KVH Best Practice Advice

Monitoring for pests and disease

Background

Monitoring an orchard is important for several reasons. By becoming familiar with what is usual for your plants you can pick up on anything new or different early on and identify disease for early removal, if required. Monitoring is also a critical component of establishing disease presence, location, and volume so that it can be managed.

When and how often should I monitor?

Psa	• Regular monitoring is advised, starting shortly before budburst and continuing throughout the year. • Ideally, every plant in an orchard should be inspected. • Spring and autumn are considered the higher risk infection periods. • As soon as sap flow begins Psa symptoms may express in the form of red exudate from pruning wounds and cane joints. • There tends to be a reduction in symptom expression in summer. Monitoring may therefore be able to be reduced over this time (dependent on location/risk factors)/ *Once an infection is detected, particularly in high risk vines, weekly monitoring should be completed to identify and remove secondary Psa symptoms.*
Other diseases	• When you are doing your spring round of mandatory monitoring for Psa you should look out for other symptoms as well. • Budbreak is a good time to look out for vines which have canes where budbreak has failed. • In late summer look at leaf condition. • During fruit set watch for fruit drop and damage to fruit which may indicate the presence of pests.

Where should I focus in my orchard?

Psa	• Focus on high-risk plants that may show infection first:
	  ○ Gold is more susceptible than Green.
	  ○ Young vines are more susceptible than older vines.
	  ○ Older male varieties are generally more susceptible than female vines.
	• Focus on high-risk areas of your orchard where infection may appear first:
	  ○ Areas near gaps in shelter and exposed to prevailing winds.
	  ○ Edge of blocks where there may be more vehicle movement around the orchard.
	  ○ Areas where vines are under stress, e.g., frost pockets, water-logged areas, and wind prone areas.

Other diseases	• Plants which are high-risk for Psa may also be at risk of other diseases – young vines, stressed vines and those in colder pockets or exposed areas of the orchard.

What should I look for?

Psa	Psa symptoms may differ with time of year and variety. Before beginning monitoring, familiarise yourself with typical Psa symptoms. • Spring – Once there is a canopy, leaf spotting is the most common symptom. Shoot dieback may be evident. – The appearance of leaf spot and dieback is often associated with weather events. Leaf spot is not as commonly seen in Gold. Often, first signs of infection in this variety is shoot or cane dieback. • Summer – Generally, a quieter time for the appearance of symptoms. – However, shoot dieback in Gold varieties appears to increase from late summer to early autumn. • Autumn – Cane dieback is the most common symptom seen. – Young vines rubbing on wires may result in wounds that can provide an entry point for Psa. • Winter – The most common symptom in Gold varieties is red exudate in canes or leaders. – Similar exudate symptoms can be seen on Hayward vines (usually first seen in older male varieties). – Cut trunks ready for grafting should be inspected, as they may show exudate if infected.
Other diseases	Be on the lookout year-round for pests that you haven't seen before or are on the Kiwifruit's Most Unwanted list, and anything unusual that can't be explained. • Spring – Failed budbreak, buds rotting or dropping off, flower infection, cupped leaves. • Summer – Wilting or yellowing leaves, dying plants. • Autumn – Mushroom like growths, fruit damage that can't be explained. • Winter – Cankers, exudate which isn't Psa, peeling bark.

Symptom Identification

Psa	• Visiting an infected orchard to observe Psa symptoms is a good way of educating monitoring staff who need to know what to look for. • KVH has produced a number of resources to assist in identifying symptoms. o KVH fact sheet *Identification of Psa-V symptoms* o *Psa-V Symptoms Guide* o *Psa Symptoms Guide for ZESPRI varieties* o KVH *Seasonal Management Guides* - refer to Psa-V Yearly Monitoring Guide on last page o YouTube demonstration video on *Psa monitoring and common symptoms* o Case study video – managing Hort16A in a Psa environment
Other diseases	KVH can arrange for a diagnosis from the Ministry for Primary Industries (MPI) lab for unusual symptoms that are causing concern on an orchard and have no explainable cause.

What do I do if I find unusual symptoms on my orchard?

Psa	• If symptoms are seen, confirm they are typical of Psa-V. • Check any cane wilting/dieback is not the result of physical damage, e.g. pruning or wind damage. • Canes affected from Psa-V infection are still firmly attached to the vine. However, dieback can occur anywhere along the cane, it is not limited to the end. • Mark the area on the orchard where you have seen the symptoms of concern. • Contact your packhouse Psa manager for confirmation of symptoms. • If you are not associated with a packhouse, contact KVH on 0800 665 825 or info@kvh.org.nz. • Absence of obvious symptoms does not necessarily mean absence of Psa-V. • Regular monitoring should continue, even if no Psa-V symptoms are found.
Other diseases	*Symptoms* • Tag the vine(s) on the orchard where you have seen the symptoms of concern. • Take some photos. • Check whether it's an isolated vine or if others on the same area or elsewhere on the orchard are also affected. • Contact KVH on 0800 665 825 or info@kvh.org.nz. *Pests* • Catch and contain the pest if you suspect it may be a biosecurity threat. • Take photos. • Tag the vine/area where the pest was found. • Contact KVH on 0800 665 825 or MPI on 0800 80 99 66.

Removal of infected vines

Psa	• Remove secondary Psa-V symptoms as soon as possible. Refer to KVH's *Vine Removal and Disposal* page on the KVH website www.kvh.org.nz/vine_removal.
Other diseases	• Once KVH has been contacted, samples taken, and an identification made, remove the infected material or follow advice which has been provided with the diagnosis.

Testing and results

Psa	• Tests are completed by Hill Laboratories. They take approximately 48 hours to complete. If sampling is requested by KVH, the cost of testing will be covered by KVH. • Sample tests will only show the status of the vines sampled at that point in time. A 'Not Detected' result means there was no bacteria found on the sample taken at that time. It does not necessarily indicate your orchard (or nursery) is Psa-V free. • Test results, along with a copy of the test, will be emailed to the email address you confirm. This information may come from either KVH or your packhouse Psa manager. • To follow up on your test results, contact KVH on 0800 665 825 or info@kvh.org.nz or contact your packhouse Psa manager. • Continue to monitor your orchard and note all changes. Contact your packhouse or KVH if you feel you need to be re-tested, or if you find other symptoms.
Other diseases	• Testing is completed by MPI after samples have been taken by KVH • Results will be provided to growers as soon as they have been received by KVH and appropriate action should be taken depending on the diagnosis.

Notification to KVH

Psa	• Any Psa-V infection on an orchard must be reported to KVH within 48 Hours of identification. • This notification can be either by one of the labs above, through a test result, or by a visual identification from a suitably qualified person, e.g. a packhouse Psa manager or KVH representative.
Other diseases	• Stay vigilant, be on the lookout, and report anything unusual to KVH on 0800 665 865.

Pests

KVH regularly receives calls, emails and visits from the public and people within the kiwifruit industry, who think they may have found an unusual bug. Although they have so far turned out to be native pests and not of further concern, it's a good thing that reports are being received. This is exactly the type of behaviour we want to see as it shows people are on the lookout and increasingly aware of the need to report things they have never seen before that concern them.

KVH has also noticed that the reports and photos we receive are often of bugs that have several similarities to unwanted exotic ones – this shows us that people do know the physical attributes of the organisms that are considered highest risk to the kiwifruit industry.

Growers, contractors, and people who work on-orchard are the key line of defence and are best-placed to spot invaders early on.

Green vegetable bug nymphs

Brown Shield bug 10mm

Brown soldier bug 15mm

Queensland Fruit Fly

BMSB nymphs

BMSB 17mm

Spotted Lanternfly

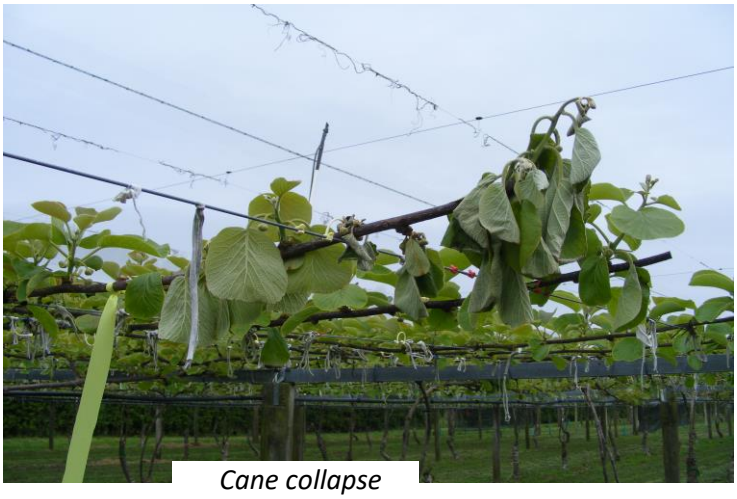
Psa Symptoms

Leaf spotting

Shoot dieback

Gold 3 cane rubbing on a wire

Red/orange exudate



Cane collapse

Cane dieback

Unwanted pathogens

Fig 1 and 2 : Ceratocystis fimbriata staining in kiwifruit vines

Figure 1

Figure 2

Figure 3: Wilting is an early sign of Ceratocystis fimbriata

Phytophthora - rot of lower main roots

Verticillium wilt

Other unusual symptoms

White spots on leaves

Sick plant believed to be phytophthora

Armillaria mushrooms

Cupped leaves due to off-target herbicide or growth regulator damage.

Swelling/cankers on trunks and leaders

Trunks with orange mottled lesions

Yellowing leaves and fruit collapse

Yellowing and dead tissue on leaf edges