Kiwifruit Plant Certification Scheme Review

Report

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Executive Summary:

The Kiwifruit Plant Certification Scheme (KPCS) review has allowed for focused, in-depth discussions with 18 experienced kiwifruit industry individuals who were chosen to represent nurseries, post-harvest operations, a pollen mill, growers, biosecurity science and thought leaders as well as KVH staff. Discussions were guided by structured interview questions, the responses of which have been grouped and captured in the body of this document. As part of the review, the KPCS standard and supporting protocols were reviewed, along with other documentation requested by the reviewer.

The development and implementation of the KPCS by KVH has provided a valuable nursery certification scheme that gives a level of assurance to buyers of kiwifruit plants and rootstock that biosecurity protocols are in place, and plant material is free of target pests and diseases including Psa. The standard is recognized as robust and comprehensive, providing a useful benchmark for both established nurseries and new entrants to the nursery sector. Larger nurseries noted the training value for new staff that the standard offers, while more than half of the nurseries noted the high value of engagement with KVH staff.

One of the most consistent messages coming through from the review, was that orchard owners do not recognize the value of the KPCS or the efforts nurseries go to in order to meet the standard. There is limited interest by growers in Psa free rootstock now the disease is present on nearly all orchards within recovery areas. Clearly the value proposition of nurseries meeting the KPCS goes beyond Psa-V in terms of generic biosecurity risk management practices, however, this does not appear to be understood by growers. Nurseries feel more can be done to tell the KPCS story in the context of wider industry biosecurity controls, and KVH is ideally placed and has the mandate to do this.

The KVH compliance focus for the scheme is seen by some nurseries as a barrier to fully engaging with KVH. As an example, the focus of passing audits, obtaining a Psa negative test result and retaining full certification, meant that some nurseries did not see KVH as a first place to contact if unusual plant disease or die off was observed. One large nursery noted a desire to work more closely with KVH on a range of future biosecurity risks and surveillance initiatives, however felt KVH was more focused on policing the industry rather than playing a thought leadership role. Given the much broader role of KVH (its involvement in R&D, biosecurity policy development, Government Industry Agreement (GIA) for readiness and response and also border controls) it is important to fully understand this sentiment.

Nurseries raised a number of tactical issues that they felt were important to capture in the review. Some of smaller nurseries noted the costs of audits and testing as a significant cost that could not be passed onto clients. The timing of sampling, close to the point of sale, was noted as unhelpful by several specialist (grow-in-line) nurseries as any detection may lead to forfeiting the full year's production, with no time to recover. These nurseries suggested that earlier testing to demonstrate freedom of Psa, and other target organisms, would be more helpful to these nurseries.

The opening up of regions was considered a step too far by most nurseries in terms of overall biosecurity management for other risk organisms. However, the nurseries recognized why this move

had occurred, and that the current regulatory framework for Psa does not lend itself to implement movement controls for risk management for pest and diseases not already identified in New Zealand.

The use of budwood within the industry presents a significant pathway for the introduction and spread of endemic and exotic pests and diseases, through inadvertent silent spread. There was universal agreement that budwood controls could be better managed to reduce the biosecurity risks, both in terms of reducing the relatively free movement of budwood and also ensuring that traceability of this commodity is more robustly managed. Nurseries and the KPCS are not the obvious vehicle for managing the budwood pathway risk, and other options should be considered for this, perhaps through the post-harvest operators who store considerable amounts of budwood canes over the winter.

The recent observation of canker in the South Island, that is currently being investigated, has brought a fresh focus to budwood with current KVH protocols being reviewed. These protocols are focused on budwood collection from vines showing no evidence of disease, and testing negative for Psa. However, it is common for many plant pathogens to show no symptoms, often only becoming apparent when other factors such as climate and management factors trigger the occurrence of observable clinical signs.

The recommended practice of using your own budwood, while clearly the best way to mitigate biosecurity risk with budwood, is not totally without risk either. Examples were provided by growers, and post-harvest operators where canes had been picked up from cool stores incorrectly and also the traceability records were not robustly recorded. This activity can be further de-risked by improving controls for winter cool storage; including implementing robust traceability and product separation.

The use of pollen for artificial pollination represents another potential pathway for kiwifruit pathogens that can survive the pollen milling process. Currently, controls on the movement of pollen focus on KVH rules around regional Psa controls, but other plant pathogens are not covered by this. Unlike budwood, the practicalities of only using pollen from the same orchard is currently unrealistic to implement. Cleaning of pollen mills between batches is both time consuming and therefore costly and also difficult to implement 100% effectively. Many orchards and geographical areas do not have sufficient male plant blocks to be self-sufficient.

The natural movement of pollinating bees which will cover up to 5 Km also negate the value of limiting artificial pollen movement to the orchard level. Without a closer examination of the competence of pollen to vector high risk diseases, and understanding the epidemiology of different diseases, it is difficult to make recommendations around the value of pollen controls. Further work is recommended to better understand the likely risk pollen poses as a pathway for plant pathogen spread and cost implications of possible risk management options. There are for example some orchards planting large male blocks that allow a much greater degree of independence, and while the main driver for this is not biosecurity, but rather certainty of access to pollen, it does demonstrate that growers can and will adjust practices if there are compelling drivers to do so.

Introduction:

Plant material movements, particularly of nursery stock, are considered a high-risk pathway for transporting pests and pathogens over long distances, including significant kiwifruit pathogens such as Psa, *Ceratocystis fimbriata* and *Verticillium* wilt. By managing biosecurity risks associated with the movement of plant material, the likelihood of spreading endemic pests (Psa, nematodes, *Phytophthora*, viruses etc.) can be reduced, in addition to mitigating the risk of spread and subsequent impacts of new pests that may be present but have not yet been detected.

The KPCS is a pan-industry certification scheme designed to reduce the risk of pests and diseases being spread through plant material movements associated with the nursery trade. The primary goal of the KPCS is to enable growers to purchase kiwifruit plants of known plant health status, supporting long term success and future growth of the New Zealand kiwifruit industry.

The scheme was approved and launched by the KVH Board in May 2014, with full implementation of the scheme commencing 1 October 2016 after a two year transition period. Under the scheme all kiwifruit nurseries are able to demonstrate they are managing biosecurity risks with only KPCS certified plants being able to be bought or sold. At the inception of the scheme, around 27 nurseries were certified, now there are around 70 either certified or progressing through to certification.

In the time since the KPCS was conceived and implemented, the industry has experienced significant expansion and there has been changes in the geographical distribution of important plant diseases such as PSA-V in New Zealand.

The stated benefits the kiwifruit industry is seeking to achieve through the KPCS include:

- Minimising the risk that any new to New Zealand high risk pests or diseases (including new strains of Psa-V) are rapidly spread, to give the best chance of successful response with least possible impacts
- Minimising the spread of specified established diseases, including Psa-V, between kiwifruit growing regions
- Increasing the prospects of successful vine establishment in a Psa-V environment (i.e. by starting with healthy plants of known pest and disease status)
- Allowing efficient movement of cultivars throughout New Zealand
- Supporting movement of cultivars to offshore commercial opportunities
- Recognising nurseries operating to professional standards
- Reducing nursery business risk and uncertainty, by providing a clear and enduring framework on which business decisions can be based.

The KPCS Standard sets out:

- Basic requirements (e.g., personnel training, traceability, record keeping)
- Site requirements (physical requirements to ensure production areas remain free of pests and diseases)
- Minimum requirements to control biosecurity hazards
- Monitoring, testing and audit requirements.

To be part of the scheme a nursery must be able to demonstrate it meets the KPCS Standard. The KPCS Standard is aligned with HACCP methodology (Hazard Analysis and Critical Control Points) to provide a systematic framework to identify and manage risk within the nursery production process (see Box 1 for an explanation of HACCP).

The KPCS Standard requires all nurseries to maintain a place of production free of all target organisms. Monitoring is an essential component of the scheme as it provides the operator with verification that controls are effective or if not an early indicator of a systems failure. For many organisms, early detection is critical to the likelihood of a successful eradication.

Psa-V was the first target organism of the scheme. In October 2016 additional target organisms were added to the scheme, to achieve a balance between organisms present within New Zealand and offshore biosecurity threats, and make the scheme as meaningful as possible for growers purchasing plants while improving industry preparedness for future biosecurity threats.

Target organisms of the scheme include the following;

- Cherry leaf roll virus and Actinidia Seed-borne Latent Virus
- Soil borne pathogens (*Ceratocystis fimbriata,* Verticillium wilt, *Phytophthora* sp.)
- Soil invertebrates (Root knot nematode)
- Bacteria (Psa, all forms)

The list of target organisms and associated controls was based on technical advice provided by Plant and Food Research.

The KPCS Standard requires nurseries to conduct their own monitoring of plants on a regular basis. In addition, all nurseries will undergo annual independent monitoring that includes visual inspection (and in most circumstances diagnostic testing) to verify freedom from target organisms and associated symptoms. KVH will co- ordinate the independent monitoring and diagnostic testing components of the scheme. Details are provided in the KPCS Standard.

Aims and objectives of the KPCS review

Since the inception of the KPCS, the wider biosecurity landscape has evolved, particularly in terms of PSA V distribution and also the understanding of emerging biosecurity risks outside of New Zealand. KVH has therefore commissioned a review of the KPCS, via stakeholder interviews, to ensure it remains fit for purpose and continues to provide effective and efficient plant material biosecurity management. The review has looked for opportunities to improve the scheme, potentially broadening beyond nurseries to include movements of other plant material (rootstock, budwood, pollen and mature plants) and to cover other biosecurity risk organisms, in addition to Psa-V, to ensure it remains both relevant and effective going forward.

Methodology:

The KPCS review comprised an initial review of relevant scheme documentation and records provided by KVH covering the KPCS scheme, its development and current protocols. The reference section lists those documents reviewed. Following this review, 18 semi-structured interviews were conducted with a selection of growers, nursery owners, post-harvest operators, a pollen mill owner, Zespri, NZPPI and biosecurity researchers and biosecurity managers. In addition, KVH staff, managers and contractors were also interviewed and additional information was provided as requested. Set questions were covered in each interview, although these often generated further quality discussion.

Nursery owners and managers were interviewed from Waimea Nurseries and Peach Island Nursery in the South Island, Riversun Nursery in Gisborne, Fernbrook Farm Nursery, Southern Cross Horticulture, and WC & VM Parker Ltd in the Bay of Plenty, and Amber Nurseries in the Waikato. Several commercial growers were interviewed as well as the owner of a large commercial pollen mill. A Zespri representative from their industry liaison team was interviewed, as well as the Chair of KVH and NZPPI.

Grower Services and Orchard Operations Managers were also interviewed from Post-harvest organisations including Apata, East Pack and Seeka. These interviews included a particular focus on pollen and budwood production and management, and one organisation also had a nursery registered with the KPCS. Science community managers were also interviewed from Plant and Food Research, Forrest Owners Association and Better Border Biosecurity.

Questions covered during the interviews;

1. What do you see as the benefits of the KPCS?
2. What do you see as the strengths of the scheme?
3. Who do you think most benefits from the KPCS?
4. How do you measure the value of the KPCS?
5. What do you see as barriers to the scheme to date and going forward?

6. What do you see as the weaknesses of the scheme?
7. How could the KPCS be improved?
8. Would other similar schemes that include pollen and budwood be useful as future initiatives?
9. What barriers would you see to including other plant materials in the KPCS?
10. Are you aware of any other certification schemes from other areas of horticulture or primary sector in New Zealand or overseas?
11. Are there other ways to achieve the outcomes wanted?
12. What are the costs of the KPCS to your business and how do you measure its value?

Findings

Feedback and findings have been grouped into theme areas focusing on:
a) Areas where the KPCS is working well, is seen to add value and to the wider industry
b) Area where the scheme is considered either weak or could be improved
c) Consideration around the risks associated with pollen and budwood
d) Any other comments or ideas.

Responses from the nurseries, of which seven were interviewed, were grouped together, as were the post-harvest operators and ZESPRI responses. Growers, science community interviewees, a single pollen mill and NZPPI are described individually.

Nursery feedback:

Strengths:

1. There was broad agreement that the KPCS provided a robust nursery biosecurity standard. This allows both established businesses and an increasing number of new entrants to the kiwifruit plant growing business to ensure that key biosecurity protocols are applied.

2. The KPCS materials are seen by several nurseries as a useful tool for staff training.

3. Several of the small nurseries commented on the quality interaction with KVH staff during the KPCS roll out and during annual audits. They saw the audits as adding value, with useful information shared.

4. The KPCS was seen by most nurseries as a useful benchmark to ensure everyone was meeting a core level of biosecurity and also creating a bar for new nurseries to meet.

5. One large operator noted the focus purely on biosecurity was a key strength of the KPCS.

6. The surveillance value for resistant strains of PSA and other target organisms was seen as a useful element of the scheme: should an incursion or disease emergence occur within a nursery.

Weaknesses and areas for improvement:

1. One of the most consistent messages from all nurseries was they felt strongly that growers did not understand the value of the KPCS and very rarely asked about it when purchasing plants. There are a number of reasons put forward for this, including;
    a. The mind-set that the scheme is all about Psa and this is not a high concern for growers at this time.

b. That the primary focus for buyers was price, plant physical characteristics and availability, not purchasing disease free certified plants. A recent real example of this came from one nursery that contacted all clients when they had a PSA detection, and experienced very little concern from clients.
c. The KPCS story and value proposition it creates in terms of biosecurity risk management is poorly communicated by KVH to the industry as a whole. Therefore, growers are unaware of the added protection the scheme provides.

2. The compliance focus of the scheme is seen by some nurseries as a barrier to fully engaging with KVH. As an example, the focus of obtaining a PSA negative test result and retaining full certification, meant that some nurseries did not see KVH as a first place to contact if unusual plant disease or die off was observed. One large nursery noted a desire to work more closely with KVH on a range of future biosecurity risks and surveillance initiatives, however felt KVH was more focused on a compliance framework rather than a thought leadership role.
The need to achieve the right balance between regulation, compliance, extension and engagement is not unique to KVH, and is experienced by a range of organizations that have dual roles across regulation and industry good.

3. The smaller nurseries noted the cost of audits and testing was a significant burden, while larger operations easily absorbed these costs as part of their overall compliance management.

4. Several of the larger nurseries felt that their internal systems already meet the KPCS standard and as such, the KPCS provided them little direct value. There was recognition though at an industry level, that the scheme provided benefit.

5. The timing of plant leaf sampling was raised by two grow-in-line nurseries as a frustration. The focus on sampling close to the point of plants being sold may be of benefit to the grower, but means that if any detection is made, there was no time to recover for the season in terms of lost sales. Testing earlier in the growing cycle would be more user friendly for these specialized nurseries.

6. Some nurseries question the ability for orchards to grow up to 1000 plants for own-use as a potential loop hole in the KPCS as it was impossible to monitor if these plants were home grown or sold/purchased outside of the scheme.

7. Several nurseries felt that more could be done to market full certification nurseries to encourage new buyers to contact these nurseries.

8. Most nurseries felt the opening up of the regions as a step backwards in terms of general biosecurity risk management. Specifically, if a new or emerging pest or disease appeared in one region, the freer movement of kiwifruit root stock was considered an increased risk to

the wider industry. There was understanding why this move had occurred, and that the current regulatory framework for Psa does not lend itself to implement movement controls for risk avoidance for pest and diseases not already identified in New Zealand.

Nursery feedback on pollen use.

Several nurseries used pollen, but most did not. There was recognition that the industry use of pollen clearly represents a potential biosecurity risk pathway for those diseases for which pollen is a competent vector. Pollen mills are able to provide a traceability history for batches of pollen, but those batches may have many contributing orchards and the final pollen may be used over wide areas. There are significant reported challenges of effectively cleaning the pollen mill between batches, meaning there is ongoing risk of cross contamination of batches.

One nursery noted they had invested in their own small pollen mill and were very happy with this switch away from purchasing pollen. The cost of the imported machine apparently easily paid for itself in one season.

Nursery feedback on budwood use.

More than half of the nurseries interviewed did not graft budwood, however some of these noted that this plant material pathway was a biosecurity risk that could be better managed at the industry level through more robust traceability.

Those that do undertake grafting explained that the requirement to purchase budwood from the South Island was viewed by them as both an added cost and more importantly a biosecurity risk compared to using their own budwood. The recent canker detection in the South Island was raised by two nurseries who use budwood as a concern. Their preference would be to use their Psa certified free vines for budwood.

Post-harvest and ZESPRI feedback:

The post-harvest operations interviewed and the Zespri representative had limited direct involvement in the KPCS scheme other than one that operates a full KPCS certified nursery. The feedback from this nursery was included in the above summary. One interviewee noted that the annual GAP audits required growers to demonstrate purchased plants had come from KPCS certified nurseries.

Budwood:

Post-harvest operators provide a service for their growers to store owner-harvested budwood over the winter in cool stores. In addition to owner-harvested budwood, G3 provided by ZESPRI and Chieftan males are also stored when required. Budwood is stored in labelled bags containing the canes and usually are stored in individual bins. Some post-harvest sites provide a dedicated chilled

shipping container for budwood storage, while at other locations a corner of a cool store is typically used.

Records are generally kept for traceability purposes, but there was recognition that this process could be more robust. There were recent examples provided of growers collecting the wrong budwood and then other growers arriving to find their supplies no longer there. Several post-harvest operators suspected if a full traceback was ever required, the system would be found lacking with gaps.

Zespri recommend growers obtain budwood from their own orchard following KVH advice. They do support growers with the provision of South Island sourced G3 budwood primarily for new license orchards. Parent plants are tested 6 weeks prior to harvest following KVH protocols. Historically this budwood has been sourced from selected orchards in the Nelson region, is shipped to Mount Maunganui and is stored in a chilled shipping container for grower collection. Good records are kept of where this material is supplied based on KPINs, however Zespri suspects some budwood may go to other orchards not recorded.

As a result of the recent detection of canker in the South Island this is under investigation, the practice of sourcing G3 budwood was under review at the time of this review interview. Of relevance here is that budwood for the new red kiwifruit variety is sourced within region, as it is not grown in Psa free areas.

<u>Pollen:</u>

There is a range of involvement in pollen collection, processing and storage with several operators arranging male flower picking with milling being undertaken by commercial pollen mills. Another operator is increasing their involvement and actively harvest and mill pollen for their suppliers.

The post-harvest operators interviewed all appeared confident that each batch of finished pollen had a robust and auditable traceability history that accurately identifies the source of flowers. This process was not closely examined as part of the review, noting that KVH undertakes audits of the pollen mills and records were available of these visits.

The obvious challenge with pollen noted by the post-harvest operators is that there is plenty of potential for pollen to be used quite large distances away from the place of harvest, and therefore can be a long-distance spreader of diseases in cases where pollen is an effective vector. Some interviewees noted that attempts were made to keep pollen processed in specific areas in batches that are only used in these areas. Batches could quite easily have 20-30 supplying orchards making up the batch, so clearly represent a significant plant material mixing event. Several interviewees noted that the picking teams may, unintentionally or intentionally, collect male flowers from orchards not listed on their picking list. In these cases, traceability is at risk.

Grower feedback:

Two growers were interviewed as part of the review. Neither were well informed about the KPCS which supported earlier comments from nurseries that growers do not appear to understand the value of the scheme. Both felt that overall biosecurity awareness within the industry had dropped in recent years with less focus on the risks this presents to the industry. Budwood traceability was noted as a concern by one of the growers who believed current traceability requirements were not sufficiently robust. Both also noted the extensive use of pollen and the challenges this presented.

Other comments included the suggestion that Zespri was well positioned to support traceability improvements based on the KPIN system. There was also recognition that for KVH, their compliance activities could also be somewhat of a barrier to early reporting of unusual disease.

Pollen Mill feedback:

A large pollen mill owner based in the Bay of Plenty was interviewed. The discussion focused on pollen in the context of biosecurity as the KPCS was of little relevance to the mill and as such awareness of the KPCS was low. The use of artificially harvested and milled pollen is a critical part of the production system today with a significant effect on the overall volumes and quality of exportable kiwifruit from orchards.

The pollen mill has some clients who require that their pollen is milled separately, however this comes with additional costs due to extra cleaning and time for the mill. The cleaning process is also not 100% effective. The majority of orchards do not request pollen separation although some geographical areas do request pollen is sourced only from their area. Some areas however don't have sufficient male vines to be self-sufficient, and this is an important challenge when considering potential risk management approaches for pollen use.

It was noted that some large operators often grow their own male blocks to be self-sufficient, and reduce the risk of not having access to pollen.

When considering the risks associated with pollen, it is vital to properly understand the epidemiology of various risk diseases. This is because as pollen is not a competent transmission pathway for all kiwifruit diseases. As part of biosecurity preparedness planning, there would be value in simulating the impacts of a biosecurity incursion pre-pollination in terms of business interruption, and flow on loses if artificial pollination was impacted.

Science and biosecurity community feedback:

This group comprises of plant biosecurity science and thought leaders from Plant and Food, Better Border Biosecurity (B3), the Forest Owners Association and New Zealand Plant Producers Incorporated (NZPPI).

Some key theme areas relevant to the KPCS review are noted below:

a. Placing increased effort to detect disease at places at aggregation and propagation points, which the KPCS does clearly has considerable merit from a wider biosecurity perspective.

b. It was noted that nurseries place a high priority on early detection of signs of disease so they can quickly respond through either treatment or removal in an attempt to protect the rest of the crop. Young plants are typically more closely observed, in nurseries than when placed in orchards. The drive though to report these events may not be such a high priority as potential biosecurity controls result in considerable uncertainty around ability to continue to sell product. The reliance on treatment, both preventative such as copper or reactive in the case of specific disease can also lead to masking of important clinical signs. Understand this dynamic is important if early detection of new or emerging diseases is to be optimized.

c. Multi-species nurseries have a much greater number of inputs of seeds, seedlings and young plant so should be consider higher risk in terms of disease pathways.

d. The high number of plant pathogen, multi-factorial nature of disease expression and often limited science are real challenges which make biosecurity risk assessment more difficult. As such, focusing on first principles such as traceability, reduced movement and more closed orchards makes obvious sense.

e. The optimization of surveillance sampling will vary between diseases in terms of sample type and timing. The KPCS has had to balance this against the cost of such surveillance such as the virus target disease testing is an example of this.

f. The nursery staff training requirements of the KPCS appears to rely on participation and does not test competency per se. In terms of early detection of disease symptoms, this may be relevant and could be improved through some form of competency assessment. The skill level of staff and managers working across the nurseries included in the KPCS is very varied, ranging from expert level with decades of experience and or post tertiary training through to those with very limited formal training or experience.

g. The movement of budwood and pollen was recognized by everyone interviewed in this group as a significant biosecurity risk and while the KPCS may not be the vehicle to manage these risks, the industry should consider other mechanisms to mitigate risks of the silent (pre-detection) spread of diseases.

h. Any potential enhancements to the KPCS may increase costs to the nurseries, costs that will inevitable be passed on the growers. Examples were given where high program costs actually lead to growers preferring non-certified plants. Is this a rec? Avoid the pitfall of increasing costs too much and driving trade underground.

i. Measuring the value of the KPCS was challenging for nearly all interviewees. The concept of cost avoidance for growers and in some instances the entire kiwifruit sector, was discussed by several members of the biosecurity community as the primary measure of value. The early detection of key pests and diseases and hopefully reduction in distribution is likely to deliver considerable cost savings, although the estimated dollar value would require modeling based on different incursion and long term costs for specific organisms.

Discussion:

The development and implementation of the KPCS by KVH has provided a valuable nursery certification scheme that gives a level of assurance to buyers of kiwifruit plants and rootstock that biosecurity protocols are followed. The standard is robust and comprehensive, and provides a useful benchmark for both established nurseries and new entrances. Larger nurseries noted the training value for new staff that the standard offers, while more than half of the nurseries noted the high value of engagement with KVH staff.

Several large nurseries felt that their existing biosecurity protocols meant that the KPCS added little additional value, however they also noted that meeting the standard was therefore not difficult and could in most cases be achieved through business as usual programmes. One nursery made the point that the focus of the KPCS being 100% biosecurity was a strength and cautioned against trying to fit the KPCS into other broader compliance programmes.

Recommendation 1: There is broad base support to maintain a nursery certification scheme for the kiwifruit industry. KVH should continue the scheme, noting recommendations within the review.

Measuring the value of the KPCS was challenging for nearly all interviewees. The concept of cost avoidance for growers and potentially the entire kiwifruit sector, was discussed by several members of the biosecurity community as the primary measure of value. The early detection of key pests and diseases and hopefully reduction in distribution is likely to deliver considerable cost savings, although the estimated dollar value would require modeling based on different incursion scenarios.

One of the most consistent messages coming through from the review was that orchard owners do not recognize the value of the KPCS or the efforts nurseries go to in order to meet the standard. There is limited interest in Psa freedom now the disease is present on nearly all orchards within recovery areas. Clearly the value proposition of nurseries meeting the KPCS goes well beyond Psa-V in terms of generic biosecurity risk management practices, however this does not appear to be understood by growers. Nurseries feel more can be done to tell the KPCS story in the context of wider biosecurity controls, and KVH are ideally placed and have the mandate to do this.

Recommendation 2: KVH should build on past efforts and initiatives to further communicate the wider biosecurity system to growers and specifically how the KPCS supports this.

The KVH compliance focus of the scheme is seen by some nurseries as a barrier to fully engaging with KVH. As an example, the focus of passing audits, obtaining a PSA negative test result and retaining full certification, meant that some nurseries did not see KVH as a first place to contact if unusual plant disease or die off was observed. One large nursery noted a desire to work more closely with KVH on a range of future biosecurity risks and surveillance initiatives, however felt KVH was more focused on a compliance framework and policing the industry rather than a thought leadership role.

The need to achieve the right balance between regulation, compliance, extension and engagement is not unique to KVH and is experienced by a range of organizations that have dual roles across

regulation and industry good. Given the much broader role of KVH, its involvement in R&D, biosecurity policy development, Government Industry Agreement (GIA) for readiness and response and also border controls, this sentiment is important to understand and KVH may wish to explore this and its implications more fully.

Recommendation 3: KVH should consider if the perception by some within the industry that its key role is one of compliance is impeding delivering its overall purpose for the industry.

Plant nurseries place a high priority on early detection of signs of disease so they can quickly respond through either treatment or removal in an attempt to protect the rest of the crop. As a consequence, plants grown in nurseries are typically more closely observed than when placed in orchards. The desire to detect disease early may not however always mirror the desire to report these events as potential biosecurity controls often result in considerable uncertainty around ability to continue to sell product. The reliance on treatment, both preventative such as copper or reactive in the case of specific disease can also lead to masking of important clinical signs. Understanding this dynamic is important if surveillance for new or emerging diseases is to be optimized.

Nurseries also raised a number of tactical issues that they felt were important to capture in the review. Some of smaller nurseries noted the costs of audits and testing as a significant cost that could not be passed onto clients. The timing of sampling, close to the point of sale was noted by two grow-in-line nurseries as unhelpful as any detection may lead to forfeiting the full year's production, with no time to recover. Earlier testing to demonstrate freedom of Psa and other target organisms, would be more helpful to nurseries.

Recommendation 4: KVH should investigate if the timing of KPCS sampling could be changed without creating a significant increase in overall biosecurity risk?

The opening up of regions were considered a step too far by most nurseries in terms of biosecurity management for other risk organisms. Specifically, if a new or emerging pest or disease appeared in one region, the freer movement of kiwifruit root stock was considered an increased risk to the wider industry. There was recognition why this move had occurred and that the current regulatory framework for Psa does not lend itself to implement movement controls for risk avoidance for pest and diseases not already identified in New Zealand.

Recommendation 5: KVH should note the sentiment reported by the nurseries for the opening up of Psa regions in the context of opportunities for future regulatory framework review.

The use of budwood within the industry presents a significant pathway for the introduction and spread of endemic pests and diseases, as well as the inadvertent silent spread of new and emerging diseases. There was universal agreement that budwood controls could be better managed to reduce the biosecurity risks, both in terms of reducing the relatively free movement of budwood and also ensuring traceability of this commodity is more robustly managed.

Nurseries and the KPCS are not an obvious vehicle for managing the budwood pathway risk, and other options should be considered for this, perhaps through the post-harvest operators who store

considerable amounts of budwood canes over the winter. The recent detection of the cankers on South Island vines (of which research is underway to determine cause), has brought a fresh focus to budwood with current KVH protocols being reviewed. These protocols are focused on avoidance of budwood collection from vines showing evidence of disease, however, it is common for plant pathogens to show no symptoms, often only becoming apparent when other factors such as climate and management factors trigger the occurrence of observable clinical signs.

Recommendation 6: KVH should strengthen the advice to nurseries to use cleanest possible plant material

The recommended practice of using your own budwood, while clearly the best way to mitigate biosecurity risk with budwood is not totally without risk. Examples were provided by growers, and post-harvest operators where canes had been picked up incorrectly and also the traceability records were not robustly recorded. This activity can be further de-risked by improving controls for winter cool storage of the budwood bags to ensure robust traceability and product separation.

Recommendation 7: Ensure that the practice of storing own use budwood is both tightly managed to ensure risk of inadvertent mixing of budwood is avoided and that full and robust traceability it maintained.

The use of pollen for artificial pollination also represents another potential pathway for kiwifruit pathogens that can survive the pollen milling process. Currently, controls on the movement of pollen focus on KVH rules around regional Psa controls, but other plant pathogens are not covered by this. Unlike budwood, the practicalities of only using pollen from the same orchard is currently unrealistic to implement. Cleaning of pollen mills between batches is both time consuming and difficult to implement with 100% effectiveness, and many orchards and even geographical areas do not have sufficient male blocks to be self-sufficient.

The natural movement of pollinating bees, which will cover up to 5 km, also negate the value of limiting artificial pollen movement to the orchard level. Without a closer examination of the competence of pollen to vector high risk diseases, and understanding the epidemiology of different diseases, it is difficult to make recommendations around the value of pollen controls. Further work is recommended to better understand the likely risk pollen poses as a pathway for plant pathogen spread and cost implications of possible risk management options. There are for example some orchards planting large male blocks that allow a much greater degree of independence, and while the main driver for this is not biosecurity, but rather certainty of access to pollen, it does demonstrate that growers can and will adjust practices if there are compelling drivers to do so.

Recommendation 8: KVH should further investigate the risks posed by pollen in terms of the key disease risks to kiwifruit and undertake a cost benefit analysis with key stakeholders to fully understand the benefits and costs of different control schemes.

In conclusion, this review has clearly identified the need for improved biosecurity management for both budwood and pollen. The expansion of the KPCS to include pollen and budwood would be an obvious vehicle for such biosecurity management. The current regulatory framework that KVH

operates within was established for the control of Psa-V. This framework does not lend itself to the proactive risk mitigation of other biosecurity risks not yet detected, or present in New Zealand, and opportunities to address this should be properly explored.

Recommendation 9: KVH should consider the development of both pollen and budwood certification schemes to proactively mitigate the biosecurity risks associated with these plant materials.

References:

- KVH Information Sheet “Kiwifruit Plant Certification Scheme” 16 July 2018
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- Cost effective control measures for viral, fungal, soil invertebrate and bacterial threats of New Zealand Actinidia spp. Plant and Food Research, Horner M et al, December 2015.
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