

Elimination of grapevine viruses *in vitro* using a combination of thermotherapy and chemotherapy



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Stage 1
Sample submission



Stage 2
In Vitro establishment
2 - 3 months



Stage 3
Treatments
3 months



Test 1*



Stage 4
Rooting stage
1 - 2 months



Stage 5
Hardening off
3 months



Test 2*



Stage 6
Field testing
2 dormancies



Test 3*

Background

- Virus diseases can cause significant economic loss to the Australian grape and wine industry.
- The cost of maintaining a virus-infected vineyard is higher than that of an unaffected vineyard due to the additional expense of controlling insect vectors, roguing and replanting.
- An effective strategy to prevent grapevine virus disease is to establish a vineyard using virus-free or certified material.
- Imported niche grapevine varieties may contain one or more economically important viruses, which should be removed prior to their release to the market.

Methods

- A grapevine virus elimination service has been optimised involving thermotherapy and chemotherapy of tissue culture explants established from buds of virus-infected cuttings.
- The plantlets subjected to virus elimination are tested for the presence of viruses using polymerase chain reaction (PCR) during various stages of the elimination process, after three months in the glasshouse, and after two dormancy periods.

Results

- This method has been used on a range of varieties to successfully eliminate Grapevine leafroll-associated virus (GLRaV)-1, 2, 3, 4/9, Grapevine virus A (GVA), Grapevine fleck virus (GFVK) and Grapevine rupestris stem pitting-associated virus (GRSPaV) from a range of varieties (Table 1).
- GRSPaV, which is a minor virus and usually symptomless, is more difficult to eliminate. Two years after planting 30 virus-eliminated Carignan vines, four vines tested positive for GRSPaV (13%), while testing for the other viruses listed above gave negative results.

Table 1. Viruses removed from different grapevine varieties using the virus elimination procedure

Grapevine variety	Viruses removed [#]
Nero D'Avora	GRLaV-1, GVA, GRSPaV
Grenache Gris	GRLaV-1, GRLaV-3, GRSPaV
Mourisco Tinto	GVA, GRSPaV
Carignan	GVA, GRLaV-4/9, GRSPaV
Cinsault	GRSPaV, GRSPaV-SyD
Piquepoul Noir	GRSPaV, GRSPaV-SyD
Gamay	GVA, GRLaV-4/9, GRSPaV, GRSPaV-SyD
Torrontes Riojana	GRLaV-3, GRLaV-4/9, GRSPaV
Bonarda	LR2, GRSPaV
Prime seedless	GRLaV-1, GRLaV-3, GVA, GRSPaV
Pinot Gris	GFVK, GRSPaV
Unknown	GRLaV-2, GRSPaV

[#] Viruses with negative PCR results at stage 5 of the elimination process (post-hardening off stage in the glasshouse).
SyD = Syrah decline strain

This service is offered by AWRI Commercial Services.

* Virus elimination is confirmed by PCR tests at various stages throughout the elimination process



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