

Evaluation of RNAi as a control method for giant willow aphid *Tuberolachnus salignus*.

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The giant willow aphid *Tuberolachnus salignus* is an abundant pest species found throughout New Zealand. The aphids feed by sucking sap from the stems of willow trees reducing the trees' health and vigour. Aphid feeding activity also produces honeydew that attracts large numbers of vespid wasps, especially in urban parks which causes a public health and nuisance factor. These wasps also predate on some native insects and bees, and rob honey from hives sited near willow trees. Bees also harvest the aphid honeydew and from it make honey with a different sugar content that crystallises in the comb and is unable to be extracted. Many control methods are under development to reduce aphid numbers, including the manipulation of gene expression by RNAi. Using RNAi, willow trees would be injected or sprayed with dsRNA for a gene critical to *T. salignus* survival, and sap feeding would cause dsRNA uptake and aphid death. However, this method relies on the willow trees both taking up and then circulating foreign genetic material for the aphids to then feed on. To determine if this uptake and circulation is likely, we tested the uptake of a dsDNA construct in *Vicia faba* via qPCR. We found that uptake and circulation of foreign genetic material is significantly assisted by the ligation of a tRNA molecule to the dsDNA, and that the DNA can be detected in plant material following feeding, giving promise for this as a method of aphid control. This study will be replicated in willow trees to determine the efficiency of dsDNA translocation and the ability of *T. salignus* to ingest dsDNA by sap feeding.

