Factsheet

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Grapevine Pinot Gris virus

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Key messages

- Grapevine Pinot Gris virus (GPGV) is established and present in New South Wales, South Australia and Victoria and has been detected in a number of wine, table and rootstock varieties
- GPGV may be associated with grapevine leaf mottling and deformation but also occurs in symptomless grapevines
- The impact of GPGV on vine health and productivity is variable
- GPGV may occur in mixed infections with other viruses
- GPGV is spread through propagation material and grafting and is vectored by bud and blister mites
- Virus testing is required to confirm the presence of GPGV
- Vineyard planting material should be obtained from an accredited source and diagnostically tested for presence of GPGV
- Controlling mites and alternative hosts in the vineyard and removal of infected vines will also help to prevent the spread of GPGV.

Introduction

Grapevine Pinot Gris virus (GPGV) was first identified and characterised in Italy in 2012. It was named after the winegrape variety in which it was first detected, but subsequently has been found in many other wine, table and rootstock varieties, and in many countries. GPGV was first detected in Australia in 2016 and is established and present in New South Wales, South Australia and Victoria.

Symptoms

Overseas, GPGV has been associated with 'grapevine leaf mottling and deformation' (GLMD) disease in some winegrape varieties. GPGV has also been detected in grapevines expressing symptoms of other diseases (asymptomatic) and grapevines that appear healthy (symptomless). In some vigorous varieties, recovery from symptoms and presentation of normal growth has been observed after veraison. Clarification of symptoms and their association with GPGV in a range of wine, table and rootstock varieties and environments is still required. The occurrence of mixed infections of several virus species in single grapevines also presents a difficulty in attributing symptoms directly to GPGV.

Figure 1: **Chlorotic mottling and leaf distortion in Pinot Grigio, symptoms of GPGV. Image courtesy P. Saldarelli, University of Bari, Italy.**

Foliage

Leaves on GLMD-affected grapevines may have chlorotic mosaic or mottling symptoms (Figure 1), and may also be distorted. These symptoms are sometimes more pronounced early in the growing season and can resemble symptoms of cold or bud mite damage.

Vine growth

GLMD-affected grapevines may have stunted shoots, due to shortened internodes, and delayed budburst (Figure 2). Less common symptoms include poor lignification, shoot tip necrosis, zig-zag shoot growth and reduced cane weight (Figure 3).

Fruit

Reduced yield due to low bunch weight and bunch numbers has been reported in Italy in GLMD-affected Pinot Gris, Gewürztraminer and Glera (Prosecco) that were also infected with GPGV. Bunch shatter and desiccation, millerandage and delayed ripening were also reported. Fruit of affected grapevines may have increased acidity and lower sugar levels can occur in must. The impact of GLMD on fruit yield and quality in other varieties is currently unknown.

Varietal sensitivity

GPGV has been detected in many wine and table grape varieties and rootstocks, which suggests that most *Vitis* spp. are susceptible to infection. Variability in disease expression may be attributed to differences in varietal sensitivity to GPGV infection: some varieties express the more common symptoms of GLMD, while others are asymptomatic or symptomless. Pinot Gris, Pinot Blanc, Pinot Noir, Gewürztraminer, Tocai Friulano and Glera (Prosecco) are reported as the most sensitive varieties to GPGV infection in north-east Italy. Genetic variability of the virus is also reported to affect symptom expression. Variability in symptom expression from one season to another can also occur, and may be associated with environmental factors such as temperature and water stress.

Figure 2: Stunted shoots in Gewürztraminer, a symptom of GPGV. Image courtesy P. Saldarelli, University of Bari, Italy.

Figure 3: Stunted, zigzag growth and lateral shoot development caused by the bud mite strain of the grape erineum mite on *Vitis vinifera* in early spring. (W. Gartel) In: *Compendium Slide Sets A Pictorial Guide to Grape Diseases* © 1989 by The American Phytopathological Society produced in the United States of America.

Biology

GPGV presence worldwide

GPGV is a member of the genus *Trichovirus* in the subfamily *Trivirinae*, family *Betflexiviridae*. Many different strains of the virus have been detected in grape-growing regions of European and Asian countries, USA and Canada in North America, Brazil in South America and in three states of Australia (New South Wales, Victoria and South Australia). Multiple GPGV strains can occur within a single vineyard. Studies have suggested a division of GPGV strains into three or four clades. Some clades of GPGV consist of strains that are more commonly associated with GLMD-affected grapevines, whilst other clades contain strains more commonly associated with asymptomatic/symptomless grapevines.

Transmission and spread

GPGV is found in phloem tissues. Like similar viruses, it is not known to be mechanically transmitted by touch or *via* pruning and harvesting equipment. GPGV can be spread through the movement and subsequent planting of infected propagation material. The virus and the disease are also graft-transmissible.

Overseas it has been demonstrated that grape leaf bud and blister mites (*Colomerus vitis*) can transmit GPGV between grapevines (Figure 4). Other vectors are not known.

Virus movement within a grapevine

The concentration (titre) of GPGV within a vine can vary across the season, with the highest titre in spring and lowest in autumn. This variability can affect laboratory detection, as false negatives are possible if virus titre is below the level of detection.

In addition, distribution of GPGV within the grapevine can be uneven and sampling strategies need to be sufficient to ensure accurate detection.

Alternative hosts

In Europe, GPGV has been detected in several plant species, including *Ascelpias syricaca* (Common Milkweed) and *Chenopodium album* L. (Fat Hen), *Rubus* (Raspberries and Blackberries), *Rosa* species (e.g. Rose) and *Silene latifolia* subsp. Alba (Mill.) (White Campion). However, the importance of these alternative hosts as a reservoir from which mites can acquire the GPGV and then transmit it to grapevines, is unknown.

Disease management

GPGV is spread through propagation material. The nursery, vine improvement and germplasm sector is therefore critical in the management of GPGV. Material held by this sector should be routinely screened through active diagnostic testing and visual inspection for the presence of viruses and virus-associated diseases, including GPGV. Identification of GPGV infection is challenging because of the occurrence of symptomless or asymptomatic propagation material. It is therefore important to confirm the presence/absence of virus through diagnostic testing, which should be done at all points in the supply chain where infection and spread may occur. Such measures will help to ensure provision of high-health status propagation material (high-quality, pathogen-tested) to the sector and achieve desired productivity and sustainability for Australian vineyards.

Unpublished research in Australia has shown that a minimum of two shoots, one from each side of a grapevine, or 10 leaves with petioles randomly collected across an entire grapevine, is adequate for detection of GPGV during autumn, winter and spring. As GPGV can be spread by bud and blister mites, grapevines should be continually monitored and actively tested to check for new GPGV infections.

Active control of bud and blister mites, alternative GPGV hosts and rogueing of GPGV-infected vines should be undertaken by the nursery, vine improvement and germplasm sector. The use of grapevine tissue culture and/or an insect-proof screenhouse covered with a fine mesh to hold high-health germplasm can minimise risk of infection through vector activity and should be considered. Virus elimination can be undertaken to produce virus-free mother grapevines.

To reduce the risk of introducing GPGV into previously uninfected areas, all vineyards should use high-health planting material obtained from accredited sources for vineyard establishment and vine replacement. Both the scion and rootstock should be virus-tested separately when purchasing grafted vines and in grafting or top-working situations.

GPGV vectors and alternative hosts should be controlled in all commercial vineyards to minimise virus spread. In addition, the incidence of GPGV should be determined through virus testing and removal of GPGV-infected vines considered.

Figure 4: Bud mite damage. Image courtesy F. Constable.

Further information

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