

Grapevine fleck and associated viruses

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Summary

Fleck disease is named for the appearance of affected leaves on *Vitis rupestris* and is associated with grapevine fleck virus (GFkV). Many grapevine varieties and rootstocks infected by GFkV alone are symptomless although infection may be associated with graft incompatibilities.

Symptoms

Foliage

Fleck symptoms associated with GFkV primarily affect *V. rupestris*. Symptoms include clearing of the veinlets (they are stripped of colour) in young leaves (Figure 1), which can spread into a mosaic pattern in older leaves. Older leaves may also become distorted and curl upwards. Symptoms are observed in spring during mild weather and disappear with the onset of hotter temperatures.

Vine growth

GFkV, in combination with other virus-associated diseases, was linked with reduce growth and cane pruning weight in rootstocks; a 51% decrease in the

growth of 420 A and a 37% decrease in Kober 5BB has been observed. This will affect the quality of wood collected for propagation.

Fruit

There is no direct evidence of fruit yield and quality losses associated with fleck disease. However yield and quality losses have been reported from grapevines with mixed virus infections that include GFkV.

Varietal susceptibility

Fleck symptoms are observed on the sensitive indicator *V. rupestris*. GFkV infection is symptomless in other *Vitis* species and hybrids. Differences in symptom severity may also be associated with GFkV strain variation. Disease expression may be affected by environmental factors such as temperature and fleck symptoms often disappear during hot weather.

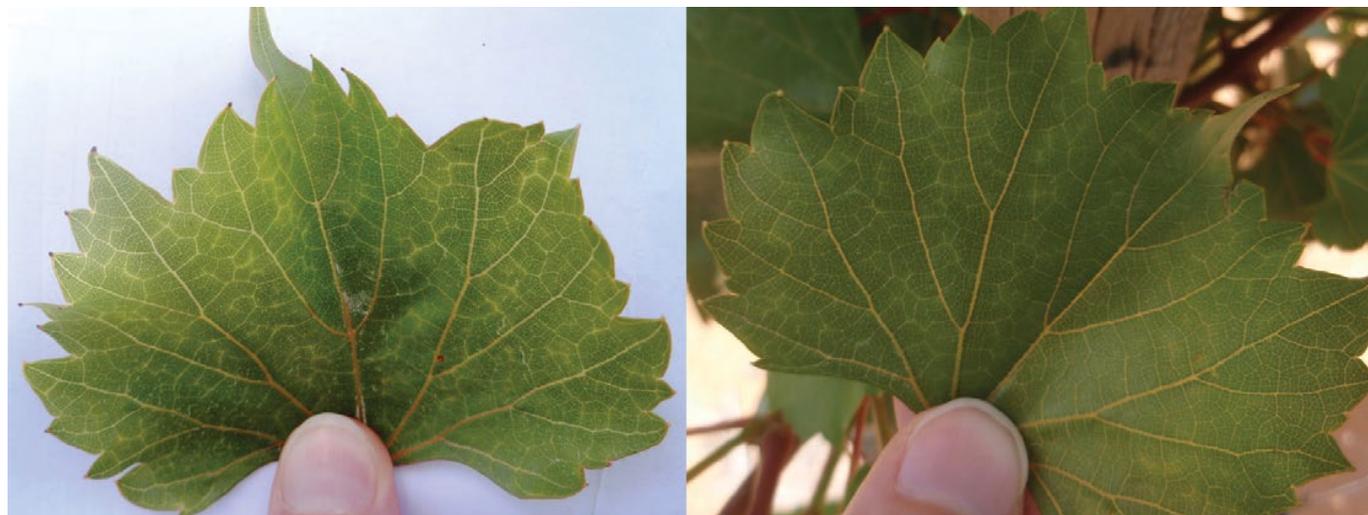


Figure 1: Vein clearing symptoms associated with fleck disease and grapevine fleck virus in *Vitis rupestris*. Note the distortion of the affected leaf on the left.

Biology

Fleck and related viruses

GFkV is a member of the family *Tymoviridae* in the genus *Maculavirus*. GFkV infects grapevines worldwide, including in Australia. There are four additional grapevine infecting viruses in the family *Tymoviridae*: grapevine red globe virus (GRGV) in the genus *Maculavirus*, and grapevine rupestris vein feathering virus (GRVFV), grapevine angular mosaic-associated virus (GAMaV) and grapevine Syrah virus-1 (GSyV-1) in the genus *Marafivirus*. GRVFV, GAMaV, GRGV, and GSyV-1 are not known to occur in Australia. GRGV is reported from Europe, GSyV-1 is reported from the USA and GRVFV and GAMaV have been detected in the USA and Europe.

Grapevine varieties and rootstocks infected with a *Maculavirus* or a *Marafivirus* may be symptomless. However, GFkV is associated with fleck symptoms, GRVFV with vein feathering symptoms and GAMaV with mosaic symptoms in *V. rupestris*. GRGV was isolated from grapevines with leafroll symptoms and GSyV-1 from Syrah grapevines exhibiting decline, but the association between these two viruses and disease is not known. The impact of GRVFV, GAMaV, GRGV, and GSyV-1 in combination with other viruses is also unknown.

In a recent survey of grape growing districts of mainland Australia (NSW, SA, Qld, WA and Vic.), GFkV was detected in 69 of 218 (32%) grapevines.

Transmission

GFkV is a virus only found in the phloem (part of the vine's vascular system) and is transmitted through propagation and grafting. Graft transmission can occur from rootstock to scion and vice versa. Field spread of GFkV has been reported in South Africa and Italy although no vector is known. Field spread of GFkV has not been reported in Australia. There are no reported vectors for GRGV, GRVFV, GAMaV or GSyV-1. However GSyV-1 was detected in the leafhopper *Erythroneura variabli*.

Virus movement and disease development

The concentration of the virus may be low and distribution can be uneven in grapevines at certain times of the year, particularly in the first season after an infection event. It can take more than 12 months for viruses to move from the point of infection to shoots and cordons of the grapevine. This can have important implications for virus detection and disease expression.

Alternative hosts

No naturally occurring alternative hosts have been reported for GFkV, GRGV, GRVFV, GAMaV or GSyV-1.

Disease management

Certification schemes have been established in Australia that aim to reduce the risk of spreading serious grapevine diseases by providing industry with high-quality, pathogen-tested planting material. High-health grapevine material is routinely screened for the presence of virus-associated diseases through visual inspection and active diagnostic testing for viruses. These schemes contribute to the improved productivity and sustainability of the viticulture sector and the use of high-health material is encouraged for vineyard establishment and vine replacement.

Although the impact of GFkV and other members of the family *Tymoviridae* is uncertain, the presence of these viruses could contribute to loss in quality and yield of fruit and propagation material in grapevines, particularly when they occur in mixed infections with other viruses. Vineyards should be routinely monitored for the presence of virus-associated diseases. If the presence of disease and associated viruses suspected, diagnostic testing can be done to confirm the presence of viruses, including GFkV. Removal of infected vines may reduce the risk of virus spread in a vineyard.

Because virus-infected grapevines may be symptomless, active virus testing of grapevines is recommended prior to top working to a new variety. If the new variety has not been obtained from an accredited certification scheme then it is recommended that it is also actively tested for virus. Symptomless infected grapevines may act as a reservoir for other sensitive varieties.

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