

Neonectria: what you need to know

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Early reporting is a win-win

Every grower will have an ugly vine or two on their orchard and, other than lost productivity, these may not be considered an issue. However, when the odd vine – which might cost you around \$400 in lost production annually – becomes three or four, or a quick review of a block shows that symptoms are in fact more widespread, the financial impacts can quickly reach into the tens of thousands of dollars. This highlights the value and peace of mind in calling on Kiwifruit Vine Health (KVH) to help understand what is really going on.

This article uses a recent organism on our radar - *Neonectria* - as a case study to highlight the value of monitoring and early reporting, and shows how research projects are developed to provide new

knowledge and advice about how growers can manage risks on-orchard.

What do we know?

KVH's first encounter with *Neonectria* microconidia (which is commonly referred to as *Neonectria* canker of kiwifruit, or just *Neonectria*) was in 2015 when a proactive grower reported unusual trunk canker symptoms on three young Gold3 blocks.

Samples were tested for Psa as symptoms resembled typical Psa infection, but results came back undetected for all variants of the bacteria. When more samples were tested, *Neonectria* was identified as one of the organisms present.

Although this was the first formal identification of *Neonectria microconidia* in New Zealand, a Ministry for Primary

Industries (MPI) investigation subsequently found that the organism had in fact been found in a Te Puke kiwifruit sample in 2013 but was classed and referred to under a different scientific name at the time. Today's science has been able to confirm that not only the 2013 sample is what we now know as *Neonectria microconidia*, but also confirmed isolates of this organism from as far back as 2001, as well as presence in almost all kiwifruit growing regions across the country.

With this new understanding, scientists now believe that *Neonectria* has likely been in New Zealand for much longer than originally thought (and likely earlier than the earliest confirmed isolations from 2001).

In October 2018, *Neonectria* resurfaced when a South Island grower reported



Typical cantering symptoms seen on a South Island orchard. Note the old and unprotected pruning wounds around the canker and the loss of canopy.

an increase in cane and leader die-back, and in the number of trunk and leader cankers seen in some of his Gold3 blocks. Monitoring results showed incidence of these unusual symptoms had increased from a few dying vines in 2017 (when the cankers were first noted) to 5 percent of vines across two blocks in 2018. There also appeared to be hot spots of infection in portions of his blocks, with the worst affected rows having up to 15 percent of vines affected.

KVH visited the region and samples were sent to MPI, with results indicating the presence of *Neonectria*. To build more knowledge about the spread of symptoms across the South Island, KVH requested growers monitor for symptoms and report back. This quickly highlighted that similar symptoms were also being seen across other orchards in the region and the October 2018 case was not an isolated one.

While *Neonectria* was known to be present in other regions such as the Bay of Plenty, with similar symptoms, it seemed that the symptoms were more severe and prevalent in the South Island. KVH and Zespri have been undertaking research to better understand if this is the case and how growers should best manage it on-orchard.

What has our research told us?

When KVH became aware of the incidence of *Neonectria* in the South Island it was acknowledged that little was known about the organism and that research was needed so that meaningful advice and guidance could be provided to growers.

A robust vine decline research programme was launched through the Zespri/KVH Biosecurity Innovation portfolio and the following is a summary of the key findings to date.

Where is *Neonectria* found?

We wanted to understand if *Neonectria* had recently arrived in the South Island, as this is what could have led to the increase in incidence. As a first objective, a survey across South Island growing areas was completed, with symptomatic vines tagged and locations recorded.

Samples were collected from each site and tested by Plant & Food Research (PFR). *Neonectria* was isolated from more than half of the KPINs sampled, suggesting the



Kiwifruit canker spores. Image credit Robert Lamberts PFR.

SCIENTIFIC NAME:

Neonectria microconidia

COMMON NAME:

Neonectria

CAUSES:

Canker of kiwifruit

ORGANISM TYPE:

Fungus

WHAT TO LOOK OUT FOR:

Cankers (top image) and spores (bottom image).



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KVH's Linda Peacock leading an on-orchard discussion with growers about Neonectria.

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organism is well distributed throughout the South Island and so unlikely to be a recent arrival to the region.

Is it pathogenic?

The next research question aimed to determine whether *Neonectria* is pathogenic (disease causing). It is quite common for complexes of organisms to be identified in kiwifruit tissue, but these may not all necessarily link to disease. Early lab trials have indicated that *Neonectria* can cause disease and the prevalence of *Neonectria* across and along the cankers also supports this.

Are there more susceptible varieties?

While growers had reported symptoms across Gold3 and Hayward, males and females, young and old vines, the trend was for more symptom expression in Gold3. Mirroring these orchard observations, recent pathogenicity trials suggest Gold3 is more susceptible to *Neonectria* infection, compared with the other varieties tested (Arguta, Red19 and Hayward were also tested).

Is *Neonectria* the only culprit?

A larger research programme on Kiwifruit Trunk Diseases (KTDs) is underway which is looking to better understand other fungal organisms also present in our vines. Early results show a complex mix of pathogens can be found in KTDs, but there are a few organisms that stand out as more problematic - *Neonectria* was one of these. Research is ongoing to help understand how these pathogens interact with each other. It is likely that some combinations will result in more significant disease.

Where is *Neonectria* found in the vine?

Neonectria has been isolated from symptomatic (visibly diseased) vines, predominantly from swollen canker symptoms but the organism can also be found in vines that are asymptomatic (i.e., appear healthy from the outside). Isolations have been made from across leader and trunk cankers and also from tissue up to 20cm beyond the edges of cankers.

There also appears to be a strong association of cankers with old, unprotected pruning wounds suggesting these may have provided an entry point to the vine.

How have we been supporting growers?

KVH, Zespri and scientists first visited the South Island region in December 2018 to see *Neonectria* symptoms first-hand, share latest information, and learn more from growers about the extent of the symptoms noted up to that point.

KVH has kept in contact with growers, checking on the successes of their management practices with the knowledge that the blend of science, and an understanding of what works at orchard level is important to ensure advice is practical and effective.

A second grower workshop was held in Motueka in February 2021 allowing KVH, Zespri and PFR scientists to reconnect with South Island growers, present latest knowledge on *Neonectria* and vine decline research. A field visit provided growers and researchers with a great opportunity to see typical canker symptoms and to understand from affected growers what the management lessons were going forward.

The strong advice was always having good tool hygiene, protect pruning wounds, monitor blocks, and cut and remove infections early.

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What to look out for

Typical symptoms include trunk and/or leader cankers. These cankers are often close to old pruning wounds. Other symptoms associated with *Neonectria* include cracking and swelling along infected trunks and leaders, and cane and leader dieback. Patchy budbreak, and reduced leaf and fruit size can also be an indicator of infection.

Monitoring is important

The first indication that *Neonectria* was increasing in the South Island was through a proactive grower monitoring his orchard and noticing a change in his vines. We know monitoring is important for several reasons:

- ✓ By becoming familiar with what is normal for the site, anything new or different can be identified early allowing early symptom removal, as required;
- ✓ Monitoring helps establish disease presence, location, and extent so that it can be managed. It also provides feedback on the success of applied management strategies;
- ✓ Identifies vines and areas of the orchard to avoid for budwood collection;

All vines that are showing symptoms should be clearly tagged. While these tags are a good way to follow infection progression, they also double as a tool to guide budwood collectors where to avoid collection.

While research is still underway to understand the risk of budwood in disease transfer of *Neonectria*, a recommended precautionary approach is to avoid any diseased vines so that wood from unhealthy vines is not distributed to other orchards, which may result in disease transfer.

It is good practice to also have a buffer zone around infected vines, where material is not collected. Where symptoms are widespread across a block, it is recommended to not collect budwood across that whole block.

Management advice: what to do if you see *Neonectria*-like cankers on your orchard

Management advice will continue to be refined as research informs best practice.

Current advice is:

- ✓ Monitoring and tagging rounds in spring and autumn to identify disease presence and areas to avoid when collecting budwood;
- ✓ On-orchard hygiene, including a strong focus on tool hygiene. Methylated spirits or 10% chlorine bleach are suitable sanitiser options and need to be replenished regularly;
- ✓ Prune in dry weather;
- ✓ Protect wounds to prevent disease entry;
- ✓ Remove and burn infected material soon as practicable. Do not mulch;
- ✓ Canker removal rounds will reduce spread through spores;
- ✓ Spring and autumn applications of copper are likely to help minimise risk of spread. Applying copper immediately before winter pruning will help suppress inoculum spread;
- ✓ Consider putting in a replacement plant in areas with higher disease incidence. ■