

Phylloxera Risk Management

Phylloxera and Grape Industry Board of SA
Support Paper No. 3:

History, Biology and Ecology of Phylloxera



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The history of Phylloxera

The initial impact of Phylloxera was first experienced in France in the 19th century, following the substantial movement of botanic collections of North American plants into Europe. These plants were hosts for pests and diseases that affected European plants, with the first impact on vines made by powdery mildew in 1847, followed by another wave of disease causing vine collapse from 1864. With the cause unknown, Phylloxera spread rapidly, as the exchange of propagation material between regions was common practice. Phylloxera was finally identified in 1872, but not before substantial areas of vines were destroyed.

Recognising that American *Vitis spp* were resistant to powdery mildew, French viticulturists allowed importation of material from the north-eastern United States until the 1860s. In 1878 the 'Agreement of Berne' set international rules on outbreak notification and border restrictions on movement of propagation material.

The first detection of Phylloxera in Australia was at Geelong in 1877. Once several vineyards were found to be infested, and based on experience in France, a policy of destroying vineyards was implemented. The first detection in New South Wales was in 1884 at Camden and further infestations were subsequently found nearby. Phylloxera was first found in Queensland at Enoggera, Brisbane, in 1910.

South Australia, which had not received infected material, banned movement of vine material under the powers of the *Vine Protection Act of 1874*. The first Phylloxera Act was enacted in 1899. Western Australia and Tasmania were also fortunate not to become infested with Phylloxera.

This strict ban on all importation of grape material to South Australia was in place until 1964. Since then, amendments to the importation of grape material and machinery have been adjusted as science has offered more information regarding the management of this pest.

What we know about Phylloxera

Phylloxera (*Daktulosphaira vitifoliae*) is an aphid-like insect which is native to eastern North America. In America there is a winged form of Phylloxera, but this form has been rarely observed in Australia and appears to be sterile.



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Adult Phylloxera are 1 mm long and yellow in colour in summer, tending to brown in winter. They feed exclusively on grapevines and may be found in the vineyard throughout the year, with peak populations in January and February. Eggs, which have hatched during spring into nymphs, develop as crawlers through several stages and may be found in the canopy. Following several crawler stages from 5 to 8 weeks to adulthood, they lay eggs of up to 200 eggs per cycle, and are capable of between four to seven cycles per season. Small numbers survive over winter by sheltering underground on vine roots and occasionally under the bark at the base of the vine.

As Phylloxera feed by puncturing the root surface, the vine responds by forming galls on root hairs and swellings on older roots. On the root hairs, these galls have a characteristic hook-shaped form and this damage stops the growth of the feeder roots. On larger roots, there can be swelling of the root tissue and subsequent decay through secondary fungal and bacterial infections. This, and the loss of feeder roots, causes *Vitis vinifera* to die. American *Vitis spp* (rootstocks) also react to Phylloxera feeding but not to the same extent as they have evolved to tolerate Phylloxera.

The first signs of a Phylloxera infestation include yellowing of vines and stunting of growth as leaf function is lost. Under dry conditions, symptoms may appear within 3 years, with vine death after 5-6 years. In the early stages of infestation, the affected area looks like an oil spot in its spreading pattern as the Phylloxera move from vine to adjacent vine. Soils such as cracking clays facilitate the spread in contrast to sandy soils that are more difficult for crawlers to move through. Wet seasons and well irrigated vineyards help the vine to fight off the damage cause by Phylloxera.

Phylloxera can only survive for up to 8 days without feeding on grapevines. Further, Phylloxera is a soft bodied insect with poor tolerance for heat and a preference for high humidity. Crawlers are capable of movement of up to 100m per season.

Analysis of the Phylloxera outbreaks in Europe in the late 19th century indicates that movement of infested plant material was the cause of the widespread infestations. Contamination of machinery and equipment, as well as shoes and clothing, is an additional cause of its spread.

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2

