

The New Zealand Institute for Plant & Food Research Limited

Plant & Food  
**RESEARCH**

RANGAHAU AHUMĀRA KAI



# The DNA sequence of Psa

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# Whole genome sequencing

- » What is whole genome sequencing?
- » The team carrying out this work
- » Why are we doing it?
- » What is the value to the industry?



# What is Whole Genome Sequencing?

Determining the entire DNA sequence of an organism, in this case Psa

Distinguish different forms (e.g. Psa-V and Psa-LV) much more rapidly in a robust fashion

Identify the key components (genes) responsible for causing disease

‘Knowing thy enemy’

# Whole genome sequencing

## Team:

Once Psa detected in NZ MAF bought in

- » Prof Paul Rainey from Massey University
- » Prof David Guttman from The University of Toronto

Both international experts on the type of bacterium that causes Psa.

With Plant and Food we saw the need to immediately sequence the genome of Psa.



# Whole genome sequencing: Why?

We needed to do this for two reasons:

Unwanted organisms are a significant trade barrier. Although we suspect the Psa outbreak in New Zealand was an incursion to prove it we need to demonstrate that our Psa isolates were identical to one involved in overseas outbreaks.

Whatever the outcome of the research. The industry needs to be in control of the story. We do not want other countries telling us where our Psa originated.



# Whole genome sequencing

The second reason is that we needed robust detection methods.

Especially as there are clearly different variants of Psa.

The most notable of these is Psa-LV which is also present in NZ kiwifruit orchards, and the original Psa detection method can pick up Psa-LV and other closely related isolates.



# Whole genome sequencing

By sequencing and comparing the different variants we can confidently design our detection strategy around DNA that is only present in the New Zealand isolate of Psa-V.

We can do the same with Psa-LV so that our goal is to robustly differentiate the two quickly.

We have sequenced a number of different Psa variants from around NZ and the world.

# Whole genome sequencing

We've identified unique portions of Psa-V and Psa-LV and designed a detection strategy around it.

This is being tested against a wider range of Psa isolates from around NZ and against related species starting today.



# Whole genome sequencing

Once we are satisfied the test is robust we will pass it on to the providers who are tasked with providing the service for growers.

We have been in close contact with Terry Braggins at Hills Laboratories and John Mackay at Dnature (TaskForce GREEN) and have been discussing strategies and sharing data.



# Whole genome sequencing



The whole genome sequence also gives us a window to medium and long term control strategies.

The DNA that we have found that is unique to Psa-V codes for two genes.

Understanding what they do will help us develop resistance strategies

These genes will also be used in screens to rapidly find resistance genes in our Kiwifruit germplasm collection and speed up the breeding process.

# Summary

- » We will know the origin of the incursion shortly
- » A rapid (2-3 day) robust test for Psa-V and Psa-LV is on its way
- » Resistance breeding will be sped up
- » You will be kept up to date with progress via the KVH website



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