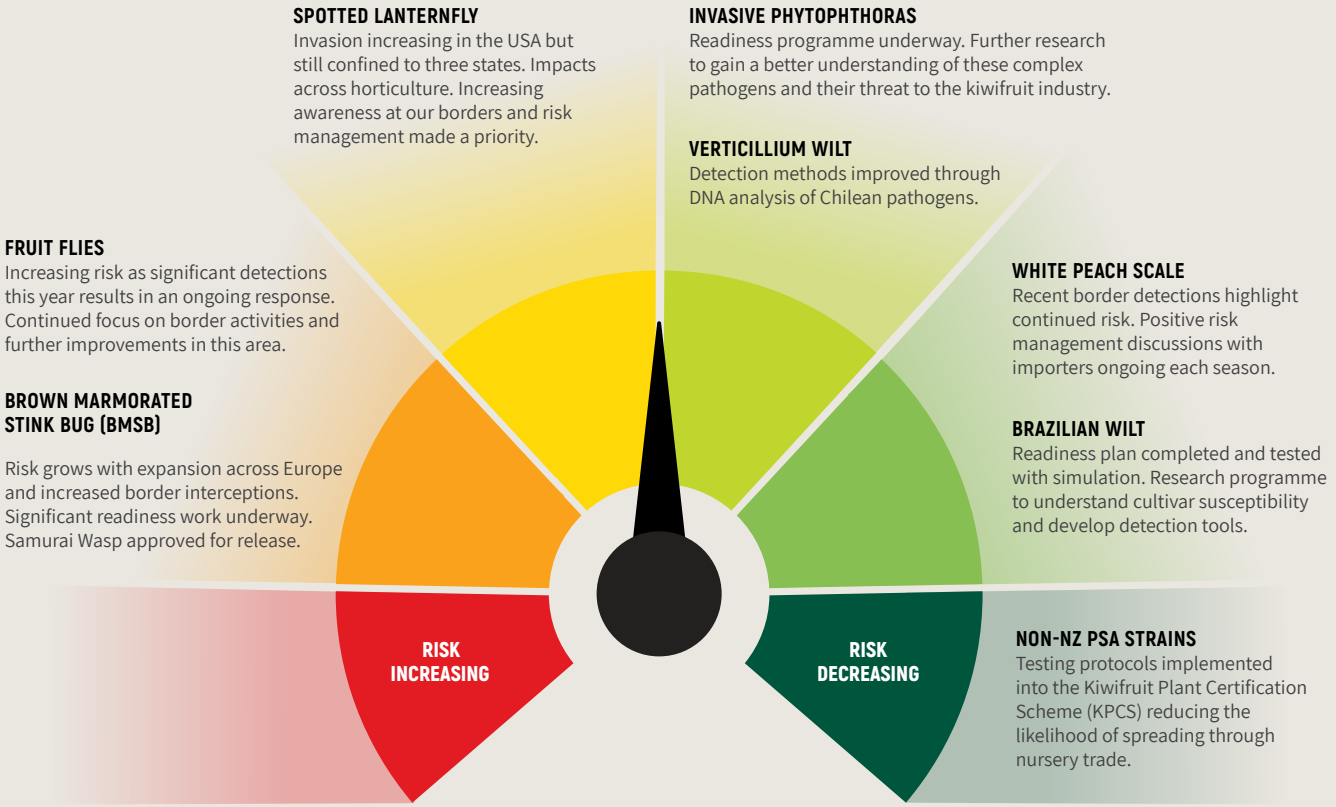
Joining Forces: armed and ready to fight our biggest threats
Assurance For All: building a better traceability system
Having a Voice: kiwifruit leads the way regionally and nationally
World Watch: keeping track of our most unwanted

ANNUAL UPDATE

2018 / 19

KO TĀTOU
THIS IS US BIOSECURITY 2025

How biosecurity risk is changing



How KVH is influencing biosecurity risk

Some of our activities to reduce risk include:

Note: Green on the dashboards indicates where we are well prepared, red indicates where improvement is needed.

UNDERSTANDING OUR EMERGING RISKS

KVH continues to work closely with the Ministry for Primary Industries (MPI), the science community, kiwifruit growers and other industries across the world to learn more about global biosecurity threats. Further focus has been on understanding biosecurity threats to kiwifruit in China by translating publications, with a focus on the impacts of BMSB.
Our website list of known threats to kiwifruit has increased and sits at 78 organisms, up from 66 last year.

READY TO RESPOND

KiwiNet (our industry biosecurity champions and deployment network) has been in full swing this year with 41 people contributing over 200 people days into the Auckland fruit fly response. This was a good test for the response training that was delivered to KiwiNet as part of twice-yearly workshops. KiwiNet reach is increasing – there are now 51 coordinators and the model has been so successful that other industries utilise it to help promote awareness and manage deployment.

BIOSECURITY AWARENESS

Significant effort has gone into raising awareness across the industry. KVH is collaborating on several initiatives, for example we have been involved in trialing a pest reporting app (Find-A-Pest) and we are actively contributing to the Tauranga Moana Biosecurity Capital initiative, including hosting Biosecurity Week events. KVH continues to provide regular podcasts, newsletters and alerts.

ON-ORCHARD BIOSECURITY

KVH developed on-orchard biosecurity guidelines to help growers protect their orchards from biosecurity threats. When growers report unusual vine symptoms, KVH ensures samples are submitted for testing. Monitoring and reporting are important with 35 unusual symptoms reported and followed up within the last 12 months.

Foreword from the Chief Executive: Influencing willingness to protect

Having been at KVH for just over 12 months, I find myself reflecting on how much has been undertaken by the organisation and industry in such a short amount of time.

KVH is in a very good position to meet current and future biosecurity challenges. While it is hard to influence wider biosecurity risks that are outside our control, I am certain we are doing all we can to increase that influence, and to achieve the best possible outcomes for the kiwifruit industry.

Our influence isn't centred around simply telling people what to do. We are here to help kiwifruit growers, the wider kiwifruit industry, associated groups and communities, understand what could be at risk if we are faced with an incursion. We're also here to increase understanding of the part that every individual plays in making sure we are preventing pests and diseases getting here and spreading. It's about everyone knowing they have a place in the biosecurity system that they're accountable for, so that we can protect what we've got and keep our businesses and communities safe.

It's not just KVH working in this manner – the national *Ko Tātou This Is Us* campaign, launched in September 2018, asks every New Zealander to take a moment to think about biosecurity in the same way.

Ko Tātou This Is Us is a national partnership between people, organisations, Maori, and central, local and regional government. It promotes the concept of 'partnering to protect' and that by working together as one we build a strong enough movement to protect the things that make kiwis and New Zealand special.

KVH has been involved in the planning, development, and launch of the *Ko Tātou This Is Us* partnership since day one and you can read more about how we contribute to it on page 18. We also have a lead role in the Tauranga Moana Biosecurity Capital (TMBC) and Port of Tauranga Biosecurity Excellence programmes – two regional examples of *Ko Tātou This Is Us* in action.

Much of our work in these programmes focus on biosecurity being a standard part of good business practice, promoting and building awareness of KVH activities, and building networks of biosecurity-conscious people and groups within the region. This all came to fruition during the December investigation of a Brown Marmorated Stink Bug (BMSB) found in Mount Maunganui. TMBC channels were used to share information about what was happening, what was needed from growers and the public, and what the next steps were likely to be in the event of any further finds – which there thankfully weren't.

Another area of increasing influence is through Government Industry Agreements (GIA). KVH is active in governing and participating in research projects across both the BMSB and Fruit Fly Councils, plus operating our own industry specific operational agreement in partnership with the Ministry for Primary Industries (MPI). Read more about the benefits of this partnership on page 14.

Through GIA, plans are made in advance and agreements put in place for how we – KVH, representing the kiwifruit industry, other industry groups, and government - jointly respond to specific pest incursions. We saw this in 2019 with the fruit fly detections in Auckland, which also led to the deployment of KiwiNet, our industry network of biosecurity champions who are trained up and ready to hit the ground running in the event of a major response. You can read more about KiwiNet on page 15.

One of the things that responses - like Psa and more recently BMSB and fruit flies - remind us of is the need for robust traceability so that we are able to trace all plants, plant material and fruit backwards and forwards at any given time to minimise the impact and spread of pests and pathogens in a timely way. A good, thorough, and easy-to-use system is integral to this and over the last 12 months we've been busy working on how to create a robust traceability programme that will be a proactive tool in the face of an incursion. Read more about how far we've come and what the next steps for this piece of work are on page 8.

I would like to thank all growers, industry participants and Zespri for their ongoing support of KVH through the last year, especially during the fruit fly response. Although activities like this response feel remote at times, it is critical that they are managed, and the risk removed, as allowing these pests to establish in New Zealand could devastate our industry.

I would also like to thank our Board and staff. It is heartening to see that the organisation is governed and staffed by dedicated professional and passionate people who give us confidence that we can be forward thinking and leaders in this important area of protecting our livelihood and community.

It's been a busy 12 months and I'm sure the next year will be just as rewarding for us all as we continue to work together to do all we can for a biosecurity resilient kiwifruit industry.

Foreword from the Board Chairman: Why every New Zealander must take responsibility for biosecurity

KVH has at its core, a mission to protect kiwifruit growers from biosecurity risks that threaten our livelihoods as growers and impact our native flora and fauna. It's an honour and privilege to serve in the governance team for this organisation, ensuring we as an industry are ready to respond should a biosecurity threat de-stabilise our hard earnt, prosperous industry.

Every person taking responsibility for biosecurity is a line we've all heard a lot over the last 12-18 months with the creation and introduction of New Zealand's national biosecurity statement (Biosecurity 2025) and the launch of the *Ko Tātou This Is Us* initiative, aimed at bringing kiwis together to form a biosecurity team of 4.7 million.

But what does that actually mean and how do we, as KVH and the kiwifruit industry, do our bit to make it happen? For the KVH Board, a big part of the answer is this: we start with ourselves, and influence others to follow suit and meet the same high standards.

As the organisation chosen to protect New Zealand's kiwifruit industry from biosecurity threats, KVH has had a very clear strategy this year focused on the vision of 'a biosecurity resilient kiwifruit industry'.

The goals and directions that form that strategy have had influence in common – to mention just a few examples: influencing other horticultural groups and government through active leadership in the Government Industry Agreement (GIA) space; enhancing the KiwiNet group of industry biosecurity champions and then playing a key role in the fruit fly responses when this group was deployed in Auckland; leading many activities in the Tauranga Moana Biosecurity Capital (TMBC) and Port of Tauranga Biosecurity Excellence programmes; and reviewing the Kiwifruit Plant Certification Scheme (KPCS) alongside laying the groundwork for a robust end-to-end industry-wide traceability system.

The above is by no means the exhaustive list of what has been undertaken over the last 12 months, but it is a fair representation of key achievements and helps demonstrate the way in which KVH is taking a leadership role not just across the kiwifruit industry but also across the wider primary sector.

I for one am always delighted when I see and hear KVH and kiwifruit industry activities mentioned at meetings and forums, on the news, and via the *Ko Tātou This Is Us* and TMBC programmes. Growers are, and always have been, our absolute priority and primary audience, but it is also important that others see the worth in the great work our growers and industry are doing and are influenced by that to want to be part of the biosecurity team.

Speaking of key achievements, I was very proud to stand alongside the KVH team in November 2018 when the organisation won a national award for its contribution to the biosecurity integrity of the New Zealand kiwifruit industry.

The award recognised KVH's contribution to the recovery of the kiwifruit industry following the devastating discovery of Psa in 2010, and its subsequent responsibility for managing all biosecurity readiness, response and operations for the industry. The KVH team is dedicated to its role in helping protect the livelihoods of New Zealand kiwifruit growers and the award also celebrated the partnership and influence approach of the organisation, which has ensured the industry is better placed for any future biosecurity event.

The KVH team, past and present, have worked hard to ensure a resilient and united voice for the kiwifruit industry, and it's great that those efforts - and those of the people who have worked with the organisation over the years – were recognised with this award. The KVH Board looks forward to many successful years ahead.

Thank you to Stu and his team for the dedication and professionalism they exhibit every day. I'm proud to be involved with you all. Thanks to my fellow Board directors for their dedication and their robust input, ensuring the KVH organisation is well governed and set up strongly to deliver a biosecurity resilient kiwifruit industry.

Stu and Dave accepting KVH's 2018 New Zealand Biosecurity Award

What’s happening around the world?

CANADA

- Brown Marmorated Stink Bug (BMSB) is now found across four provinces in Canada and continues to cause problems throughout the USA.

USA

- Spotted Lanternfly (SLF) numbers in Pennsylvania are now reported to be reaching plague proportions and some report that the pest is worse than BMSB. Measures are in place to try and limit spread.

EUROPE

- BMSB populations are growing and expanding throughout Europe. Thirteen countries are now reported to have established populations of BMSB, with a further eight countries reporting interceptions of the pest.
- Large BMSB populations now present in France.
- Mandatory offshore treatment is now required for all vehicles and machinery from high-risk countries in Europe to manage BMSB risk.

SOUTH AMERICA

- BMSB populations continue expansion in Chile. Southern hemisphere establishment increases risk to New Zealand given our seasonal alignment.
- Argentina is now reported to be free from Mediterranean Fruit Fly (Med Fly) but continues to release sterile flies in an ongoing effort to prevent any new incursion establishing.
- Spotted Wing Drosophila (SWD) continues its expansion throughout Chile. A sterile insect release programme is currently being developed.

Keeping pace with change: Biosecurity risk constantly changes as new organisms are discovered, expand their host range or invade new geographic areas. These pages illustrate some of the key events over the past 12 months that influence risk for the New Zealand kiwifruit industry.

ITALY

- Oriental Fruit Fly (OFF) found in Italy - this is the first report of OFF being found in an agricultural area in Europe.
- BMSB populations in Italy are continuing to increase and recent reports suggest numbers are reaching a similar level to those found in the USA during BMSB peak invasion.
- All containers from Italy now require mandatory offshore treatment during the New Zealand BMSB season (1 September – 30 April) to help manage risk.
- White Peach Scale (WPS) found post-border on kiwifruit exported from Italy to New Zealand.

JAPAN

- Mandatory heat treatment is required for the 300,000 new and used vehicles from Japan that enter New Zealand every year, as a result of increased BMSB interceptions at our borders.

AUSTRALIA

- Another significant year for Queensland Fruit Fly (QFF) incursions into pest free areas of Australia, such as Tasmania and Adelaide. Eradication has recently been declared in Tasmania, while continued incursions in South Australia extend out the response.
- Mass release of around two million sterile male QFF to suppress the urban populations and help prevent it moving into surrounding horticultural areas.
- Incursions of Med Fly into South Australia. Med Fly is currently only established in Western Australia.
- Australia redirects vessels carrying goods from China out of their waters due to high numbers of BMSB found during vessel surveillance. These vessels were also denied entry into New Zealand.

NEW ZEALAND

- Significant year for Fruit Fly detections. Separate interceptions of QFF in surveillance traps resulted in responses being stood up. Alongside these, for the first time, the Facialis Fruit Fly was detected in South Auckland.
- Approval was granted for the release of the Samurai Wasp as a management tool if BMSB were to establish. This wasp has a proven track record at suppressing BMSB populations by up to 80%. Work is ongoing to ensure we are in a position where we can release large numbers as an eradication tool.
- Another significant year for BMSB with continued high numbers being found at our borders and several investigations being initiated after post-border detections of single males. There were 12 rounds of enhanced surveillance completed, and no further BMSB were found.
- Vessels from USA and Europe have been redirected out of New Zealand waters due to the numbers of BMSB and other regulated pests being found during heightened border inspections.
- In April 2019, SWD larvae were detected at our border in an orange consignment from the USA.

Traceability proven to make a difference

The movement of plant material such as rootstock, budwood, pollen and mature plants is considered a high-risk pathway for transporting pests and pathogens over long distances, including our most significant kiwifruit pathogens (Psa, *Ceratocystis fimbriata* and *Verticillium Wilt*).

A recent study indicates that Brazilian Wilt, the disease caused by *Ceratocystis fimbriata* decimating the kiwifruit industry in Brazil, may have evolved from a native pathogen on a single orchard in Brazil and subsequently spread throughout their industry on budwood and rootstock, on plants not showing obvious symptoms.

The delay between infection and symptom expression is referred to as the latency phase and presents a significant challenge for management of biosecurity risk. It is a concept that most of us are familiar with from our own or children's experiences with chicken pox where a child may be exposed to the pathogen at school but not display symptoms for two weeks and in the meantime expose their siblings and any others they come into contact with.

The same concept applies to plant pathogens; however the latency period can be much longer - typically months or even years. In practical terms, this means we are unlikely to know when a new biosecurity threat enters New Zealand because symptoms won't be visible right away, and therefore unless we have good biosecurity practices in place all the time, we may inadvertently spread the disease across our industry.

The consequence of this is that some pathogens, like Brazilian Wilt, have a window where eradication is possible, but only if the pathogen is still in a confined area when it is first detected. If it is already spread across the industry, then eradication becomes much more difficult, and failure to eradicate results in another burden for growers to manage with every crop (or in extreme instances may make that crop uneconomical as may be the case with kiwifruit in Brazil currently).

There are two key principles to manage risk of spreading pathogens during this latency phase;

1. robust biosecurity practices at the orchard or nursery level to reduce risk of spreading any organism,
2. traceability records to enable tracing of movements and appropriate action should a pathogen be discovered.

These activities have been a core focus for KVH.

In 2016 KVH fully implemented the Kiwifruit Plant Certification Scheme (KPCS) as a biosecurity standard to reduce the risk associated with movement of kiwifruit rootstock material. By managing biosecurity risks associated with the movement of nursery plants we are not only reducing the likelihood of spreading pests we know already exist in New Zealand (Psa, nematodes, *Phytophthora*, viruses etc.), but we are also mitigating the risk of spread and subsequent impact of new pests or organisms that may be present, but not yet detected.

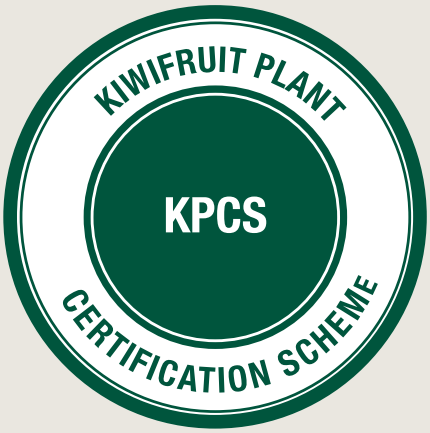


Image credit: OSPRI, managers of the national NAIT programme, providing the national animal identification and traceability system.

One of the strengths of the KPCS is the traceability component of the Standard, allowing plants to be traced back to the origins of all propagation material used (mother plants and budwood) and traced forward to the orchard where plants are planted. The importance of this record keeping is paramount and an area that is focused on for nurseries in their KPCS audits. It is also the rationale behind the Zespri GAP requirement for growers to maintain traceability on their orchard and record the source of incoming material (plants and budwood), the location where it is placed on the orchard, and any outgoing plant material from that orchard such as budwood. However, there is plenty of scope to improve the system and that will remain a KVH focus going forward.

The animal sector's current *Mycoplasma bovis* response clearly illustrates the value of traceability, and the hurdles that poor traceability records create for eradication. The animal sector does have a traceability system in place however when put to the ultimate test with a major biosecurity response, compliance rates were exposed to be poor. This resulted in a large number of animal movements unable to be traced and as a result significantly slowing down response activity.

There are lessons to be learnt from this for kiwifruit growers. In the event of an incursion of a new high-risk disease in our orchards it is likely to be present in plants at asymptomatic levels long before we see any symptoms and realise it is there.

If we have good traceability records of all plant material movements onto or off orchards, we will have a much better chance of tracing the movement of infected plant material and eradicating or containing the disease quickly. Unlike Psa, many of the high-risk diseases we want to keep out are not spread by wind so human assisted movements are likely to be the main pathway by which the disease is spread long distances.

Kiwifruit growers are urged to ensure that they maintain accurate records of what comes onto and off their orchard so that any tracing required in the future can be carried out quickly and effectively to minimise any impacts of any new biosecurity threat.

Wild kiwifruit control progresses

KVH continues to work with regional councils throughout New Zealand to ensure that wild kiwifruit is destroyed wherever it establishes.

Wild kiwifruit vines diminish the biodiversity value of native bush, reduce the value of forests and may harbour biosecurity risk organisms, threatening the health and productivity of orchards.

16,000+ wild vines destroyed in the last year.

Over the last year, contractors have completed control work in the Bay of Plenty, Gisborne and Tasman regions, destroying more than 16,000 wild vines. In the western Bay of Plenty district alone, wild kiwifruit has now been destroyed on more than 1,120 of the 1,200 properties recorded as having infestations. Many of the 80 remaining properties require abseilers to access vines growing on bluffs or steep gully sides - qualified abseilers are currently completing this work.

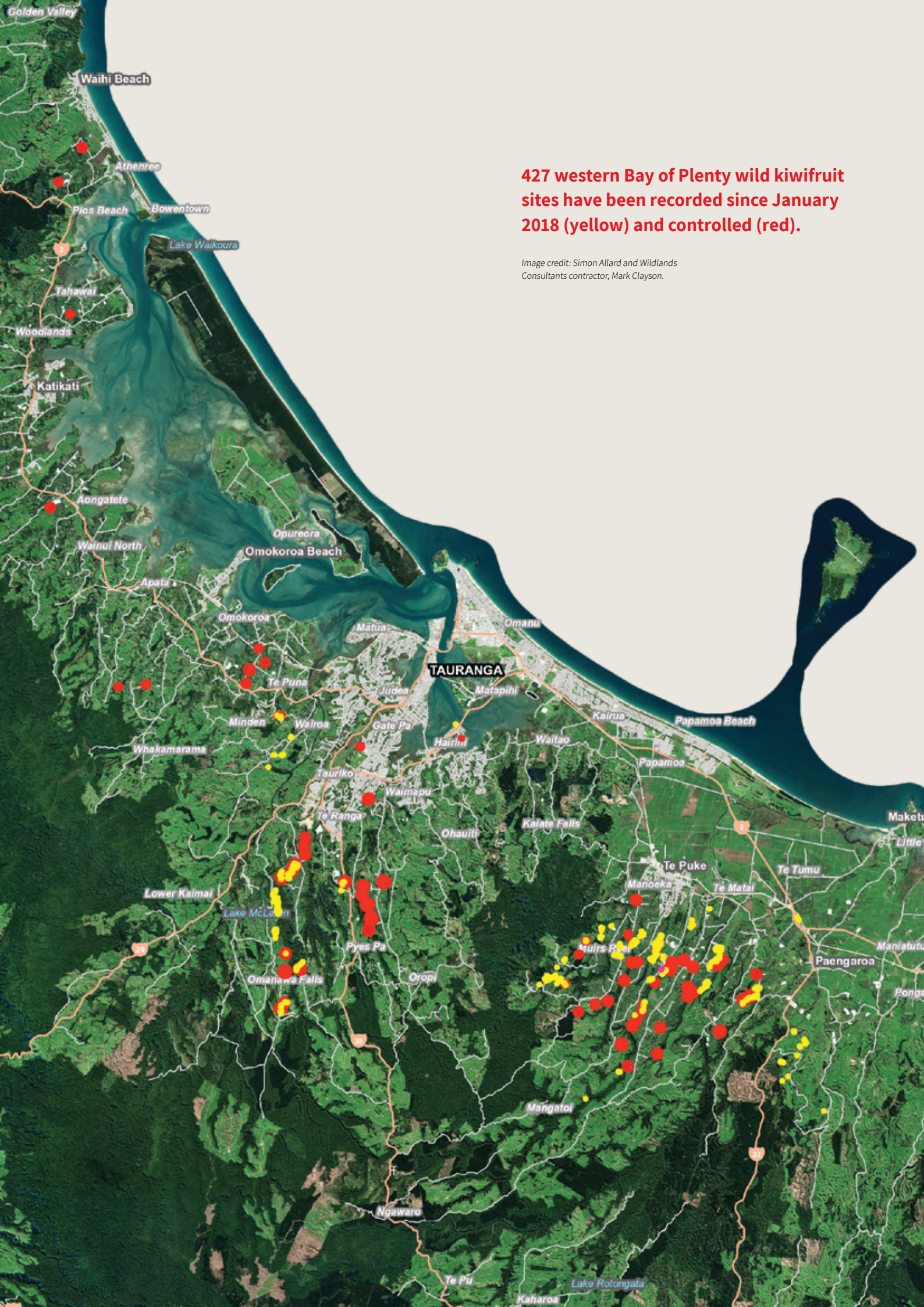
Most wild vines found over the last year have a 2-3cm basal diameter and reflect a steady recruitment of young vines establishing via bird-borne seed dispersal. White-eyes are the predominant bird species, feeding on the few unpicked kiwifruit left in an orchard over winter months, and distributing this seed into adjacent gullies, scrub or forestry blocks.

Orchard managers need to ensure that all fruit, including those few missed by pickers, is removed from vines. KVH has also allowed greater quantities of reject fruit to be composted and the compost product spread onto orchards in Psa recovery regions. Psa and kiwifruit seed is destroyed by the composting process.

Control of wild kiwifruit is funded by the kiwifruit industry through KVH, with funding assistance provided by regional councils and landowners.

A white-eye (or wax-eye) feeding on soft kiwifruit

Wild kiwifruit



427 western Bay of Plenty wild kiwifruit sites have been recorded since January 2018 (yellow) and controlled (red).

Image credit: Simon Allard and Wildlands Consultants contractor, Mark Clayson.

Fighting fruit flies

Fruit flies top our most unwanted organism list not only because they can significantly disrupt our ability to deliver kiwifruit to our markets but the likelihood of them being found post-border is relatively high compared to many other biosecurity pests.

This was demonstrated earlier this year when two different species of exotic fruit flies were found in Auckland, and at one time there were three separate responses running concurrently in Devonport, Northcote and Otara.

This scenario would always result in complexities but given the way the response unfolded and the pressure already on the biosecurity system from the likes of Brown Marmorated Stink Bug (BMSB) and the *Mycoplasma bovis* response (the most expensive biosecurity response ever for New Zealand), the situation presented significant challenges.

It is for these situations, when the biosecurity system is stretched, that the National Biosecurity Capability Network (NBCN) exists. This network of organisations can be called upon by Biosecurity New Zealand to deliver resources - people, knowledge, equipment - into a response. For the kiwifruit industry this deployment is done through KiwiNet, our biosecurity champions and deployment network that is made up from representatives from across the wider industry.

KiwiNet has been deployed into a fruit fly response before (in Grey Lynn in 2015) and has undertaken significant preparedness activity specifically for this purpose, including at six-monthly workshops. This meant that as soon as Biosecurity New Zealand notified us of the fruit fly detections, KVH was able to activate KiwiNet and within days of the responses being established, 14 people from the kiwifruit industry were en-route to Auckland to assist in the field with trapping, monitoring, and surveillance.

By mid-May, when restrictions on fruit and vegetable movements had been lifted from two of the three affected suburbs because no flies had been found in those areas for some time, the kiwifruit industry had contributed just over 200 staff days to the responses (at the time of writing this article additional flies have been found in Northcote and KiwiNet members are likely to contribute to baiting activity throughout May and early June).

Linda Peacock is the KiwiNet Response Coordinator for KVH, and she spent time working with post-harvest to populate rosters and ensure the right people were being deployed into the field.

"We've had 41 industry people working as part of the larger response team, made up of hundreds of people. Most of our people were working on fruit collection and inspection, trapping, surveying, and public education by way of door knocking and attending events like the Otara market."

"We've been delighted with the level of support and engagement from across the industry, and the keenness to provide people to be trained and deployed with very short notice. The feedback we've had is that kiwifruit people working in Auckland are always well prepared, very committed, and willing to help out in any way possible."

KVH also deployed staff resources into other areas of the response team at the Wellington headquarters to provide industry specific knowledge and help with communications and intelligence workstreams.

These industry contributions of resourcing, response governance and sharing the financial costs of the response are all significant, but ultimately response outcomes are heavily dependent on the technical expertise of Biosecurity New Zealand to successfully manage the organism and just as importantly, maintain trade with our markets. Both have significant complexities given the scenario of three responses operating in parallel over a long duration.

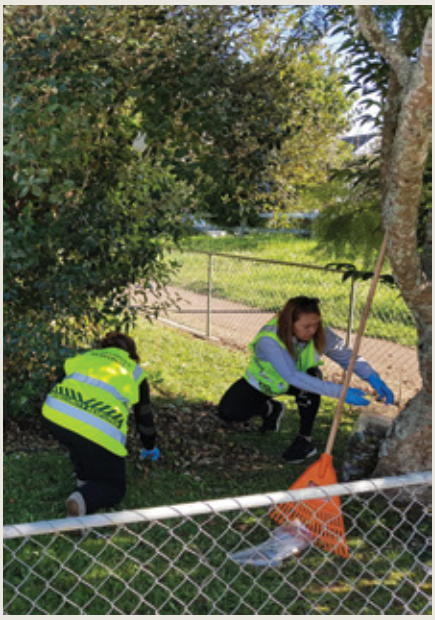
Fortunately, Biosecurity New Zealand has significant fruit fly expertise - a silver lining of dealing with a pest frequently encountered and the payoff for operating a $2m trapping surveillance system.

New Zealand has experienced post border detections of fruit fly five times in the upper North Island in the past decade and these seem to occur in clusters of multiple detections in a short space of time. After a series of detections and a Mediterranean Fruit Fly incursion in the mid-90's New Zealand enjoyed a run of 16 years with no post border detections, until the five separate events between 2012 and 2016, including a breeding population of Queensland Fruit Fly (QFF) in Grey Lynn. At the time, it seemed like this rate of interception may be the new norm, and a price to pay for increased trade and tourism.

A range of new biosecurity measures were introduced to manage this risk, such as the introduction of an accreditation scheme for cruise vessels aimed at vetting fresh produce and other food items to ensure they are free of biosecurity risks, and also ensuring that vessels are actively discouraging passengers from taking fresh produce off ships. Alongside this, Biosecurity New Zealand has introduced a number of other tools to better manage this pathway, including investment in a number of mobile x-ray machines to be used for the purpose of cruise vessel clearances, infringement notices for passengers who are non-compliant, and increasing the use of detector dogs to help sniff out fresh produce.

Other notable changes include the increase in the number of both Quarantine Officers and Detector Dog teams over the past few years. A recruitment drive began in 2015 and has seen over 100 frontline staff come on board to help manage the increasing numbers of both imports and passengers across the border.

These changes have had a positive effect and for three years there were no further finds, but this year we find ourselves again in a significant cluster of post border detections. KVH along with other Government Industry Agreement partners in the Fruit Fly Council, will be working with Biosecurity New Zealand to ensure any lessons from this response are actioned, particularly those that might correlate with findings from the independent review of passenger and mail controls commissioned after the initial fruit fly detection. The response process has worked very well so far, with teams able to react successfully to deploy in response to all new fly findings. KVH supports and agrees with all decisions taken during the responses to date. We will continue to ensure that together, industry and Government promote and highlight the benefits of our system in managing this complex response with minimal trade implications, and the high level of expertise and resources we have at our disposal.



KiwiNet members taking part in fruit collection and ground surveys during the fruit fly response

Fruit fly response staff preparing the day ahead at response headquarters

ABOUT FRUIT FLIES

Fruit flies are considered the greatest biosecurity threat to the kiwifruit industry's billion-dollar export market, as incursions can severely impact where we sell our fruit.

The QFF is our greatest threat as it is native to Australia, our closest neighbour and trading partner which significantly increases the likelihood of the pest arriving here with the 1.5m visitors we receive each year. Furthermore, the QFF is present in almost no other major markets for us outside of Australia, therefore incursions can have serious market access implications.

Industry actively fighting pest threats through partnership with government

GIA in action at the Otara markets, during the Auckland fruit fly response

The Government Industry Agreement (GIA) was established to create a framework where industry groups (both horticulture and livestock) and MPI could could participate in shared decision making, and associated cost sharing, for both readiness and response activities for potential pest and disease incursions.

This was driven by the strong desire for industry to be able to have a direct influence on those decisions that are made in relation to prevention and management of pests and diseases that can have a devastating effect on our orchards.

KVH was the first of any of the industry groups to join GIA by signing the Deed in May 2014. This process was driven on the back of the Psa outbreak in kiwifruit and the direct industry involvement in the management of this significant disease. The experience gained in collaboratively managing Psa and becoming the management agency under the Biosecurity Act demonstrated that being proactive in thinking about future risks from pests and diseases currently not in New Zealand was worthwhile.

An incursion of Brown Marmorated Stink Bug (BMSB) or fruit fly within the rural Bay of Plenty community or any other growing regions will have major impacts on many kiwifruit growers. Understanding the risks and preparing operational plans in advance means that detection can potentially occur earlier, and the degree of fruit loss and other financial impacts can be reduced.

KVH works collaboratively with Zespri as well as other industry groups and MPI through GIA Operational Agreements to undertake research so we can better understand the risks and management recommendations that can be applied in a practical sense for growers. These are then shared through ongoing communications such as our website and Bulletins and at such events as roadshows and field days.

Early and proactive involvement in the GIA development process has meant that equitable cost share agreements have been able to be established in the respective Operational Agreements between industry and Government and our representation has been in key GIA leadership positions so we have an ability to influence policy (politically and within the Ministry for Primary Industries) and outcomes.

Creating higher levels of involvement and awareness within the community especially through Port of Tauranga Biosecurity Excellence, the Tauranga Moana Biosecurity Capital initiative, and specific grower groups is very important as complacency is still a key risk. All growers can be impacted from an incursion – so taking simple on orchard biosecurity precautions can help prevent the spread of disease and mean our industry is well prepared should we face another catastrophic incursion like Psa.

GIA
Biosecurity through Partnership

KiwiNet geared up

KiwiNet December meeting

Set up to ensure the availability of skilled capability during biosecurity incursions, the KiwiNet network continues to cement its place, most recently contributing to the Auckland fruit fly detections.

Initiated by KVH in late 2014, KiwiNet ensures there can be quick deployment of industry resources into biosecurity readiness and response activities. The network is made up of a team of people from across the kiwifruit industry who play a key role in championing biosecurity.

KiwiNet Coordinators are nominated by their respective organisations and have good knowledge and awareness of biosecurity threats. Psa and the recent fruit fly incursions have reminded us that there's always something on our doorstop ready to come through the front door, and if it does, we need to be well prepared and able to respond immediately.

Coordinators work alongside KVH to identify people who can be called upon in a biosecurity response. There's a wealth of knowledge and expertise throughout the industry and by pooling people, facilities, equipment and communication channels, KiwiNet can quickly and effectively mobilise.

KiwiNet meets twice a year. The most recent workshop, in December 2018, was run with the Ministry for Primary Industries (MPI) and focussed on increasing understanding of how biosecurity responses are run. The day included a rundown of recent MPI responses and the national biosecurity network, showcased with first-hand stories and images from pest incursions over recent years.

MPI's guest presenters Andrew Sander and Gabrielle Duggan then introduced the framework used by the Ministry (and other agencies such as Civil Defence and NZ Police) when initiating a response to a biosecurity incursion. The Coordinated Incident Management System, or CIMS as it is commonly known, is a framework of team structures, functions, processes, and terminology that is applied to biosecurity/ emergency responses.

During the workshop, KiwiNet members split into groups and used the CIMS model to manage simulated responses to a fake Brown Marmorated Stink Bug (BMSB) incursion on a vineyard, near several orchards, in a small urban area. Group members learnt how teams are put together in a response, how they work together day-to-day and what the specific roles and responsibilities of different teams are. Groups also had to work through the differences between being on-site in a response versus assisting MPI in Wellington's head office.

The exercise proved that KiwiNet is a good mechanism for quickly joining forces and responding to a biosecurity incursion, as was proved in late February when the group was called upon in response to the fruit fly detections in several Auckland suburbs. Co-ordinators worked quickly to provide staff that were able to travel to Auckland and take part in on-the-ground surveillance, fruit inspection, trapping, and public awareness campaigns.

Feedback from MPI and AsureQuality, who led on-site activities, was that the kiwifruit industry contribution was well organised, well trained, and greatly appreciated. Without industry contribution of this nature it would be harder to manage detections of unwanted pests and minimise their impacts on people's livelihoods, communities and environments.

From here, KVH will continue hosting regular, topical workshops for all KiwiNet members, and will also have a focus on ensuring membership is strengthened to include a wider range of industry participants (such as retail suppliers, consultants and training providers for example) and community leaders (from Maori and Indian associations for example), who all have a place in the biosecurity team and are able to help spread information to growers and the public in the event of a major incursion. Any group wanting to have a representative join KiwiNet can contact KVH at info@kvh.org.nz for more information.

KiwiNet was established as part of industry's commitment to readiness and response planning under Government Industry Agreements (GIA) and is part of the National Biosecurity Capability Network (NBCN), which is New Zealand's field capability team deployed during a biosecurity response. The NBCN is a joint initiative between MPI and AsureQuality and is made up of more than 120 organisations, which have agreed to commit their skills and resources.

Lori Topine

"The experience has led me to look at the bigger picture and be more observant on the orchard, to take notice of things that aren't the norm and ask the question 'Why aren't we talking about biosecurity more?' We need to encourage everyone on-orchard to look for and report the unusual."

— Lori Topine, Orchard Supervisor, OPAC and KiwiNet contributor to the fruit fly response.

Sheryl Flett

"By taking part in trapping and seeing it first-hand I have gained a far greater understanding of the surveillance system. It's good to know that the traps are doing what they're designed to do, and that New Zealand's biosecurity system is really working. Coming from the kiwifruit industry I have always known about the risk of fruit fly and been aware of how important it is to keep it out. This was a reminder that if they do get here, we need to have everything in place, ready to go so that we can make every effort to stop an incursion."

— Sheryl Flett, EastPack Quality Manager and GAP auditor, and KiwiNet contributor to the fruit fly response.

Tauranga Moana network provides biosecurity weapons

KVH has been a key partner in Tauranga becoming New Zealand's leading biosecurity city, thanks to a new initiative launched in October 2018.

KVH, Zespri and several other kiwifruit industry bodies, alongside local and national government, iwi, educators, scientists and local organisations have banded together to form Tauranga Moana Biosecurity Capital (TMBC) to tackle the threat of invasive pests and diseases. The partnership, which is the first of its kind in New Zealand, promotes and coordinates biosecurity actions across the Tauranga region.

In practice, that means increasing local awareness about why biosecurity matters and what would be lost if exotic pests or diseases crossed our borders. It's about a powerful, knowledgeable group standing shoulder to shoulder and saying it's essential we pool our expertise and resources for the sake of the environment, our taonga, and our economy. These networks are also able to come together quickly in the event of a local biosecurity detection – like when the Brown Marmorated Stink Bug (BMSB) was found in Mount Maunganui in December 2018 – to share information and make sure people know what's happening, what they need to do, and what the next steps are likely to be.

One of the priorities in 2018 was overseeing inaugural TMBC Biosecurity Week activities including industry training days and public events, conferences and information sessions involving kiwifruit and forestry industries, iwi, the Port of Tauranga, school children and more. The group also hosted a one-day symposium at Tauranga Yacht Club, where Biosecurity Minister Damien O'Connor officially launched TMBC, acknowledging it is the first collective of its kind in New Zealand and an exemplar for other regions.

Several biosecurity matters both past and present – Psa, fruit fly detections in Auckland, stink bug finds in Mount Maunganui and Auckland - serve as a reminder of what is at stake for the kiwifruit industry, communities and the wider environment. We value the fruit produced by a local orchard or in our back yard, having a BBQ outdoors, swimming or gathering food from our sea, and enjoying a tramp in our local bush. A devastating pest like BMSB can take all these away, as has happened offshore and must not happen here.

TMBC is an exemplar for regional collaboration and partnership – it supports and is an example of the national *Ko Tātou This Is Us* campaign in action, which focusses on the personal and cultural impacts of a biosecurity breach and asks all New Zealanders to help create a biosecurity team of 4.7 million.

KVH has regularly contributed to TMBC and *Ko Tātou This Is Us* projects by providing subject matter expertise and resource, content for campaigns, website stories, and case studies, and examples of biosecurity action being undertaken by the kiwifruit industry and growers to help promote awareness of the proactive activities and events we run to ensure we keep unwanted pest and disease threats at bay.

Biosecurity Minister Damien O'Connor and officials welcomed to the launch of TMBC

Image credit: Jamie Troughton

Stronger together: The TMBC initiative brings together councils, iwi and hapu, government, science, education and business for the first time, to lead and take action towards biosecurity excellence.

Keeping bad bugs and devastating foreign plant and animal diseases out of New Zealand is everyone's business. We can counter these threats through community collaboration.

Detector dog display at the launch of TMBC

We need to be sure we are all prepared and can quickly respond to any biosecurity incursion to the industry. This will mean we are able to minimise the impacts on people's livelihoods, communities, and environments.

Stu Hutchings presenting at the grower day during Biosecurity Week.

Image credit: Jamie Troughton

GROWER DAY: PREPARED AND READY TO RESPOND

One of the key events held by KVH and Zespri during the TMBC Biosecurity Week was a day for kiwifruit growers, providing the opportunity to learn more about protecting the industry from unwanted pests and diseases.

Around 120 growers and industry members were treated to a series of presentations and activities that covered KVH readiness (and how this relates to TMBC and the *Ko Tātou This Is Us* campaign); a fruit fly market access simulation; research into soil-borne diseases and the importance of traceability; BMSB preparedness; and news and lessons from offshore with guest presenters, including Dr Anne Neilsen from Rutgers University in New Jersey.

Coming out of the presentations was a common theme and message that 'you are your orchards biosecurity manager'. Several of the speakers on the day went into detail about the importance of traceability and taking as many precautions as possible – as your orchards biosecurity manager you are best placed to manage record-keeping and notice anything unusual, early enough for action to be taken. This message was particularly pertinent in relation to soil-based pathogens such as the high-profile Brazilian Wilt and Verticillium Wilt.

CELEBRATING A PEST-FREE PORT

Port of Tauranga staff and contractors took part in activities organised for the TMBC Biosecurity Week, getting up close and personal with bugs and hearing from local biosecurity experts about the work being done to ensure a pest-free environment.

A biosecurity excellence programme runs year-round at the port, and to coincide with Biosecurity Week there were scones and sausages rolls on offer from the excellence programme team which comprises KVH, the Ministry for Primary Industries (MPI), and port staff. The team visited smoko huts and staffrooms to shout morning tea and chat to frontline staff about the work they do to look for and report potential biosecurity threats. Information was shared about high-risk pests, the way surveillance is undertaken around the port, and how reports of unusual finds are managed. Over two days, there were nine visits to busy staffrooms full of passionate people who know biosecurity is a critical issue, affecting everyone in some way.

There were also visits to transitional facilities across the Bay of Plenty to share up-to-date information about managing risk and to learn more about the systems such organisations have in place for raising awareness with their own staff.

In partnership with KVH, researchers from the Better Border Biosecurity (B3) collaboration are working with the port and industry partners to better understand and predict local biosecurity risks, trial new detection tools, and measure the impacts of awareness events such as Biosecurity Week. Social scientists are monitoring the change in biosecurity awareness among port staff and accompanied the team on morning tea visits so that surveys could be undertaken and collected at the same time. The results of the survey will help inform future priorities for the excellence programme.

Morning tea shout over unwanted pest discussions at the Port of Tauranga

Phytophthora...preparing for an unknown risk

"New Zealand should be in a state of alert for *Phytophthora* attacks on kiwifruit" was the leading recommendation from a biosecurity threat literature review project completed in partnership with Zespri and the Ministry for Primary Industries (MPI) and recently published on the KVH website.

For New Zealand kiwifruit growers this may seem like an over statement, as *Phytophthora* species are often associated with the odd declining vine in wetter areas which are typically pulled out and replanted with only a small impact to productivity. However, *Phytophthora* pathogens can be much more serious and have been responsible for some of the most devastating biosecurity incursions around the globe to forestry, agriculture, horticulture, and natural ecosystems.

The name *Phytophthora* refers to a group of plant pathogens that include some of the world's most deadly plant killers - sudden oak death caused by *Phytophthora ramorum* (responsible for the death of over a million oak trees in California); *P. cinammomi* which in Western Australia is known as the biological bulldozer (half of the more than 5000 described plant species there are susceptible or highly susceptible); and Kauri die back caused by *P. agathidicida* which has been present in New Zealand for at least 40 years and recently began killing our iconic kauri trees. This pathogen can be spread on just a pinhead of soil on footwear and kills most, if not all of the kauri tree it infects.

The list of diseases associated with *Phytophthora* is extensive. There are about 30 known *Phytophthora* species in New Zealand and over 100 globally, but the true number is thought to exceed 600. There is much we don't yet know and a recent study in Europe illustrates the level of uncertainty that exists with these pathogens[1] . The study surveyed 732 nurseries and found that almost all had at least one *Phytophthora* species present and there were 49 species in total across all of them. In most cases plants had no obvious symptoms despite the pathogen being widespread across the plant stands within the nurseries. Many of these *Phytophthora* species were not previously known to be associated with nurseries, occur in Europe, or infect the hosts on which they were found. Seven of these species were not even known to exist and were totally new to science.

The biosecurity threat of *Phytophthora* to the New Zealand kiwifruit industry is largely unknown. It could come from the introduction of a new species, or from a species already present in New Zealand that may not yet have been exposed to kiwifruit. It could even come from a New Zealand species that undergoes a change to become more virulent or attacks a new host. Management practices, cultivar susceptibility and the environment may also play key roles in any future attacks, and climate change is considered likely to make our growing conditions more conducive to disease development.

We do know that 15 *Phytophthora* species have been isolated from kiwifruit around the world, of which seven are present here. These pathogens can cause root and collar rot, reduction in yields and sometimes plant death – impacts that to date have been relatively minor compared to the examples on other crops noted above. Plant pathologists are in general agreement however, that the biosecurity risk associated with *Phytophthora* species are increasing for all plant sectors as they are:

- increasingly spread internationally through globalisation and plant trade;
- able to form new hybrid species within managed and natural ecosystems which may lead to rapid generation of new pathogens and diseases;
- difficult to identify in asymptomatic hosts or where symptoms have been suppressed with agrichemicals (allowing them to be easily spread across industries).

Aerial view of a Gisborne orchard affected by *Phytophthora.*

Image credit: Ian Horner, Plant and Food Research.

Suspected *Phytophthora* on kiwifruit vines in Italy.

Image credit: University of Bologna.

15 *Phytophthora* species have been isolated from kiwifruit around the world, of which seven are present here.

It is considered highly likely that under certain conditions kiwifruit would be susceptible to several *Phytophthora* species. Predicting which species will impact which cultivars, and under what conditions, is difficult if not impossible. Because of this, KVH and MPI have been undertaking generic readiness planning for *Phytophthora* species as opposed to the usual approach of focusing on one specific pathogen. This readiness activity is about planning in advance how we would respond to an incursion of these pathogens and to identify knowledge gaps that should be overcome to increase our likelihood of success. Research to address these knowledge gaps is typically progressed through the Zespri Biosecurity Research portfolio. This forms a major project for KVH and is intended to be tested with an industry simulation later this year.

Phytophthora are a concern to many sectors in New Zealand and while our Kiwifruit Plant Certification Scheme has measures in place to reduce risk of spread with our kiwifruit rootstock material, we are aware that pathogens could also be spread with other plant material - such as shelter belt species, ornamentals or other crops which are destined for planting on the same property. Therefore, KVH has also been an active participant in developing the New Zealand Plant Producers Biosecurity Standard, a biosecurity certification scheme for all plant material which has a strong *Phytophthora* focus.

Growers who wish to protect their investment against possible attack from *Phytophthora* can reduce the risk by following KVH generic biosecurity guidelines around understanding risks; agreeing with staff and contractors what must happen on site; sourcing clean plant material; checking and cleaning all tools, clothing and machinery; and reporting unusual pests or disease symptoms.

[1] *Jung et al. (2016), Widespread Phytophthora infestations in European nurseries put forest, semi-natural and horticultural ecosystems at high risk of Phytophthora diseases. For. Path., 46: 134-163. doi:10.1111/efp.12239*

Research update

INNOVATION: DELIVERING THE KVH STRATEGY

KVH contract Zespri to deliver on the research and development priorities for both Psa and biosecurity on behalf of industry. This work is completed under the Innovation Platform - Protect Supply lead by Dr Sonia Whiteman and Dr Elaine Gould.

Strategy is set by KVH, the key next-user (as well as the Zespri Orchard Productivity Centre team in the case of Psa) combined with scientists, Zespri innovation leaders and industry representatives that form research steering groups. The end result is a strong collaborative effort between the Zespri team and key KVH staff including Matt Dyck and Linda Peacock. Good progress has been made in both the Biosecurity and Psa portfolios with a key highlight being the industry days for both portfolios. Below we report back on progress in some key programmes.

BIOSECURITY PORTFOLIO

Brown Marmorated Stink Bug (BMSB) – tackling one of our most unwanted

BMSB continued to be intercepted pre, and post-border during 2018/19, and thus is a major focus of research in the Kiwifruit Biosecurity Research Portfolio, with approximately $1m dedicated to this pest over the past three to four years. During this period, we had an opportunity to undertake research in Italy and China, where BMSB is known to be a pest of kiwifruit.

In Italy a lifecycle trial is underway in five netted and one open block. BMSB entered the blocks after overwintering but before the netting sides went down after pollination. This trial on kiwifruit has confirmed:

- there are two lifecycles per year,
- feeding damage results indicate up to 30% fruit loss due directly to feeding damage or fruit drop
- BMSB in the netted orchards were able to survive solely within that block, meaning they could maintain their lifecycle on kiwifruit
- the open block had higher numbers of BMSB throughout the season indicating that netting provided some protective benefits, even after BMSB had entered the orchard before the nets were closed.

An additional aspect to this trial identified several potential predators or parasitoids present in Italy that could be useful biocontrol agents, such as spiders, parasitic wasps and flies. This trial will be repeated in 2019 to confirm the data so far.

Another Italian trial looked at the potential for trap crops, maize, soy and peas/beans, to be used to lure BMSB away from kiwifruit orchards, however this was not conclusive.

In China, two trials have been undertaken. The first is another cultural control option being investigated, overwintering wooden trap boxes which could be used as the winter hibernation 'homes' of BMSB. Initial studies have narrowed down the size of slits required to house BMSB and indicated some design features that need improving/trialling. It is anticipated that once trapped in the boxes, BMSB will be easy to control, for example by burning the boxes. A follow-on trial will be undertaken this year.

The final project has been investigating the population of BMSB in conventional and unsprayed orchards, and again looking for potential predators and parasitoids. This research will continue for another two years utilizing the results generated throughout this period.

Ceratocystis fimbriata – protecting ourselves against our most despised disease

Ceratocystis fimbriata, or Brazilian Wilt as it is commonly known, is one of our most unwanted diseases. For this reason, it has achieved a lot of attention over the past 12 months.

Key to protecting our industry from this devastating disease - which has caused the death of a considerable number of vines in Brazil - is being able to test plant material for the presence of the causative organism. This is particularly important given the import pathway for kiwifruit plant material into New Zealand has recently been reopened. The KVH/ Zespri Biosecurity portfolio has invested in the development of rapid, highly sensitive and accurate DNA detection technology by Plant and Food Research. This detection technology is now in its second round of development and is being used to test infected vines in Brazil to ensure it is robust, scalable and ready for commercial use. This puts the industry in a very strong position to be able to test vines in New Zealand if we suspect an incursion.

Brazilian kiwifruit vines showing staining of internal tissue following infection with Ceratocystis fimbriata

Declining vine in Motueka – close-up view of symptoms showing characteristic fruiting bodies of the suspected causal agent

To better understand the risk of our commercial varieties we are currently working with a Brazilian researcher to evaluate the susceptibility of Gold3, Hayward, Bruno and Bounty to the disease. We are also exploring the potential of enhancing resistance to the disease through rootstock selection.

Vine decline in Motueka – responding to emerging issues

Like charity, biosecurity begins at home. Growers regularly report concerns about vine decline to KVH so this year we created a project to follow-up these reports and determine the causal agent with a view to better supporting growers in managing these vines. This need was particularly profiled in Motueka where growers were observing significant issues. Through the Biosecurity portfolio working with Plant and Food Research we were quickly able to launch a programme of work to confirm the causal agent, evaluate the relative susceptibility of our commercial varieties and explore the potential impact of management practices on the issues. KVH will continue to update the industry on these matters when more information comes to hand.

BMSB damage to kiwifruit

PSA PORTFOLIO

Aureo Gold

Spring 2018 saw the successful launch of Aureo Gold, the yeast based biological developed for the control of Psa – in fact it was so successful it sold out within 72 hours of release.

This product has been granted a Full Label Claim from ACVM and is supplied through Arysta Lifesciences.

Aureo Gold is the product of eight years of research undertaken by scientists at Plant and Food Research, supported by Zespri and KVH, Arysta Lifesciences, and the Ministry for Business, Innovation and Employment. It is developed from a strain of yeast called Aureobasidium pullulans isolated from apricots in Otago. Many years of research have showed that it has efficacy similar to copper, is bee safe, there are no residues and no impacts on fruit quality, return bloom and components of yield. It is compatible with most products, except copper - in fact efficacy seems to be improved when mixed with an elicitor. Shelf life studies are continuing, with the current recommendation to use all the product within the season it is bought. More product will be available for spring 2019.

Other updates

When Psa arrived in New Zealand we quickly gathered together a disease management programme based on existing knowledge. Since then we have been working with Plant and Food Research to backfill a number of our best guesses. The last year has seen progress in several projects that support extension activity and give KVH's Technical Specialist Linda Peacock new data to support an old but good message.

A large research programme called Gold Futures is designed to tease out why two orchards in the same environment can be observed to have quite different impacts of Psa. The project has highlighted:

- the importance of good pruning tool hygiene,
- the high level of inoculum naturally in orchards and the high number of infection periods regardless of observed symptoms (both of which highlight the need to keep spray programmes in place)
- the ability of growers to reduce the impact of Psa in a Psa challenged orchard by doing the right things well.

Bud rot continues to be a challenge for Hayward growers, and we have data that strongly suggests this occurs due to external infection of flowers rather than systemic infections. This provides growers with an opportunity to prevent flower infection and further profiles the value of having added Aureo Gold in the Crop Protection Programme.

Finally, a project designed to understand what switches Psa from being present without causing disease to Psa being a virulent pathogen (causing potentially lethal secondary symptoms such as cankers and dieback) has highlighted that even in vines without symptoms Psa can be present. This project supports KVH activity under the Kiwifruit Plant Certification Scheme (KPCS) which includes mandatory testing to reduce the risk of spread of Psa.

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