

# Plant Virus, Viroids and High Health Hops Plants

## Observations on Plant Virus and Viroid Status and Plans for High Health Plants

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The New Zealand hop industry is enjoying strong growth with new plantings and varietal switching leading to a significant percentage of total acreage being recently planted. New Zealand is fortunate to not have significant hop pest and disease pressure as is present in most overseas hop growing regions. However, New Zealand does have most of the major viruses of hops present worldwide. Apart from two studies (Hay et al. 1992; Pethybridge et al. 2009) there has been little work done on the presence or impact of hop viruses in New Zealand. These studies found all major hop viruses present overseas to be present in New Zealand. These included; Hop latent carlavirus, Hop mosaic carlavirus, American hop latent carlavirus, Arabis mosaic nepovirus, Apple mosaic ilarvirus. These studies did not explore the economic impact of the viruses. It is expected that the viruses do cause some economic impact (as they have overseas). Further work needs to be done to assess the quantum of any impacts on commonly grown New Zealand varieties.

As part of the Hāpi Brewing Success Programme we believe there is a meaningful opportunity to explore the impact of viruses and develop a high health plant programme to ensure nursery stock and new plantings are propagated from virus-free plants. Since New Zealand lacks many of the pests that are vectors for virus transmission overseas, transmission is likely to be slow within the New Zealand industry. We believe that New Zealand is ideally suited to maximise benefits from developing a high health plant propagation scheme. It is very probable that the wide distribution of virus in the New Zealand industry is a result of virus-infected propagating material. The New Zealand hop industry currently lacks a “clean plant” scheme as is commonly used in similar crops such as grapes in New Zealand (or hops overseas).

The Hāpi Programme is currently looking to progress the following activity:

1. Survey commercial hop farms, including newly planted gardens for virus presence.
2. Estimate the economic impact of viruses found on New Zealand farms
3. Establish protocols for generating virus free plants from the existing commercial cultivars
4. Developing a clean plant scheme with the major commercial propagation nursery(s).
5. Provide advice to the New Zealand industry on the availability and value of the clean plant scheme.

We seek to understand how widespread viruses are in hop plantings in New Zealand currently and then quantify the economic impact these viruses are having in terms of yield loss and quality loss for growers and/or processors.

Assuming we can confirm there is significant value in reducing the viral-load in hop plants, the programme plans to lead industry development of clean material and methods to routinely free hop plants from known viruses. It is likely the best way to generate clean plants is through meristem tissue culture with heat treatment. Hops are not routinely propagated by tissue culture but this method seems to produce plants that are more vigorous after planting (likely due to reduced viral load). Virus-free nuclear stock plants would be held in a clean plant health facility the stock of which would be made available to hop propagators (e.g. Waimea Nurseries who propagate a large portion of hop plants for the industry). This then gives New Zealand a high chance of reducing and potentially even eliminating viruses from farms due to the slow rate of spread of viruses.

