MANAGING KIWIFRUIT ORCHARDS IN 2010/11 IN LIGHT OF THE PSA BACTERIAL DISEASE

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Introdution

It is nearly four weeks since the first identification of the Psa bacteria in New Zealand kiwifruit orchards and the industry is relieved that the disease appears to be being contained by the swift action taken to date.

There is limited information on Psa so far, but a rapid increase in information and swift information dissemination through the industry. In this article, I will discuss aspects of 'living with Psa' for the 2010/11 season.

Other horticultural crops deal with bacterial diseases on an ongoing basis and we are coming to that for Psa, with the 'living with Psa' focus the New Zealand kiwifruit industry is now developing.

New Zealand has good scientists and good collaboration and interaction between scientists, growers and other industry practitioners which helps to get further faster with addressing problems and implementing practical solutions. Learning is also being advanced through working with the kiwifruit industry overseas.

I did some checking on didymo – also known as 'rock snot' which is a microscopic type of algae that was first found in New Zealand in 2004. It's not a bacteria like Psa is, but there were similar concerns of the widespread potential impact. By 2007, New Zealand work on the containment of didymo meant 'we' were considered world experts on its management. The 'check, clean, dry' maxim and strategy to help prevent didymo spread into other waterways seems to be having some success and is widely promoted by regulatory and voluntary organisations.

In Psa, we have a kiwifruit-specific bacteria. That could prove to be a good thing as it means there aren't a range of other host plants that could harbour and spread the problem. Kiwifruit also isn't a common home-garden plant in New Zealand in the way citrus or feijoa are, nor does it have close-relatives common in home gardens, so there isn't a very dispersed plant population to keep tabs on. When bacterial fire-blight first appeared in New Zealand in the 1920's, the main concern was about infections on pipfruit and a lot of related host plants such as hedging were removed to reduce spread of the disease.

Revision-reading on bacterial plant diseases shows that some things we need to keep in mind are:

• Expression of symptoms can be very variable between seasons, regions and orchards,

• Wet surfaces are often required for bacteria to infect a host,

• Access into plants is also a key factor in bacteria being able to cause plant diseases– wounds and cracks can provide entry sites,

• Temperature also affects bacteria, with warmer or cooler temperatures favouring specific bacteria.

The disease triangle was presented by ZESPRI's Dr David Tanner at the industry meetings about Psa. It is a good framework for emphasising that disease problems occurring are not just about having the disease-causing agent present, but also about how the plant and environmental factors interact. There needs to be favourable environmental conditions and a susceptible host plant to get expression of the disease.

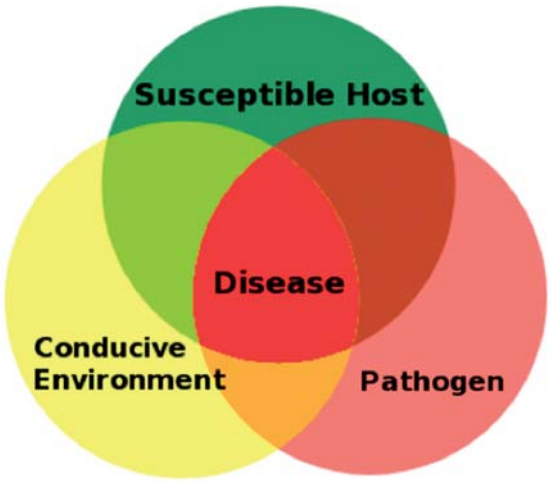

Figure1. The Disease Triangle - Disease occurs when there is a pathogen (disease-causing agent) and also a susceptible host plant and conducive environmental conditions. Picture sourced from Wikipedia.

We experienced a very unusual spring this year with a particularly cold and wet late August and September. These environmental conditions may well have been just the kind to favour the expression of Psa in New Zealand kiwifruit orchards.

I'm going to discuss how we might exploit the environmental part of this triangle to help contain Psa. But first, I want to use 'budrot' (bacterial blossom blight) as an example where a change in the orchard environment has been a big factor in containing impacts from a bacterial disease of kiwifruit. Bacterial blossom blight ('budrot') was of significant concern to kiwifruit growers in the 1980's and early 1990's and some good research was done to understand and control the disease. Since then, however, budrot hasn't been a big concern, despite few specific control measures, except in unusual seasons like in 1999 when it rained solidly through the Bay of Plenty GREEN Kiwifruit flowering period. Why was there this drop off in the impact of bacterial blossom blight?

The biggest change is drier kiwifruit canopies, particularly due to the removal of excess shelter in orchards. The shelter had done its job protecting young vines and was reducing production through shading, reduced productive area and competition with vines. With the progress of integrated pest management through KiwiGreen, we were also more aware of the pest populations being hosted in shelter trees well above the height crop protection measures could readily impact.

The other big changes are more timely summer canopy management and generally more open canopies. The big push on this was done to reduce botrytis fungal problems after harvest but it also helped to dry out the canopy, which has helped to reduce bacterial blossom blight. Males are also now more separate from females and often more open.

The prevalent conversion of T-bar to pergola vine support structures will also have helped as some T-Bars tended to have an almost vertical curtain, so moisture from the upper parts of the vine kept the lower parts wet for longer and where the T-bar met the sward it often created a barrier to air movement compared to the open access under pergola vines.

A lot of these changes weren't made specifically to combat budrot, but to increase general orchard performance or to contain other diseases or pests. Next, I'll go through some strategies for managing orchards where Psa has been diagnosed this season, then some longer term issues and strategies.

Managing an Orchard with Psa to the2011 Harvest

The initial industry focus has quite properly been on avoiding the spread of Psa from orchard to orchard. However, containing it to the currently affected areas within an orchard is also important. I am sure more advice will be developed in this area, but here are the suggested strategies discussed in our office:

• Decide your preferred management strategy, then work out how it needs to be modified by measures to contain Psa,

• Reassess vine and leaf condition before each activity this season,

• Use hygiene practices between unaffected and affected areas similar to those recommended between affected and unaffected orchards,

• Deal with the vines well away from symptoms first i.e. unaffected blocks or parts of blocks,

• Work on a properly dry canopy in buffer areas and symptomatic areas.

Dew and slow-drying days can mean canopies are wet well into the day even when there has been no recent rain. Because of the importance of moisture for moving bacteria and the possible entry sites created when pruning vines, working on properly dry vines in buffer areas and areas with Psa-leaf spotting will help to contain the spread. It is even better if there is dry weather for a couple of days after pruning activities while vines start to heal the cuts. Avoid unintended damage to vines by checking the mower covers and sprayer set-up.

Figure 2. Psa Leaf Spotting on GOLD kiwifruit. Photo: Sandy Scarrow

Other Issues for Managing with Psa

Irrigation – to contain Psa, it is best that irrigation doesn't wet the vine canopy. If your irrigation does wet the canopy significantly then hold off irrigating for a few days after pruning activities while cuts heal. Time irrigation applications to minimise the duration the canopy is wet, particularly in symptomatic and buffer areas. The early morning is probably the best time as any dew will be forming then. In the longer term, I suggest investigating whether you can modify your irrigation system to minimise canopy wetting during irrigation.

If 'over-under' sprinkler frost protection is doubling as irrigation, before the sprinklers are brought under the canopy, check you are only using it as often and for as long as required. For next spring and for those of you

with overhead sprinkler frost protection, use tight on-and-off temperature criteria rather than turning it on earlier or off later as an added precaution against frost damage. However, it is important to avoid frost damage, remembering that young vines with thin trunks close to the ground where it is generally colder are more vulnerable to frost damage. The one winter I lived in Hawke's Bay was very frosty and while many kiwifruit vines were still fairly young, there were vines showing extensive frost damage in the spring that year, but not in subsequent years with fewer winter frosts.

Under-vine shelters – these are being widely used for warming orchards with good results. Check that they don't become an aid to keeping the canopy wet for too long.

Seasonal conditions – windy wet weather conditions are likely to favour disease spread due to the wounds created by wind damage and the moisture available to move the bacteria around and into the wounds. Check the most exposed parts of your orchards in the week or two following these types of conditions.

Spring canopy check - have a spring walk through the orchard. As well as looking at leaf condition, it is a chance to note (and deal with!) other issues like any spreading of Armillaria, new rabbit holes, broken structures and wires.

Future Management

Again, a lot more will be written about this prior to the beginning of next season. It is useful however, to read other research and consider what other industries do to manage bacterial diseases. Research done on bacterial blossom blight in the 1990's identified a pre-budburst copper spray as being effective in bringing infection levels down. This may become a common practice within the crop protection programme as a measure against Psa. Furthermore, the pipfruit industry sometimes has to aggressively manage infections of fire blight, often consisting of cutting out infected material. Again, this may become a normal part of kiwifruit management when severe Psa infections occur.

I haven't written specifically about vines that have been cut back as part of the aggressive containment strategy for Psa. Many of the principles and strategies here will apply to these orchards, but with the focus on re-developing the canopy.

In summary, managing the orchard operations and environment will be part of the strategy to contain Psa this season. Psa won't be the only feature of this season and on most orchards there is every prospect of a good crop for 2011. ■

Figure 3. Psa symptoms on GOLD kiwifruit. The shoot in the photo foreground is purple coloured from the breakdown of the plant vascular tissue, causing leaf and shoot wilting. Normally the foreground shoot would be green, like the leaf stalks in the background. Photo: Sandy Scarrow