

# Visit to Chile to assess impacts of PsA-V, and to better coordinate research efforts

In January 2014, Dave Tanner and Barry O'Neil visited Chile and meet with industry leaders, government officials and university experts to assess the progress made by Chile in overcoming the impacts of PsA-V, and to strengthen the research efforts between the two countries.

## General

Chile is a major horticulture producer, and is the world number one for the production of table grapes and apples, number two in avocados and number three for kiwifruit. It has 11,000 ha in kiwifruit production, but the producing area has been decreasing by 5-10% per year, due to low returns combined with a fungal disease killing older vines.

The Hayward variety makes up the majority of production at 9,323 ha, with other varieties comprising 1,683 ha, and 35% of the total area is young plantings.

Due to previous impacts from Verticillium, nearly all the gold has been removed, with only 5% of plantings of other gold varieties (majority being Jintao, but also KiwiKiss, and Enza Gold). Verticillium wilt is not currently being seen, but there is concern that if new gold varieties are reintroduced it will reappear.

A severe polar frost lasting for five days in 2013 had a serious impact on production in some regions. While some growers lost 100% of their crop, this loss was variable and growers that had overhead frost protection have experienced minimal impacts. It is believed production will drop from an estimated 215,000 tonnes to 90,000 tonnes.

In 2012, Chile exported 260,000 tonnes of Hayward, 50% to Europe, 37% to the Americas, 9% to Asia and 4% to the Middle East. There are 150 post-harvest suppliers who nearly all export kiwifruit, however 10% manage 50% of the total crop in Chile.

The Chilean Kiwifruit Committee President Carlos Cruzat hosted our visit. The committee is a voluntary organisation which has 80% of the growers (growing 8500 ha) and 44 exporters as members. Growers pay \$US3.5 per tonne of kiwifruit exported to be a member.

The main roles of the committee are undertaking research, tech transfer, QA programs, promotion and marketing, but the committee has also taken the industry lead in the response to PsA.

## Observations from the visit

- Chile's summer climate in the Northern regions is less supportive of PsA as they don't get rain from November to March.
- Significant focus on Autumn/Winter as the period when infection enters vine, with leaf fall and winter copper spray frequencies at higher levels than New Zealand, probably due to spring/summer being much drier.
- The gold varieties are being fully removed on orchards with PsA, as Jintao and Kiwi Kiss are very susceptible (and make up 90% of their planted gold varieties).
- Growers are not cutting out infected material as they are concerned about what cuts to make, nor pruning males, leaving inoculum in orchards.
- Spray program similar to New Zealand, but not currently using Actigard. Investigating a yeast from Antarctica that will survive in winter.
- Growers were not following the SAG requirement to remove plants with secondary infection, but all orchard visited had built in concrete wheel washes for vehicles!

- Wood fungus disease appeared to be causing more problems for growers than Psa, and we need to better understand the reason why it is causing such a major problem for Chilean growers (since the same syndrome is seen in New Zealand grapes).

### **SAG meeting on Psa**

Psa was first diagnosed in Chile in January 2011 from a sample taken in November 2010, and in August 2011 SAG (equivalent of MPI) declared a mandatory control program. The program is very similar to the New Zealand program, with a few differences being: SAG undertaking a yearly monitoring survey between August and November; reliance on a 5km regulated area (c.f. NZ having 10km); and the requirement to remove infected plants with secondary symptoms (however on orchard visits we didn't see any evidence that this was happening). SAG also conducted 600 visits to orchards to monitor compliance with the control program last year.

The progression of the disease has been not dissimilar to what we have observed in New Zealand, and there are two regions affected with Psa, the most important being Maule region VII, which has 50% of Chilean crop mainly in Talca, and Curico. The second region affected, Bio Bio region VIII, produces less than 5% of the crop mainly close to Rancagua.

In region VII in 2011 there were six orchards infected with Psa, in 2012 another 40 and 2013 another 43, totalling 89 infected orchards or 82% of the growers in that region infected with Psa. In region VIII there are now 28 infected orchards or 18% of growers in the region. However, in region VI they are seeing vines with Psa like symptoms, but haven't been able to detect Psa-V as yet (500 samples all negative). This is a concern for them as this region is the other major kiwifruit growing region in Chile producing 37% of their crop. They also have severe nematode problems and believe these may be causing the symptoms seen.

More aggressive Psa-V symptoms and spread have been observed following the frost event, the majority of spread believed to be associated with human transfer. Little flower drop was seen in Hayward this season due to favourable weather conditions in spring, but it was observed last season with some growers losing up to 60% of their flowers, although they thought this was mainly due to other forms of *Pseudomonas* including *viridiflava*.

Their spray program is based on copper, with SAG recommendations of one application per week post-harvest and in winter, and every 15 days in spring, although most growers we met were not doing this. Antibiotics are also being used by some growers (streptomycin and gentamycin). Actiguard (Bion) is not available as yet.

### **University of Chile and Psa technical committee**

A Psa technical committee had been established comprising SAG, University experts, growers and the kiwifruit committee. This is the group that has driven the research program, including developing the risk models that are used, and the components of the control program that SAG has regulated.

The research efforts to date have focused on products and their application, epidemiology, and development of a geographical risk model to determine growing region risk level, along with a calculator to determine individual property risk level. The risk model is based on Japanese work, and takes into account climatic conditions within the region, distance from Psa infected orchard, type of varieties grown, and age of orchard, each with different weightings. In the future they will look to add a frost component. While their risk model is suited to the significant geographical difference in a country the length of Chile (4,300km), it would not be as useful in New Zealand, especially with the wider spread that we are now seeing.

One issue of concern discussed was the wood fungal disease that is a Basidiomycota fungal complex similar to Esca disease in grapevines in Italy and France (and New Zealand). The incidence varies on orchards from 5-50%, with stressed vines more severely affected and leaders completely dying. Most growers have grown suckers to replace leaders (Hayward rootstock), to minimise the time it takes to replace leaders. Older vines (6-10 years) are more affected, and Chilean researchers have found two species of *Trichoderma* that successfully compete with the five groups of fungi involved.

## **Orchard visits**

### **Orchard 1, Segrade Familia**

This was the first orchard identified as positive in Chile, with samples taken in November 2010, but not confirmed as positive until January 2011. The grower believed he saw symptoms in 2009, in Jintao and thinks scion wood either from Jintao or Summer Kiwi introduced infection. The frost had impacted the orchard significantly, with production dropping from 30 tonnes per ha to 10 tonnes.

Little Psa was identified, but wood fungus disease was evident.

### **Orchard 2, Maule**

Frost had again impacted on this orchard with production dropping from 40 tonnes a hectare to 12 tonnes. Summer Kiwi heavily impacted by Psa, especially the males (Faenza), even with a strong copper and antibiotic spray program (post-harvest, three over leaf fall, every 20 days over winter and three during spring based on weather events). Last year 10% of flowers lost due to Psa in Hayward.

Psa spray program costing \$US1200 per year.

### **Orchard 3, Longavi**

This orchard had Jintao and had the highest infections levels of the orchards we observed. The grower is going to completely remove the orchard as it is not viable with such a high level of Psa infection, even though he had used an aggressive spray program. The males (Berlin) in the block were also heavily infected. The Hayward blocks nearby also had more infection than we had seen on others, no doubt coming from the heavily infected Jintao.

Kiwi Kiss had already been completely removed as it was the first variety to die, and Jintao, while able to survive slightly longer is also non-viable in a Psa environment.

### **Orchard 4, Roberto**

This was the only orchard we visited that had overhead frost protection, and also applied artificial pollen, and as such had the best crop we saw. Interestingly, like all the orchards we visited, infected material was not being removed from the orchard, and males haven't been pruned (due to concerns of infection entering the wound).



**Appendix:** Photographs of the orchards visited.

**Orchard 1, Segrade Familia**







**Orchard 2, Maule**







**Orchard 3, Longavi**









**Orchard 4, Roberto**

