to control weeds in the established part of the vineyard.
- Replanted grapevines must be visited on two or three occasions during the growth season to single-shoot and train them up to the trellis.
- Replanted grapevines must be provided with additional appropriate fertilizers to ensure rapid vegetative growth in order to "catch-up" with the established grapevines.

- Weed control must be done around the replanted grapevine to avoid competition. More weeds tend to grow near the replanted grapevine because the soil there has been disturbed during infected grapevine roguing and the absence of any canopy allows more light to reach the vineyard floor. This weed control is best achieved with mulching which also helps retain moisture.

When replanting grapevines in spring, treat them with a systemic insecticide to ensure, should they be infested with viruliferous mealybugs that they do not serve as further sources of infection by secondary spread. This precaution is taken because they are planted in close proximity to where an infected leafroll grapevine was removed, where infected remnant roots may remain and viruliferous mealybugs may still occur in this planting space.

Replants must therefore also be monitored for leafroll symptoms annually in autumn and removed if disease symptoms occur. This must be done as a low incidence of re-infection of replanted grapevines by leafroll has been noted, due to viruliferous mealybugs still occurring in that planting space.

The feasibility of using large, potted grapevines grown for replanting is being assessed for local use.

11.4 Alternatives to replanting

If vineyards are well established, it is very difficult for replanted grapevines to be established and to reach the same level of production as previously established grapevines. The logistics of replanting single grapevines in established vineyards is also often difficult. An alternative is to extend the cordons of adjacent grapevines to fill the planting space where a grapevine was rogued (Fig. 4).



Figure 4: Extension of cordons (circled) to fill the space made by roguing a leafroll infected grapevine. (Image: T. Oosthuizen, Vititec)

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