

The role of scale insects as vectors of grapevine viruses in German viticulture

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Grapevine leafroll is one of the most widespread and economically important virus diseases of grapevine worldwide. It is caused by different Grapevine leafroll-associated viruses (GLRaV). Typically, symptomatic leaves of vines show a progressing interveinal discoloration and frequently roll downwards. Infected vines have often lower sugar content and the yield can be severely reduced. Scale insects are vectors of these viruses. The following species are known vectors and present in German viticulture: *Phenacoccus aceris*, *Heliococcus bohemicus*, *Pulvinaria vitis* and *Parthenolecanium corni*.

Healthy vines can be infected through feeding by scale insects if the vectors had previously acquired GLRaV from the phloem of infected vines. Nymphs of the mentioned species are more efficient vectors than adult females because they are more mobile than adults. Scale insects have a great sexual dimorphism and adult males of the four species cannot suck from phloem and are no vectors.

The role of scale insects as vectors in German viticulture needs to be checked through epidemiologically analyses. Different vineyards are tested for infection by the most widespread scale insect

transmissible viruses in Germany. These are Grapevine leafroll-associated virus 1 and -3 (GLRaV-1; -3) and Grapevine virus A (GVA). Additionally we investigate the occurrence of GLRaV-2. For this virus the vector and spread is unknown. The results of this survey will be used to reconsider the risk posed by scale insects as virus vectors to German viticulture.

In some winegrowing regions a high density of scale insects was found in vineyards. To investigate possible reasons for increasing scale insect populations, we aim to test the side effects of plant protection products on scale insects and their natural enemies. We use different fungicides, herbicides and insecticides in the lab. Since the native species *Phenacoccus aceris* is difficult to rear, the obscure mealybug *Pseudococcus viburni* is used as a model organism for these studies. Additionally a non target- organism (Parasitoid) will be checked as well. Products with direct or indirect side effects on our model organism *Pseudococcus viburni* will later be checked on the native scale insect *Phenacoccus aceris* in the same way, but with field sampled insects.