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New Zealand's Borders are Closed

What are the impacts on germplasm importers if regulations get harder to comply with and what are the downstream consequences for New Zealand?

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1.0 Executive Summary

New Zealand is an exporting nation with its primary sectors being some of the biggest contributors. There is a lot to protect ourselves from in the way of biological incursion that could crush our primary industries, in particular, horticulture. Protecting our country is done in the way of border controls and monitoring what is entering the country through government created biosecurity systems. The new germplasm import pathways has its own biosecurity system which for users is fraught with complex and multilayered challenges, all with the primary goal of protecting New Zealand from biological incursions.

This report aims to help support ongoing work in the germplasm import industry and to find beneficial solutions for importing pathways while keeping New Zealand safe from biological threats. This report will explore three key research questions.

- What is the history of the quarantine system in New Zealand, and how does the system now work?
- What are the most common barriers to entry of new plant germplasm material into New Zealand?
- What are the solutions to assist with the simplification of the import process?

The methodology comprises a literature review to provide context around the key barriers faced with the importation of germplasm. A thematic analysis is then conducted from ten anonymous semi-structured interviews of four people from fruit and vine, two that work across multiple horticultural production sectors, one from the ornamental sector, one from the arable sector and two from a non-governmental organisation. The questions were grouped into five high-level themes:

- Business involvement with plant germplasm
- Introduction of new plant germplasm
- The impact and understanding of import barriers
- Challenges, improvements and impacts
- Other opinions brought to light

After analysing various themes related to import systems, four major discussion areas emerged from the literature. These areas include the need for simplified operational processes to improve the import system's usability, economic feasibility to address the potential implications of increased import costs, and New Zealand's competitive advantage in both domestic and international markets for horticultural products.

Recommendations to improve import pathways for New Zealand and the users:

- Plant importers, NGO's and the government need to implement better collaboration between themselves for the improvement of importation frameworks and legislation.
- To build better capability with MPI and provide comprehensive training for biosecurity officers and relevant personnel involved with the import processes.
- The need to streamline and standardise New Zealand's import processes to reduce inconsistency between imports and decrease time delays.
- Industry and government's continual investment in advanced diagnostic technologies to reduce testing time and cost.

2.0 Acknowledgements

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3.0 Introduction

The importation of plant germplasm, which includes both ornamental and commercial varieties, plays a crucial role in New Zealand's economic prosperity and environmental sustainability. It enables the horticultural industry to innovate, adapt to future challenges, and develop plant varieties that are more resilient to climate change and pests. New Zealand's horticulture industry, with exports valued at \$6.2 billion in 2019 (Proudfoot, 2023) relies on access to plant germplasm to maintain its international competitiveness. Importation of germplasm also enhances environmental biodiversity and supports cultural and social outcomes. In addition, the importation of ornamental varieties has significantly boosted houseplant demand. The importation of germplasm, whether as plants for planting or seeds for sowing, is critical for the prosperity and resilience of the horticultural industry. Furthermore, New Zealand's seed trade, especially in vegetable seeds, contributes significantly to the country's primary industries and export revenue, with a growing demand for varieties like radish and carrot seeds. Overall, the importation of germplasm and seeds is essential for economic growth, market access, and protecting New Zealand's environment and way of life from foreign plant pests and diseases.

The biosecurity system in New Zealand for plant germplasm is generally effective but it faces significant challenges. Due to increasing demand for importing diverse germplasm, and limited availability of Level 3B PEQ facilities, there can be delays and impact on planting schedules. The facilities are fully booked until 2025, and a backlog of Import Health Standards (IHS) applications leads to long approval wait times, which limits imports. Moreover, there is heavy reliance on offshore quarantine facilities, restrictions on sourcing ornamental germplasm, and an increasing risk aversion among stakeholders, which complicates the process. In order to address these issues, alternative strategies are required to improve risk management, enhance system efficiency, and adapt to the growing demand for germplasm while maintaining stringent biosecurity standards.

So why bother bringing in new plant germplasm into New Zealand then? It is a difficult question as depending on who you speak to will result in a different outcome. If you were to talk to a kiwifruit grower, they might tell you that we don't need new imports as the breeding is done in New Zealand (Nadarajan et al., 2023) New Zealand's fruit exports could be at risk due to a potential biological incursion. To maintain our country's clean, green image, it's crucial that we plant vegetation that is suitable for the environment it's being placed in. For instance, planting a plant in an unsuitable environment, like a roundabout in the middle of a busy highway, can lead to the plant's death after just six months. Importing plant germplasm is essential for the economic growth of New Zealand and to enhance the quality of the places we live, work, and play. Access to plant germplasm for our primary industries is necessary to enable them to maintain competitive value, grow, innovate, and cope with future changes. Importing new plant germplasm can be a game-changer in the development of plant varieties that are more resistant to climate change, pests, and diseases. Moreover, it allows New Zealanders to have access to a wider range of plant materials to support cultural and social outcomes (Plant Germplasm Import Pathway, 2022).

Every sector in horticulture has its own industry body that helps assist members with challenges or queries they may have on a day-to-day basis. For example, plant producers have New Zealand Plant Producers Incorporated (NZPPI), tomato growers have Tomatoes New Zealand Incorporated; this list goes on. All of these industry body groups come together to form councils, which are there to establish ways to improve the system so that importing new plant germplasm is kept simple, such as the PGIC council or the GIA (Government Industry Agreement: Biosecurity). Discussions are sometimes held to address the issue of keeping New Zealand's small and fragile environment safe from biological incursions. However, these discussions can sometimes overlook the interests of smaller horticultural sectors, such as the New Zealand Plant Producers, who contribute very little to New Zealand's export revenue. Meanwhile, at the same table, there are representatives from Kiwi Vine Health, who represent kiwifruit growers that contribute 34% to New Zealand's horticulture industry who don't import any new plant germplasm (Situation and Outlook for Primary Industries June, 2023).

The question is, how can we make the process of importing safer, simpler and more beneficial for all growers in New Zealand whilst keeping New Zealand's precious biodiversity safe from incursions that can wipe out a sector in a heartbeat?

4.0 Research Aim

The aim of this report is to highlight the history of our biosecurity system and how we have got to where we are currently, which makes bringing new germplasm into New Zealand seem difficult. I will then explore the reasons and barriers why the importation of new germplasm can seem so challenging. This will finally lead me to investigate if there are viable and safe alternatives to streamline the process for New Zealand importers.

4.1 Research Questions

- What is the history of the quarantine system in New Zealand and how does the system now work?
- What are the most common barriers to entry of new plant germplasm material into New Zealand?
- What are the solutions to assist with the simplification of the import process?

5.0 Methodology

The following are the main methods used to help address the research questions.

5.1 Literature Review

The literature review is to help add some understanding of the history of New Zealand's importing process, as this topic alone is something very few people will have little knowledge of. It will also paint a picture in people's minds of the process required to import that stunning new plant they now see in their local garden centre or the new variety of apples they see on the shelves at their local supermarket. Consumers are always looking for a product that looks better than the previous, grows better in drier conditions or is less susceptible to bug infestations in summer. This all stems from plant breeding programs that are run from overseas laboratories. What we need people to realise is that when we import new products, there is a risk that we also import their "problems" with the plant, i.e pests, virus and disease. We need to highlight these risks and barriers with the literature review and add context to why food and plants may cost the price that they are because of the barriers we face in importing new and improved products. The research completed in the literature review will put all the pieces of the puzzle together and give us a better understanding of what work has been done in the past.

5.2 Semi-Structured Interviews

Sometimes, the best way to gain more knowledge on a specific issue growers face is to be at the ground level with them. I have conducted ten interviews. The first three questions asked to the respondents are:

- Who they are and what do they do?
- Do they import plant germplasm?
- If so, what do they import?

From there categories were formed to help structure the analysis.

The five main categories are:

- Non-governmental organisations
- Fruit and Vine
- Ornamental
- Cross Sector
- Arable
- Research

The interviewees from cross sector import germplasm into New Zealand in the forms of budwood, whole plant, tissue culture, and seed. Interviewees from fruit and vine imported in the form of budwood, whole plant and tissue culture. Ornamental interviewees imported whole plants, tissue culture and seed. The arable importer only imported seed. The research category encompasses all of the importing aspects like the cross sector interviewees however, have a slightly different motive than the others. The NGO that I have interviewed is an industry body that supports plant producers and part of that is helping with the import pathway. Figure 1: An organisation chart has been formed to help explain how each interviewee has been categorised. helps to explain this in a more simplified form.

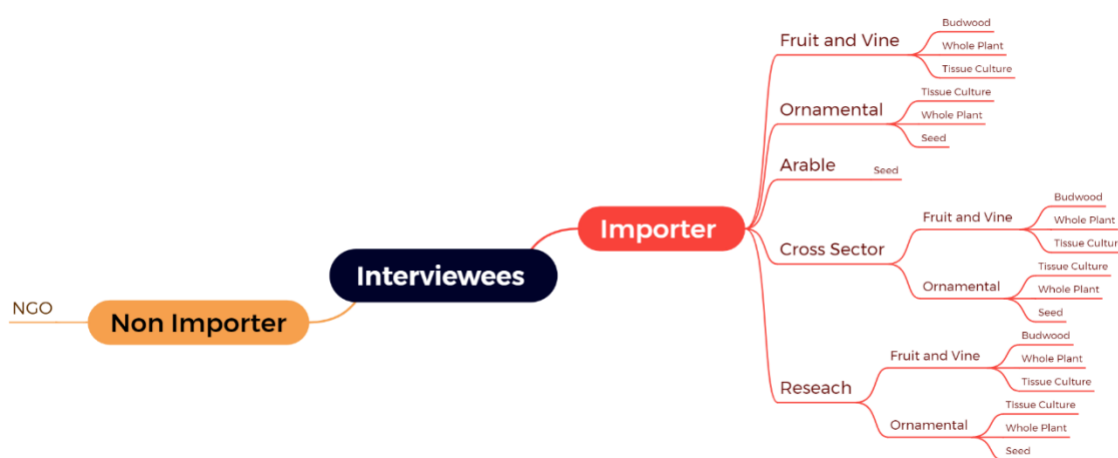


Figure 1: An organisation chart has been formed to help explain how each interviewee has been categorised.

The questions have been broken into five high-level themes:

- Business Involvement with Plant Germplasm
- Introduction of New Plant Germplasm
- The Impact and Understanding of Import Barriers
- Challenges, Improvements and Impacts
- Other Opinions Brought to Light

Detailed questions based on the five high-level themes have been asked of the respondents.

5.3 Thematic Analysis

When reviewing my semi-structured interview questions, I use a qualitative method for “identifying, analysing and reporting patterns (themes) within data” (Braun & Clarke, 2006). This is the thematic analysis technique. I have used this technique to review all the interview questions to define themes between each person's response.

5.4 Limitations

The purpose of this report is to provide a comprehensive view of germplasm imports from government to industry. There was a lack of meaningful response from Ministry for Primary Industries (MPI) and Horticulture New Zealand (Hort NZ), who play an important role in the policy and legislation of New Zealand's import system. This led to a reasonably one-sided approach as it was only industry that could answer the questions.

6.0 Literature Review

6.1 History

New Zealand has a long history of importing goods due to its lack of land borders with other nations, making it one of the most isolated places on Earth. This isolation has provided the country with protection against unwanted diseases and pests (Shoebridge, 2023). The arrival of European colonists in the 1800s brought about a dramatic shift in the rate and number of plant species introduced (Hulme, 2020). It became clear that certain plants and animals had become pests, threatening their livelihoods and carrying diseases harmful to the nascent agricultural and horticultural industries (Shoebridge, 2023).

Starting from the 1840s, the government in New Zealand introduced measures to protect livestock from pests and diseases. One of the earliest regulations, passed in 1849, mandated that all livestock arriving in the country be thoroughly checked by sheep inspectors for the 'sheep scab' mite. With the help of successive inspection laws, the mite was successfully eradicated from New Zealand by 1893. In 1861, an Act was passed that permitted provincial governments to ban diseased cattle from their districts. By 1876, diseased livestock were prohibited from entering the country altogether (Shoebridge, 2023).

It was realized that the introduction of plant quarantine regulations was necessary upon the arrival of international travel in 1952 (Shoebridge, 2023). Agricultural biosecurity was strengthened in the 1950s with the creation of the plant quarantine service in 1952, shortly after New Zealand joined the International Plant Protection Convention (Sikes et al., 2018). There are certain formalities that we still follow at airports, such as completing declaration forms and inspecting baggage, cargo, and the aircraft itself. Quarantine inspectors have become more vigilant about the items that international passengers carry with them on arrival, especially small quantities of fruit and meat that may be infested and could potentially spread animal diseases (Shoebridge, 2023). In the past, the agricultural sector has been vulnerable to the introduction of plant pathogens through various pathways such as imported seeds and other plant materials. However, the situation has improved significantly since the 1960s, thanks to a combination of government investment in agricultural quarantine and an industry-based seed certification scheme. This combined approach has been effective in reducing the arrival rates of pathogens of crop and pasture species, making the agricultural sector more resilient and sustainable. By specifically targeting key pathways that were most likely to introduce plant pathogens, the agriculture industry has been able to safeguard the country's crops and pastures against the threats posed by these harmful organisms (Sikes et al., 2018).

The 1980s and 1990s saw a shift towards risk assessment, with deregulation paving the way for dynamic collaborations with international trading partners. This gave rise to new inspection methodologies and technological integrations (Shoebridge, 2023). Significant progress has been achieved thanks to the implementation of new technologies and techniques, such as soft-tissue X-ray machines and the use of detector dogs at international airports since 1996. Prior to this, the Ministry of Agriculture and Forestry estimated that only 55% of risk goods brought in by passengers were being detected. However, after 2001, detection levels increased significantly to 95% to 100% (Sikes et al., 2018). The Ministry of Agriculture and Forestry underwent significant changes as it transitioned to the user-pays era. The old bureaucracy was dismantled, and the quarantine service underwent several structural changes. Importers were now required to pay for fumigation and inspection services, which were previously free, and compliance services that were labour intensive were also shifted to cost recovery principles based on the user-pays system (Shoebridge, 2023). A

landmark moment arrived with the Biosecurity Act of 1993, which expanded the ambit of border protection beyond agriculture to encompass environmental conservation.

The Biosecurity Act (1993) plays a pivotal role in safeguarding the country against the invasion of pests and unwanted organisms. With its focus on exclusion, eradication, and effective management, the Act provides a comprehensive framework for implementing robust border controls aimed at preventing the entry of such organisms, establishing a surveillance system to detect their presence, and ensuring the prompt control and eradication of pests that have already established a foothold in the country. This legislation is a critical component of our national biosecurity system, which is essential for protecting our environment, economy, and public health (Biosecurity Act 1993, 2018). From the late 1990s until 2012, the Ministry of Agriculture and Forestry managed the act. Since it is under the management of MAF, it is responsible for conducting border surveillance with the aim of preventing both accidental incursions and deliberate illegal introductions of unwanted organisms (C.M.C Vieglais, 2004).

The importation of new plants is governed by a specific regulation known as the Hazardous Substances and New Organisms (HSNO) Act 1996. This act is responsible for managing the legal introduction of new organisms and established the Environmental Risk Management Authority (ERMA New Zealand) to evaluate all applications for the import, development, field testing or release of new organisms. ERMA closely collaborates with the enforcement agency for the new organisms component of the HSNO Act, the Ministry of Agriculture and Forestry (Vieglais & Harrison, 2004). The new legislative framework for addressing non-native plants is unique in that it takes a different approach than previous methods. Rather than using a prohibited list, called the "black list," it uses a permitted list, called the "white list." This approach is the first of its kind and is based on the Plants Biosecurity Index, a database of all plant species - both native and non-native - that were cultivated or established outside of cultivation before July 29, 1998. This new approach is a significant departure from the traditional "black list" approach (Hulme, 2020).

Since the implementation of MAF (Ministry of Agriculture and Forestry) and the HSNO (Hazardous Substances and New Organisms) Act, every step of the horticultural import process has been scrutinized to prevent any biological incursion, which is crucial for maintaining New Zealand's biodiversity. This has provided more opportunities for importing as the standards are now controlled and safer than before the Biosecurity Act. However, there is always a risk involved, and frameworks have been established around the HSNO Act to enable the introduction of new germplasm or hazardous substances into New Zealand through a systematic application process as shown in figure 2.

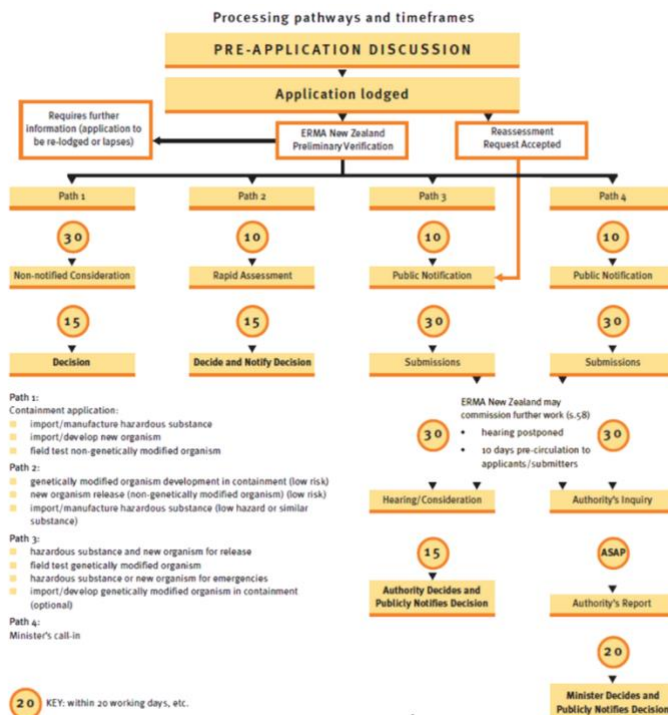


Figure 2: Displays the pathway that an application must follow with ERMA to allow the approval of a new import (Hazardous Substances New Organisms Act New Organisms Act 2001).

6.2 Barriers

Barriers such as cost, import health standards, the hazardous substance act and lack of accredited offshore facilities are faced by importers who wish to bring new plant germplasm into New Zealand. This is also noted by industry and from governments that sit on The Plant Germplasm Import Council that “*biosecurity and regulatory regimes governing imports of some new plant material can be highly detailed, complex, and difficult for importers to traverse*” (Plant Germplasm Import Pathway, 2022).

For this topic, I have reviewed a GERMAC (The Germplasm Advisory Committee) report completed by Market Access Solutions covering what New Zealand growers thought were the main barriers to entry of new plant germplasm back in 2014. GERMAC, which has now changed to the Plant Germplasm Import Council (PGIC), used to be a consultative forum between the plant germplasm import industry groups and the Ministry for Primary Industries (MPI). It worked collaboratively to foster open communication between industry, MPI, and key agencies in the regulatory system for plant imports. According to a survey conducted by Primary Purpose NZ in the horticultural industries, it was found that 74% of the respondents believed that GERMAC was not performing well and was fundamentally broken. As a result, PGIC was established in 2020 to act as a communication platform between the Ministry for Primary Industries, plant importers, the industry, and other relevant stakeholders. The PGIC's main objective is to provide engagement and leadership level guidance to the users of the plant germplasm import pathway.

6.2.1 The Hazardous Substances and New Organisms Act 1996

The HSNO Act aims to safeguard the environment and public health from hazardous substances and new organisms (Hazardous Substances New Organisms Act, 2001). The Act defines an organism as any microorganism, any genetic structures (excluding those from humans) that can replicate or create copies of themselves, a reproductive cell, or a developmental stage of an organism. It also includes any organism defined as such under the Biosecurity Act 1993 (Hazardous Substances New Organisms Act, 2001). Because plants fall under the category of an organism the HSNO covers plants. New organisms are defined as “*an organism that was not present in New Zealand immediately before 29 July 1998*” (About New Organisms 2023). Knowing that plant producers aim to bring in new plant germplasm that may be a hybrid species or a new organism that had been introduced after 1998 will require a review by the Environmental Risk Management Authority (ERMA). This is a long process that follows four pathways, which have varying levels of input and timeframes. Pathway 1 offers the quickest turnaround of 45 working days to Pathway 4 of approximately 100 working days as seen in Figure 2 (Hazardous Substances New Organisms Act, 2001).

According to a report by Clinehens (2004), the HSNO application process posed a significant challenge for many plant producers due to its complicated and technically demanding nature. The report further noted that the ERMA review added to the complexity of the process. They also highlighted a lack of flexibility or common sense on the part of the Environmental Risk Management Authority. This is shown in Figure 2 (Hazardous Substances New Organisms Act, 2001). Another aspect of HSNO's implementation that concerned most plant producers was the fact that the Plant Biosecurity Index (PBI) is an incomplete list of plant species that were present in New Zealand prior to 1998 (Clinehens, 2004). In order to import a species that is not in the database, importers must submit an application to ERMA to determine if the organism is present in New Zealand (Clinehens, 2004). Because of this difficulty, plant producers are put off by the task of importing new plant germplasm. This is supported by the evidence in a survey found by Clinehens (2004) that suggested: “*Eleven of the 12 nursery respondents had decided against importing new plant species under the Act*”. Another issue that is faced is where plant importers have a plant species that they wish to import that has been crossbred with a plant that is listed on the PBI while the other species is not. It was found in a report that different industries noted that the status of hybrid species under the HSNO Act is an emerging issue. Incorporating certain traits from one species into another using conventional breeding techniques can pose a specific issue. This is particularly true when the two species are closely related, and the primary species is already recognized as present in New Zealand and deemed not new. However, the traits are obtained from a species that is not present in New Zealand (Johnson, 2014).

6.2.2 Import Health Standard

Under the Biosecurity Act 1993, an import health standard (IHS) is required for importation into New Zealand of any biosecurity risk goods. "Risk goods are any items that may constitute, harbour, or contain an organism that may cause unwanted harm to natural or physical resources or to human health in New Zealand" (Situation and Outlook for Primary Industries June, 2023). Products brought into New Zealand that could contain unwanted pests or organisms need to follow strict import health standards. There are import health standards for both propagable and non-propagable plant products. Biosecurity clearance is contingent upon meeting specific standards throughout the entire exporting, transit, and importing processes. These requirements must be fulfilled by the exporting nation as well as during the transit and importation stages.

The standards exist to make sure these imported goods aren't harbouring unwanted pests or diseases (Biosecurity for Importers, 2023). Countries exporting to New Zealand must ensure their certification systems comply with these import health standards (Clinehens, 2004).

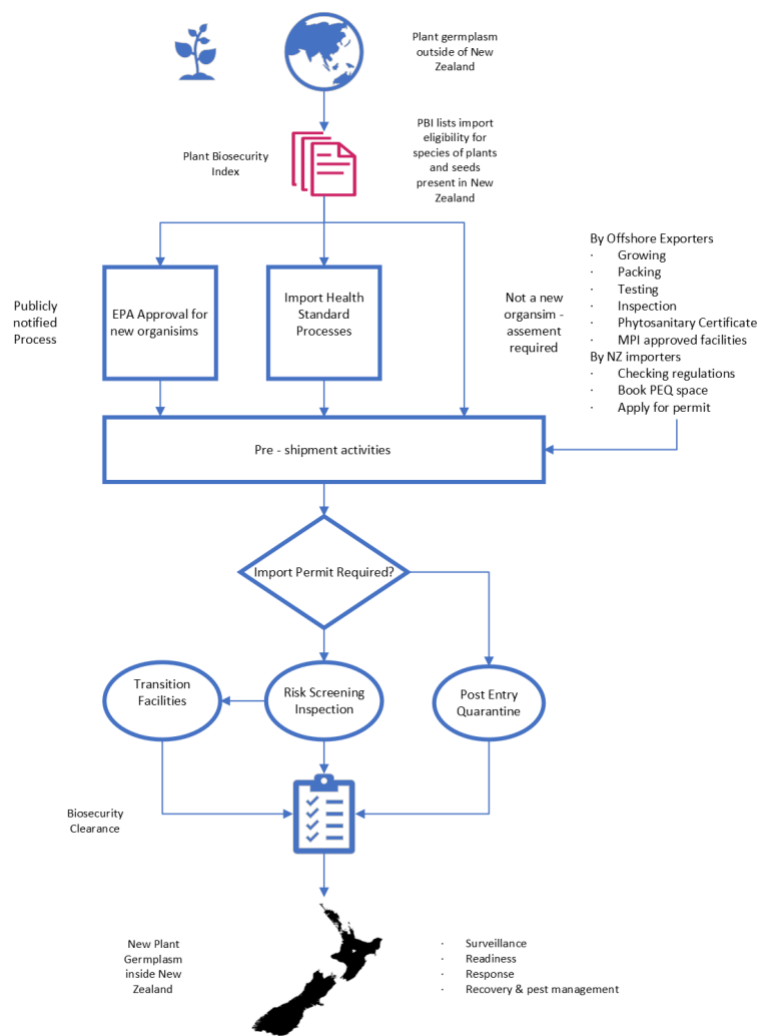


Figure 3: Demonstrates the process that a user must follow to apply for a new Import Health Standard, with a definition of what happens at each step.

For plant producers in New Zealand, the report by Johnson (2014) highlighted that there were a number of other IHS they would like to have in place, but they have not submitted a formal request for IHS development because they have been advised it will take too long. It was noted that even if the industry agreed to pay for the development of the IHS, MPI have indicated that it would be too expensive and take too long. Upon review of the IHS Development process, it is very apparent that plant producers are correct in their thinking, as there can be 16 steps involved in creating a new import health standard. This involves multiple steps of consulting, submissions, risk analysis and reviews, as shown in

Figure 3

Plant producers who are willing to develop a new IHS face a backlog of IHS applications leading to long wait times for IHS approval. Additionally, most import health standards have not been reviewed in years and at least 20 stakeholder requests for new standard development or review remain unmet. This backlog of unmet requests limits the variety of commodities that can be imported into New Zealand, causing delays and increased costs (Strategic choices for managing plant germplasm, 2021). This backlog was also noted back in Clinehens (2004) report, where it was said that *"the importation system agents are responsible for was described as topsy-turvey, characterised by quickly changing rules, a backlog of unissued import health standards, and a lack of quarantine facilities"* and that *"others were waiting for the backlog of import health standards to be revised and issued"*. MAF import requirements were seen as confounding, burdensome, and constantly in a state of flux. In the importer's mind, distinctions between regulations such as HSNO, the Biosecurity Act, and Import Health Standards seemed blurred (Clinehens, 2004). A recent meeting of the PGIC group made mention of the fact that *"the biggest bottleneck in the IHS review system presently is the risk assessments"* (PGIC Board Meeting - 23 May, 2022).

Importers often face the challenge of dealing with outdated Import Health Standards, especially in the seed and ornamental industries. Some IHS require treatments that are no longer available or not considered best practice. The seed industry is a prime example of this, where IHS often mandate seed treatments to address the risk of fungal contamination, even though better alternatives are available. IHS specify the type of treatment that must be applied before a phytosanitary certificate can be issued by the exporting country. Because the treatments are not available in the exporting country, exporters either cannot get a phytosanitary certificate or must have the treatment applied on arrival in New Zealand if the treatment is available (Johnson, 2014). This is also similarly felt in the fruit and vegetable industry, where importers have strained relationships with New Zealand customers. A report conducted by Yangyuyu (Luo et al., 2023) suggested in the context of food importation *"it is believed that a relationship between trade partners can be more persistent if the two countries have similar food safety standards. Distinct standards would make trade together more*

complicated and the relationship more difficult. In this case, the trade relationship is likely to be short with multiple sequences or, once they can trade (with high costs to comply with new requirements), long and stable." Because of the import standards, chemical treatment for vegetable and fruit importers is the same as for plant importers. The Sanitary and Phytosanitary Measurement Agreement determines whether a product imported from a specific country requires a sequence of treatment. These country-specific biosecurity treatments are regulated by the New Zealand Import Health Standards (IHS) issued by the Ministry of Primary Industries. There are seven sub-variables under this variable, which include treatments such as methylbromide fumigation, cold disinfestation, high temperature forced air, irradiation, water treatment, heat treatment, and fumigation and cold disinfestation treatment (Luo et al., 2023). This difference in Import Health Standards highlights the need for offshore quarantine facilities between countries.

6.2.3 Offshore Quarantine Facilities

The Ministry for Primary Industries approves offshore facilities to carry out some or all of the quarantine and testing requirements that would otherwise have to be done onshore in post-entry quarantine (PEQ) in New Zealand. This means that importers can bring plant germplasm into a lower level of PEQ in New Zealand for a shorter period. It also usually results in importers having access to new plant germplasm more quickly and at a lower cost (Offshore plant quarantine facilities, 2023). Once the offshore quarantine facility and testing methods are authorized by the Ministry for Primary Industries, the material can be transferred to the New Zealand quarantine for observation and additional testing, if necessary, which was not conducted at the offshore facility (Johnson, 2014). In addition, the competent authority of the exporting country also provides phytosanitary certification and/or additional export assurances prior to export (apart from for species of seed listed as 'Basic' in the Plants Biosecurity Index, which does not require phytosanitary certification (Strategic choices for managing plant germplasm, 2021). Plant producers in New Zealand have identified several problematic areas in the offshore quarantine schemes, particularly in relation to the testing requirements of the Import Health Standards. It has been discovered that some offshore facilities lack the necessary tests or treatments required by the IHS, which is a problem that was previously mentioned. It was also noted by the report conducted by Johnson (2014) that some tests need to be completed in an offshore facility required by Ministry of Primary Industries and may also need to be repeated in New Zealand quarantine. If a facility is accredited by MPI to undertake a specific test that is required and it has been done, then there is no reason why the material should be held in quarantine while that test is repeated in New Zealand. If this action was taken, it would require us to keep the material in a New Zealand quarantine facility to carry out the task again. This would mean that the space in a PEQ facility cannot be used to hold other new plant germplasm (Johnson, 2014). This indicates that there is a fundamental fault with the import health standards due to the time-consuming nature of changing them. This may be an issue when it comes to having out-of-date Import health standards (Clinehens, 2004).

Both New Zealand and Australia have strict quarantine measures for the importation of new plant germplasm. There is an overlap of regulated pests, diseases and the requirements for plants to be quarantined in Biosafety level 3B and level 2 containment greenhouses (Vieglais & Harrison, 2004). Approved offshore facilities provide a higher degree of certainty that some or all the biosecurity risks of plant germplasm have been addressed prior to reaching New Zealand's border (Strategic choices for managing plant germplasm 2021), regardless of the fact of the shared similarities between Australia and New Zealand. Australia currently only has one accredited quarantine facility approved for use by the Ministry for Primary Industries giving New Zealand a total of six accredited offshore quarantine facilities (Offshore plant quarantine facilities, 2023). The report conducted by Johnson (2014) noted that only five facilities had been accredited, meaning that over the past ten years, only one more has been added to the accredited list. It has been observed that New Zealand has a limited capability to enforce and influence offshore requirements and exporting National Plant Protection Organization (NPPO). There is also a lack of independent oversight of these facilities, especially in terms of meeting New Zealand's biosecurity import requirements. This makes it challenging for the Ministry for Primary Industries to remain confident that these facilities are continuously conforming to the import requirements (Strategic choices for managing plant germplasm, 2021). This highlights the difficulties that we face for gaining accreditation of more offshore quarantine facilities.

6.2.4 Costs

Cost has been listed as a contributing factor for all importers of new plant germplasm in New Zealand. In one way or another, there are going to be costs, big or small with plant importation. Referring to the HSNO act specifically, New Zealand developed the white list, known as the Plants Biosecurity Index (PBI). This catalogues plant species in New Zealand that were established before 29 July 1998. Species on the list can be imported with phytosanitary compliance, a further risk assessment undertaken by the Ministry for Primary Industries may also be necessary to ensure compliance with import health standards. A new application and risk assessment will be required to be completed by the Environmental Protection Authority and Ministry for Primary Industries if a new plant species is trying to be introduced into New Zealand that is not already on the PBI (Hulme, 2020). The costs of these risk assessments are the responsibility of the applicant and can be sizeable (Hulme et al., 2017). The horticultural industry in New Zealand's shared view is that the importation of non-native plant species to New Zealand is a complex, time-consuming and costly process that is a significant barrier to innovation in the horticulture industry (Hulme, 2020). The survey conducted by Johnson (2014) noted that inaccessibility because of cost was the most frequently raised issue among plant importers. Almost all nursery operators interviewed explained that the application fees were too high in relation to the profit that could be anticipated from future sales of new plant species. Other plant importers mentioned their concerns about the application fees and the lack of protection for the 'first mover'. This is the person who submits an application to import a new plant species that must pay the application fee, while subsequent importers of that species pay nothing, thus putting the first mover at a commercial disadvantage (Clinehens, 2004). This cost barrier also relates to the import health standards when there may be no standard for a plant that you wish to import. The majority of the responses in the Johnson's (2014) survey on the barriers to plant imports said that, in general, *"they have not submitted a request for import health standards development because they have been advised it will take too long even if they agree to pay for it and the cost of paying for the IHS development will be too expensive"*. This refers back to the Ministry for Primary Industries having no set policy for cost recovery for the new import health standard developed and once again punishes the first mover.

According to reports reviewed, offshore facility owners have expressed that the reaccreditation process is also viewed as costly and time-consuming. They have said that they make no money from running the facility, which adds to their workload. If New Zealand importers were required to cover all the costs of accrediting and operating the facility and the testing required, it is unlikely that it would be affordable (Johnson, 2014). In a discussion had by the PGIC (Plant Germplasm Import Council) (PGIC Board Meeting - 23 May, 2022) it was stated that Ministry for Primary Industries would need to audit offshore facilities, which would increase the complexity of the system and place a burden on Ministry for Primary Industries to ensure ongoing conformance with all requirements. It is also likely that PEQ (Post Entry Quarantine) would still be needed in New Zealand, leading to a doubling up of quarantine requirements. This comes back to the argument that they will need to be held in a New Zealand quarantine facility to carry out the repeated task, which doubles the cost of the testing of the imported material.

The testing cost of plant germplasm has most recently been an industry talking point. Currently, testing and diagnostic fees can range from \$50 to \$550 (Proposed New PHEL Test Price List, 2023). These tests may be carried out multiple times during the plant germplasms quarantine period depending on the species and type of material i.e tissue culture or whole plants (Import Health Standards, 2023).

While reviewing the Johnson's report (2014) respondents found that the Ministry for Primary Industries inspection of plant material is the most significant cost incurred in PEQ (Post Entry Quarantine) at over 50%. Testing costs are responsible for between 12-40% of costs and administration costs, including permit and on-arrival inspections. Inconsistency in testing and inspection costs between facilities was also noted. There have also been long-standing issues with prices increasing over the years, with one response of Johnson's (2014) survey saying that *"Level 2 PEQ for Pyrus and Prunus used to be a 6-month process and cost \$500 per variety. Now it costs \$10,000 and takes three years"*. Ministry for Primary Industries have also recently suggested that there will be new PHEL (Plant Health and Environment Laboratories) testing prices, which on selected test will see increases of 100% - 300%, plus the addition of new test that the industry has not seen before (Proposed New Level 3B Post-entry Quarantine Greenhouse Prices, 2023).

There have been talks since 2021, by NGOs discussing how the costs of the new Level 3B PEQ facility should be priced and how it will be structured. MPI gave a presentation to the PGIC about cost recovery principles. Specific pricing estimates were to be considered in early 2022 with consultation by July 2022; however, the business case for greenhouse facilities is now still being developed, and

prices will be set once the costs for the interim and final facilities are known. One of the main concerns of the group was that future pricing is a critical but contentious issue, with significant differences in the ability to pay across different classes of importers and differing attitudes to issues of cross-subsidies and the scale and nature of the “public good” aspects of the services provided (PGIC Board Meeting - 22 August, 2022). It was then noted six months later at another PGIC (PGIC Board Meeting - 13 March, 2023) meeting that the current plan was that MPI will commence formal industry consultation on PEQ test prices, L3B space & husbandry costs, and the booking policy. In December 2022, MPI released a report conducted by Deloitte outlining what 17 stakeholders thought the market was willing to pay for Level 3B PEQ services and the prices at which Level 3B PEQ customers would reduce and/or stop their usage of MPI’s facilities (Level 3B PEQ Greenhouse Market Prices: 2022). Ministry for Primary Industries operating costs have increased over time due to inflation, wage increases and escalating regulatory requirements. At the same time, the fees have remained the same for the user since 2012. The introduction of Level 3B PEQ facilities in Mt Albert, Auckland also expected to increase operating costs (Level 3B PEQ Greenhouse Pricing Approach Scenarios: 2023). There is currently one MPI-managed Level 3B PEQ site in Tamaki Auckland with an offering of 12 greenhouse spaces. The proposed Mt Albert facility will add an extra 15 spaces, expanding the offer to 27 greenhouse spaces in 2024. MPI has calculated the cost of running the two facilities, sitting at \$4.02 million per annum for the offering of 27 greenhouse spaces. This comes to \$12,500 per greenhouse space per month, which is \$11,305 more than the current rate of \$1,195 (Proposed New PHEL Test Price List, 2023). 17 stakeholders that took part in the Deloitte report gave their points of view regarding the set pricing shown in Figure 4 (Level 3B PEQ Greenhouse Market Prices: 2022).

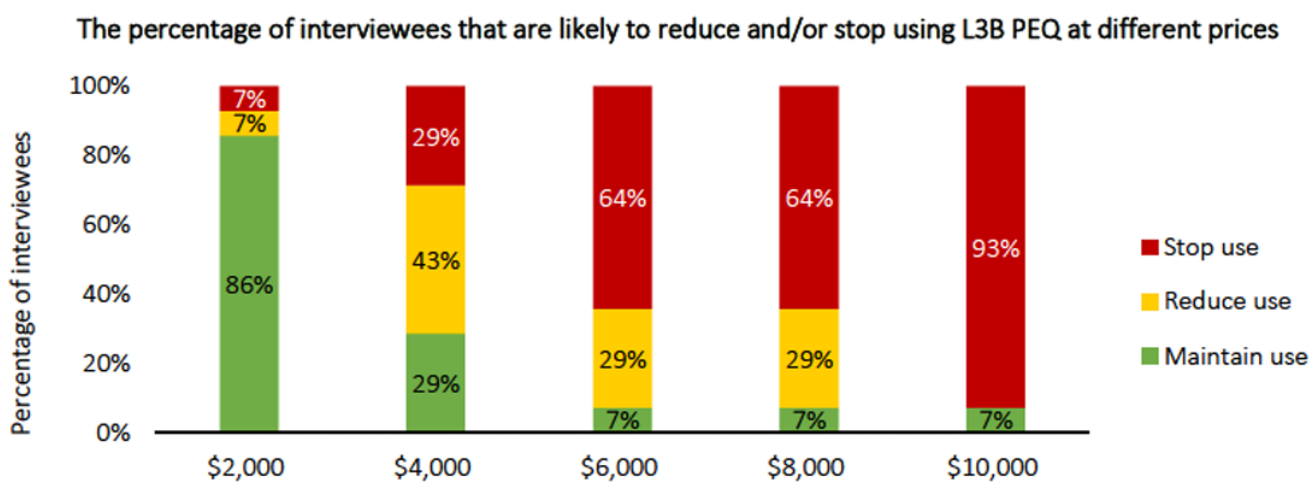


Figure 4: This graph shows the percentage of users that would reduce and/or stop using PEQ L3B facilities in New Zealand (Level 3B PEQ Greenhouse Market Prices: 2022)

Deloitte (2023), conducted a pricing analysis with a baseline scenario and three other scenarios that varied in price and complexity. Based on the workshops and analysis with MPI staff, scenario 1 stands out as the most effective and feasible differentiated price structure for MPI to achieve increased cost recovery, with the potential to also include preferential access at an additional price premium, if upcoming market consultation indicates sufficient interest. Scenario 1 also suggests an effective strategy for the MPI to enhance cost recovery by offering premium-priced rolling bookings to importers who are willing to pay more. This approach ensures a predictable revenue stream and utilisation for designated greenhouses over a minimum period. Importers can choose between premium rolling bookings or more affordable general bookings at \$6,000. A monthly greenhouse price of \$8,000 for rolling bookings could achieve a 55% cost recovery, only 4% higher than the base case of 51%. The pricing strategy is flexible, allowing adjustments based on demand with minimal policy modifications. This approach simplifies operations and minimises administrative overhead, benefiting both importers and MPI (Level 3B PEQ Greenhouse Pricing Approach Scenarios: 2023). With this information, MPI is offering three pricing options for greenhouse bookings. General bookings cost \$6,500 per greenhouse per month, sharing costs equally between importers and Biosecurity New Zealand and it aligns with the new booking policy. Rolling basis bookings covering two or more plant import cycles over 32 to 48 months cost \$9,500, and immediate access bookings cost \$12,500. The latter two options are not subject to the new booking policy (Level 3B PEQ Greenhouse Market Prices: 2022).

7.0 Semi-Structured Interview Analysis

The questions have been structured in two directions: for importers and non-importers. There are particular sections in the analysis where some questions do not apply to non-importers.

This section of the report is used to review the answer's given by the interviewees to find common themes between them. This will help to identify areas of thinking that interviewees share to help form a discussions for the following section in the report.

7.1 Business Involvement with Plant Germplasm

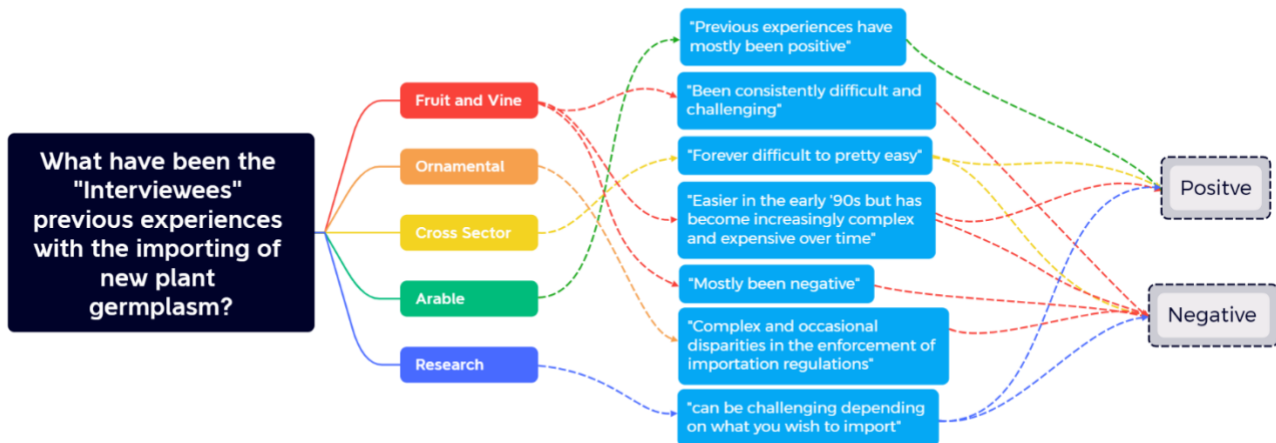


Figure 5: This logic chart shows how the respondents felt about their import experience which flows from left to right into a positive and negative category. If their response was mixed it was categorised as positive and negative.

7.1.1 Previous Experiences of Importing New Germplasm

In evaluating these perspectives, it's evident that the experience of importing plant germplasm into New Zealand is multifaceted, influenced by the type of plant material, regulatory frameworks, and relationships with regulatory bodies. It is also influenced by what type of germplasm you are importing into New Zealand. While most respondents from fruit and vine and ornamental have mostly reported a negative experience, they have alluded to the fact that in the 90s, the process was more straightforward due to a less systematic approach to plant imports by MPI. Respondents who import all three germplasm types have acknowledged having positive and challenging experiences. While relationships with the Ministry for Primary Industries have facilitated certain areas of the importation process, issues like palletted seed contamination have posed significant challenges as MPI didn't have any sort of protocols on how to test palletted seed which also added cost to the import. The cross-sector importers realise that there is a dynamic landscape where difficulties and ease coexist, influenced by specific germplasm and regulatory nuances.

In complete contrast, the arable respondent offered a more positive perspective. They indicated that these pathways are generally more accessible compared to those for live plants because of different import health standards. This delineation highlights the variation experience depending on the type of plant materials being imported.

This highlights the type of germplasm that importers wish to bring into the country will generally dictate whether the outcome is positive or negative. The variance in experiences indicates the need for a more streamlined, transparent, and efficient regulatory landscape that balances biosecurity with accessibility. The contrast in experiences also implies room for improvement in standardising and simplifying procedures to make them more user-friendly while maintaining biosecurity integrity.

7.2 Introduction of New Plant Germplasm

This category of questioning is aimed to explore the reasoning and importance of the introduction of plant germplasm into New Zealand.

7.2.1 Motives for Bringing in New Plant Germplasm

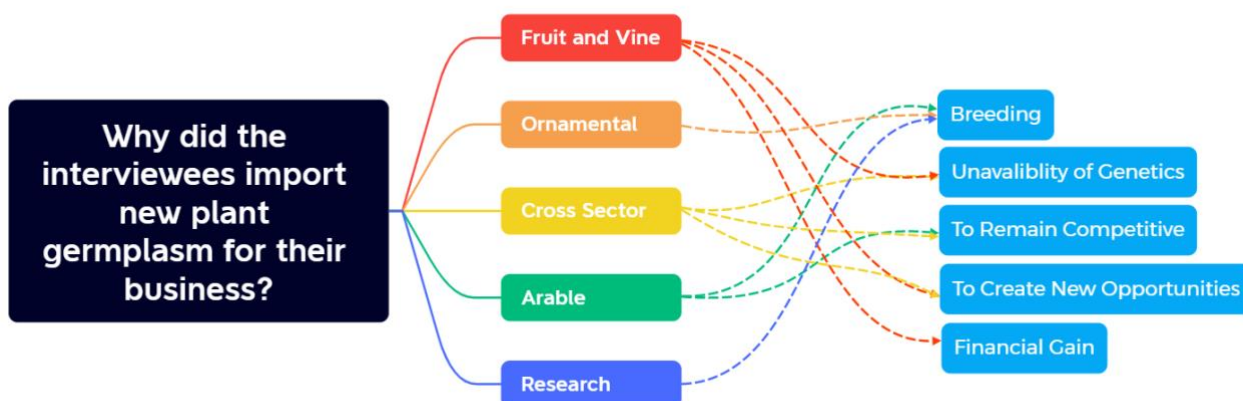


Figure 6: This logic chart shows the reasoning behind why the respondents imported new plant germplasm for their business which results in 5 key themes.

In Figure 6, respondents were asked why they imported new plant germplasm for their business. The diagram above highlights five key themes.

The themes showed that the participants imported for innovation, market demand, financial soundness, and the need for unique genetics. A fruit and vine respondent emphasised the drive for innovation and the necessity of introducing new plant germplasm to promote growth and development in the industry. The participant of the cross-sector category also echoes this but is more succinct, pointing out the straightforward reasons - the materials are not available in New Zealand, and there's a need to meet offshore market demands and keep products climate-ready. They also mention that new germplasm provides their grower network with new market opportunities and supports breeding programs, indicating a more pragmatic and business-oriented approach.

The perspective of respondents from the research and ornamental category puts emphasis on innovation but zeroes in on the pivotal role of unique genetics. They also contend that exclusive and high-quality genetic material is a core strategy for differentiation in the market. This suggests that the introduction of new plant germplasm isn't just about broadening the variety but is also a strategic move to attain a competitive advantage. In contrast, the respondent from the arable sector provides a simplified view, concurring with a participant from the cross-sector category that the primary motivation is the unavailability of specific cultivars in New Zealand and the need to improve seed genetics for better climate adaptability.

The overarching theme is the necessity to balance innovation with financial viability, market demand, and strategic positioning. This deepens the complex, multifaceted motivations that nursery and plant businesses in New Zealand navigate to remain competitive, sustainable, and responsive to the changing market and environmental conditions. Each response, though distinct, collectively illuminates the intricate interplay of factors that drive the importation of new plant germplasm.

7.2.2 Importance of New Plant Germplasm Introduction

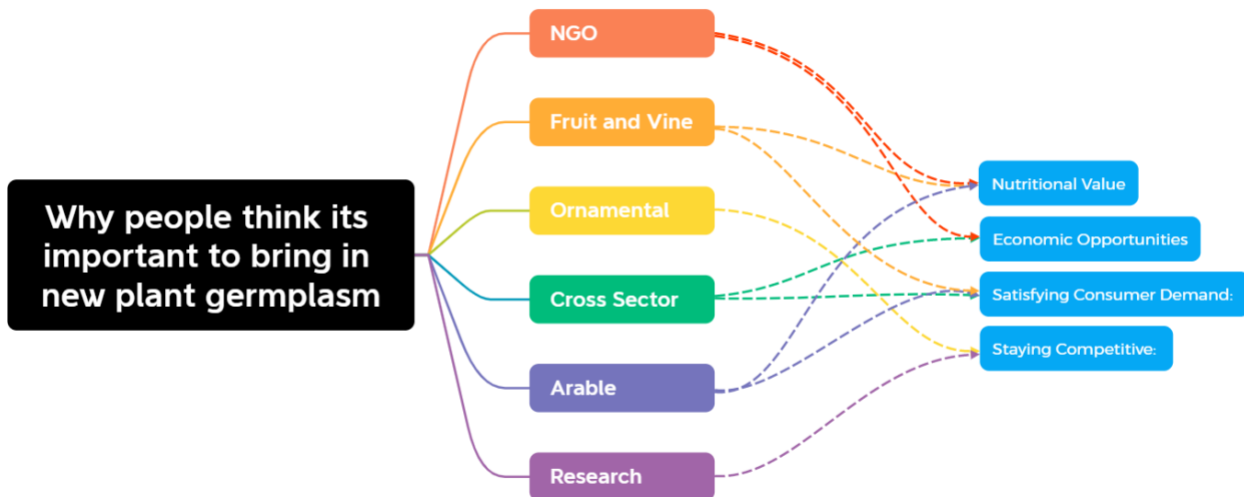


Figure 7: This logic chart shows the themes between the sectors and why they believed that it was important to bring in new plant germplasm to New Zealand.

All participants noted that bringing in new plant germplasm was crucial. This led to the question of why they thought it was necessary. Figure 7 shows four key themes that emerged from the interviews.

Even though all the respondents to the question believed it was critically important, each highlights different motivations and challenges associated with it. The fruit and vine respondents share the same emphasis that imports are a must for economic opportunities, nutritional value, and global relevance, outlining a holistic view of the benefits that include financial gains, enhanced public health, and increased global competitiveness. Respondents of the cross-sector category stress there is a high importance due to the lack of local production of quality seeds, aligning with the seed importers' assertion on the necessity of imports to ensure food security and adapt to changing climates.

Some fruit and vine respondents also shared a collective insight beyond why they imported. They highlighted the need for advocacy for a balanced approach in policy and regulatory frameworks that supports germplasm importation while safeguarding New Zealand's biosecurity.

Respondents of the NGO category also share the view as the arable and fruit and vine sectors and that it is essential to keep up with the latest in genetics and having a product that is fit for purpose in New Zealand and can remain nutritious for the consumer with less inputs than our current crops. This somewhat coincides with what the research category says in that if we have a high-quality product, we producers can remain competitive in their domestic and international markets.

Overall, there is a pronounced agreement on the necessity of germplasm importation but a diversity in pinpointing its primary benefits and associated challenges. These insights reflect a shared recognition of the role of imported germplasm in enriching genetic diversity, fostering innovation, and ensuring food security. This analysis also aligns with the PGIC comities strategy, which highlights that "access to plant germplasm is vital to enable innovation and growth. This can include resilience to climate change and/or resistance to certain pests and diseases" (Plant Germplasm Import Pathway, 2022).

7.3 The Impact and Understanding of Import Barriers

This category of questioning is based around key themes of import barriers found in the literature review.

7.3.1 Past, Present or Future import Barriers

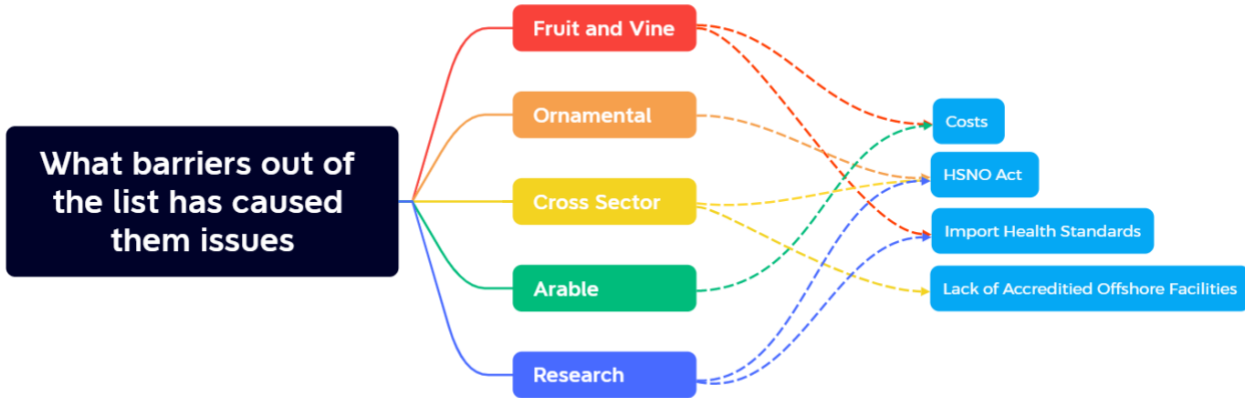


Figure 8: The respondents were read key barriers that were found in the literature review. The logic chart shows which of the respondents were affected by the four key barriers listed in the past, present or future.

After reading to the respondents a section of my literature review that highlighted the key barriers to importing in New Zealand, which were cost, the HSNO Act, import health standards and the lack of accredited offshore facilities. It was asked whether or not the barriers that were read to them had caused them issues in the past, present or future. An analysis was then conducted to see if the participants in each category had been affected at all. If so, were there similarities between them. Figure 8 demonstrates the corresponding themes.

7.3.2 Impact of Identifiable Import Barriers

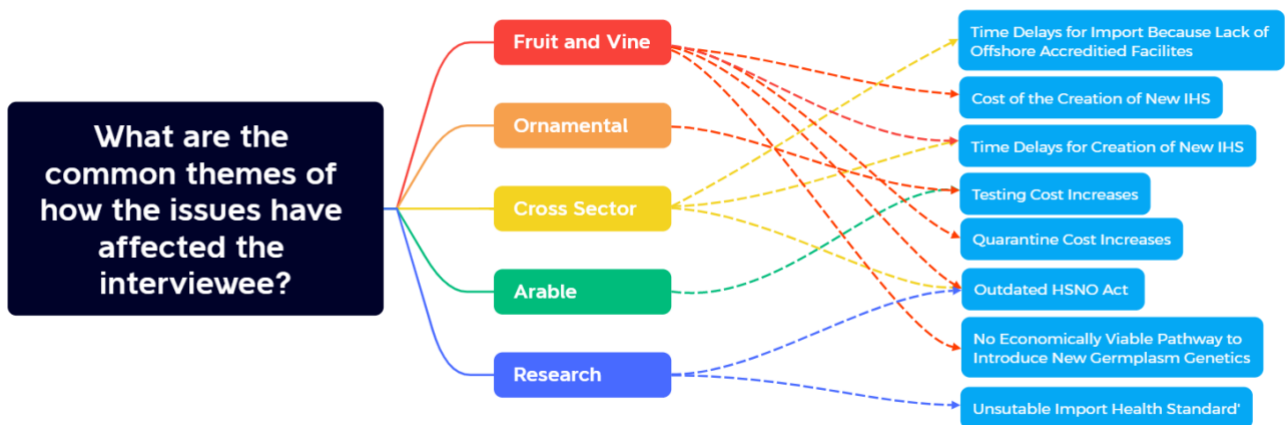


Figure 9: Respondents described how they were affected by any of the four barriers that were read to them. This shows the common themes between the respondents.

Upon reviewing who was affected by the four barriers listed in Figure 8, Figure 9 was used to highlight who the importers were affected by the barriers. Eight themes have arisen from the analysis.

The primary focus of all the respondents, except the arable category, is on the challenges posed by the HSNO Act and Import Health Standards in New Zealand, revealing a common theme of regulatory and bureaucratic hurdles impacting the importation of new plant germplasm. A respondent from the fruit and vine category outlines concerns regarding constantly changing import health standards, leading to delays, which is a sentiment echoed by a respondent from the cross-sector category, who highlights inefficiencies in the regulatory process due to potentially outdated standards. They also emphasise the cost and uncertainty associated with the HSNO Act, especially regarding speculative breeding programs. The arable respondent offers a slightly contrasting perspective, noting a good relationship with MPI and minimal issues with the HSNO Act but expressing concerns over increasing costs due to excessive testing regimes. One respondent from the fruit and vine category has acknowledged that these barriers have affected them. However, they are reasonably happy about them as they identify the advantages that New Zealand has over other countries, stating that “New Zealand's grapevine industry has probably got the cleanest reputation. We've got the least disease issues of any country in the world and that's a huge advantage to us”.

The majority of respondents expressed concern about cost. The respondent from the arable category has grave concerns about the new test and diagnostic proposal by MPI (Proposed New PHEL Test Price List, 2023) that “it may become commercially unviable as the test regime is becoming excessive. The proposed cost increases of testing from 100% to 300% is excessive and will be very problematic and will lead to the unavailability of products to consumers”. This view is also shared by a respondent from the cross sector category saying, “We might want to do a breeding programme, but we can't afford to pay \$30,000 to go through the process”.

Overall, the collective narrative underscores a need for a more streamlined, predictable, and cost-effective regulatory process to facilitate the introduction of new plant germplasm, although underpinned by the narrative that we have significant economic advantages globally for the very reason that barriers are in place.

7.3.3 Purpose of Barriers to Plant Imports



Figure 10: The mind map displays a unanimous agreement between all the respondents of what purpose the barriers serve.

The respondents were asked what purpose the barriers serve, to which all the sectors have come to one common theme: that the barriers are in place to protect New Zealand from a biological incursion.

This highlights the awareness among all the respondents that New Zealand can't be taken for granted and that there is a lot to protect the country from. One respondent from the fruit and vine category alluded to the fact that overseas countries like Italy and Germany are envious of our country as we are free from a lot of the nasty biological threats that they face in their own countries. The example the respondent used was "we don't really use insecticides in the New Zealand viticulture industry, whereas across Europe the use is hefty because they have these nasty diseases which are affected by insects. So, they're saying if there's any country in the world, which can probably go organic it is New Zealand, because we have that head start and that we don't have those diseases". This also highlights New Zealand's competitive advantage against other countries and why the barriers are in place.

7.3.4 The Importance of Import Barriers

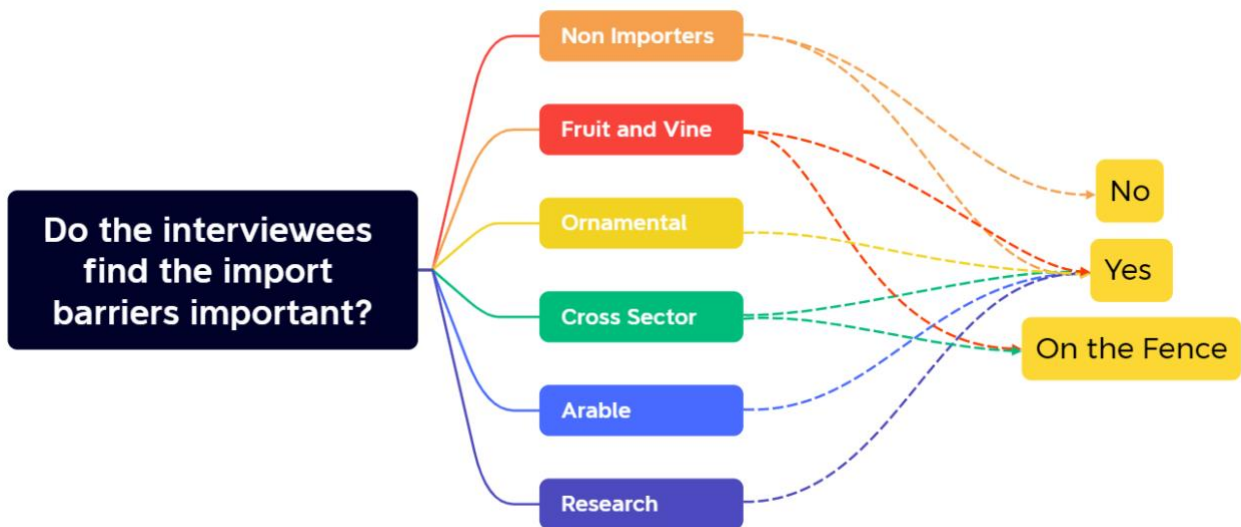


Figure 11: This logic chart shows the feelings and themes of the respondents regarding the importance of the barriers.

Respondents in Figure 11 were asked whether or not they felt the barriers were important in contrast to what was asked in Figure 10. From their answers, they were categorised into three themes. The respondents all acknowledge the importance of biosecurity, which is shown in Figure 8, but offered varied perspectives on the current regulations and measures in place. Fruit and vine, ornamental, cross sector, research and arable respondents all lean towards affirming the current biosecurity measures. Fruit and vine respondents highlight the value of integrating scientific methods with regulatory measures, suggesting an endorsement of the current systems. The arable respondent straightforwardly underscores the necessity of border protections. A cross sector respondent, summarising the key points, reinforces the importance of biosecurity and economic interests, emphasising the role of modernisation and cost-effectiveness.

Conversely, a respondent from the cross sector and a respondent from the NGO focus on the drawbacks and potential improvements of the existing biosecurity measures. The cross-sector respondent highlights unintended consequences like impeding the development of new plant varieties advocating for a balanced approach. One of the NGO respondents echoes this sentiment, emphasising the need for a balance between stringent biosecurity measures and fostering innovation in the horticulture sector. An NGO respondent is also critical of the current barriers, highlighting their cost ineffectiveness and impracticality and calling for a re-evaluation to ensure a balanced approach to biosecurity and import processes.

While all respondents agree on the importance of biosecurity, there is a dichotomy in their views on the existing measures. With the exception of two respondents from the cross sector and NGO categories, all participants agree with the current regulations. The two respondents from cross-sector and NGO categories expressed critical views, emphasising the need for a balanced and optimised approach that takes into account both biosecurity and economic and developmental interests. There's a unanimous acknowledgment of the importance of biosecurity, but opinions diverge on the implementation, efficacy, and impact of the current measures.

7.4 Challenges, Improvements and Impacts

This category of questioning is aimed to find out what the respondents thought of the import system when it came to making improvements and what impacts maybe felt across New Zealand because of the challenges importers face when import new plant germplasm.

7.4.1 Other Barrier Suggestions

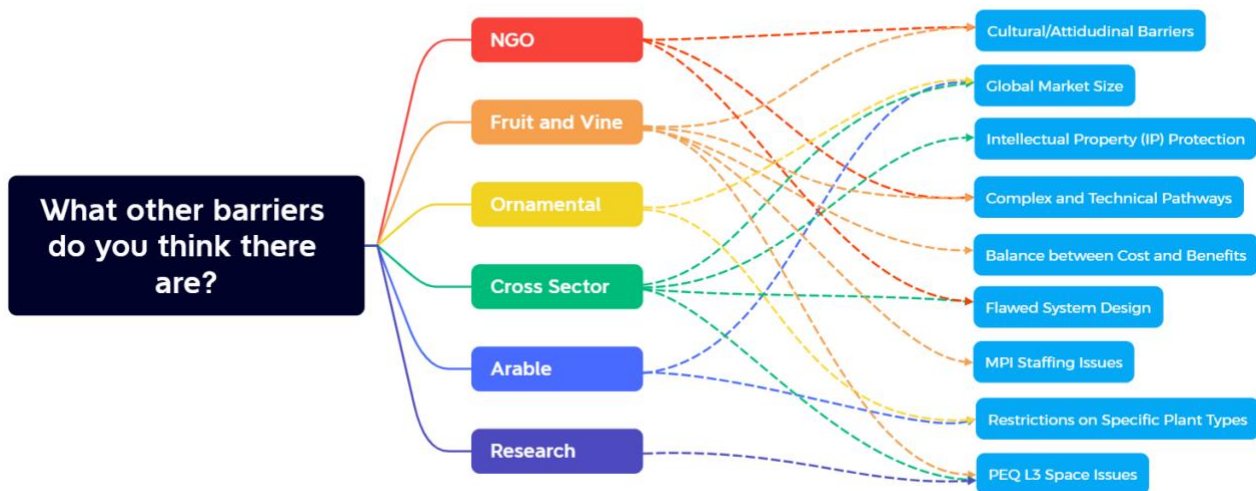


Figure 12: This logic chart highlights the common themes between respondent's suggestions on other barriers that may have not been mentioned. This is aimed at removing the leading question from Figure 8 and encourages respondents to identify other challenges they may have faced.

In Figure 12, the respondents were asked if they could identify any other barriers that haven't been listed out of the four that were referenced in Figure 8. Nine themes emerged, with some respondents having many more than the four mentioned.

The respondents delineate a series of barriers that they face and can be grouped into categories such as technical, cost, bureaucratic, space, and attitudinal challenges. An NGO respondent underscores the complex interaction between technology and cost, where advancements in diagnostic testing technologies, while essential for biosecurity, are inflating the importation costs. This point is augmented by a respondent from fruit and vine, who pinpoints the staffing issues at MPI leading to delays in processes and by another respondent from fruit and vine, which emphasises the high overall costs and complexities related to IP protection.

A cross sector respondent highlights another dimension - the market size and specific operational issues, suggesting that New Zealand's small market doesn't offer economies of scale, dissuading international breeders. It also touches upon the capacity issues at facilities and additional costs burdening importers.

Both the cross sector, research and fruit and vine respondents indicate that space is a significant barrier – with fruit and vine emphasising limited quarantine space and the challenges related to securing operational space. However, this issue has been pointed out by MPI and is under current review, as mentioned in the literature review (Proposed New Level 3B Post-entry Quarantine Greenhouse Prices, 2023).

A cross sector respondent also brings to light attitudinal and awareness barriers, underscoring a lack of public awareness and political support that complicates the importation process, which is echoed by the NGO and fruit and vine categories.

All respondents collectively paint a picture of a multifaceted barrier landscape. These include the rising costs due to advanced technologies, bureaucratic red tape, limited PEQ space, and attitudinal and awareness issues. While each respondent highlights different aspects, together, they offer a comprehensive insight into the intricate challenges faced by importers, underscoring the

need for a holistic approach to mitigate these barriers, balancing biosecurity, cost, efficiency, and accessibility.

7.4.2 Import Pathway System Simplification

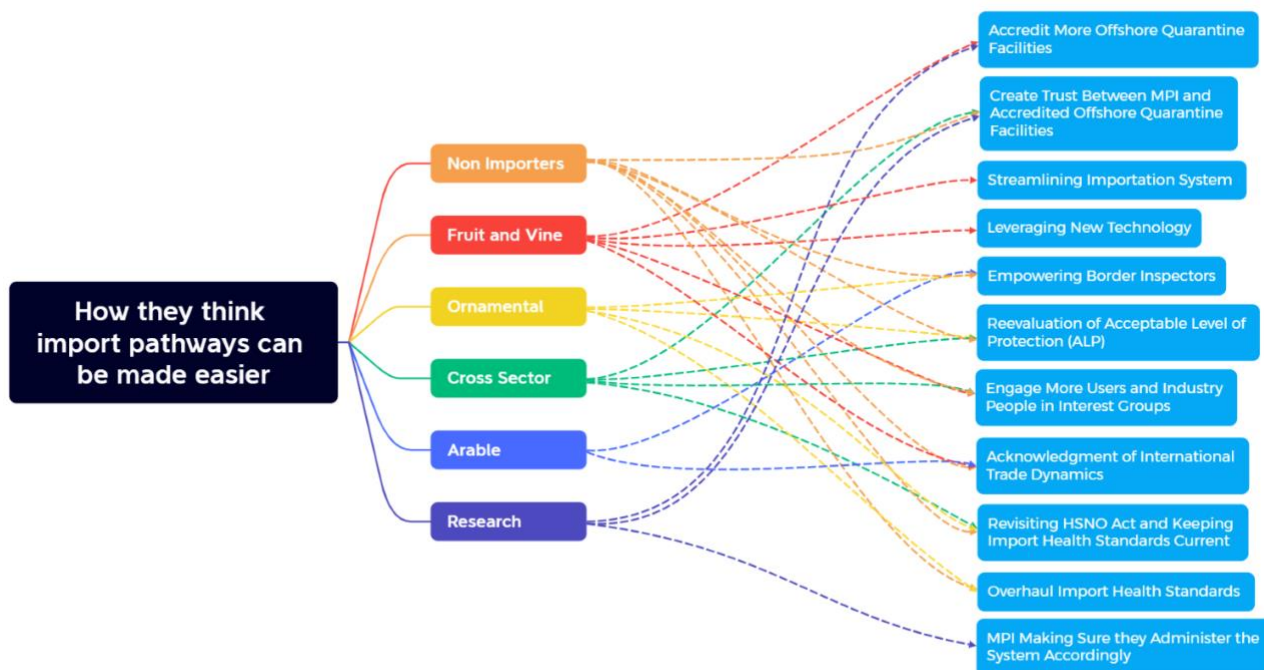


Figure 13: The logic chart highlights the key themes between how the respondents all view the import pathway becoming simpler.

In Figure 13, respondents have been asked how they see the import pathway becoming easier. Eleven themes emerged. This adds ideas around how importers can look to progress ideas moving forward into the future.

All the respondents each offer unique perspectives on improving the plant import pathway. A respondent from fruit and vine focuses on procedural and bureaucratic simplifications, suggesting easier access to import permits, self-declaration for imports, utilisation of high-tech, low-cost solutions, and volume increase for cost reduction. They also stress modifying the bureaucratic mindset that aims to minimise risk at the expense of progress and innovation.

Two cross sector respondents highlight that decision making underscores enhancing the efficiency and effectiveness of quarantine standards, suggesting the involvement of private management, incorporation of industry experts in decision-making, and embracing genome sequencing to reduce chemical reliance. They advocate for empowering MPI individuals with decision-making authority, ensuring a practical approach to risk and benefit assessment, and engaging various interest groups to ensure a balanced perspective. This viewpoint is also shared by an NGO respondent who emphasises empowering border inspectors, revising the HSNO Act, enhancing the consultation process, and reviewing risk assessment protocols.

Another theme from the fruit and vine, which is shared by a cross-sector respondent, is the emphasis on technological adaptation and global cooperation. They suggest MPI's adoption of high throughput sequencing and offering testing flexibility. They also propose involving the actual system users in decision-making and fostering international relationships for mutual respect and cooperation in import assurance systems.

In essence, all suggestions focus on easing the plant import pathway. Each set of suggestions presents a multifaceted approach, emphasising the need for a balanced, technologically advanced, globally informed, and practically efficient plant importation pathway in New Zealand.

7.4.3 Government and NGO Collaboration

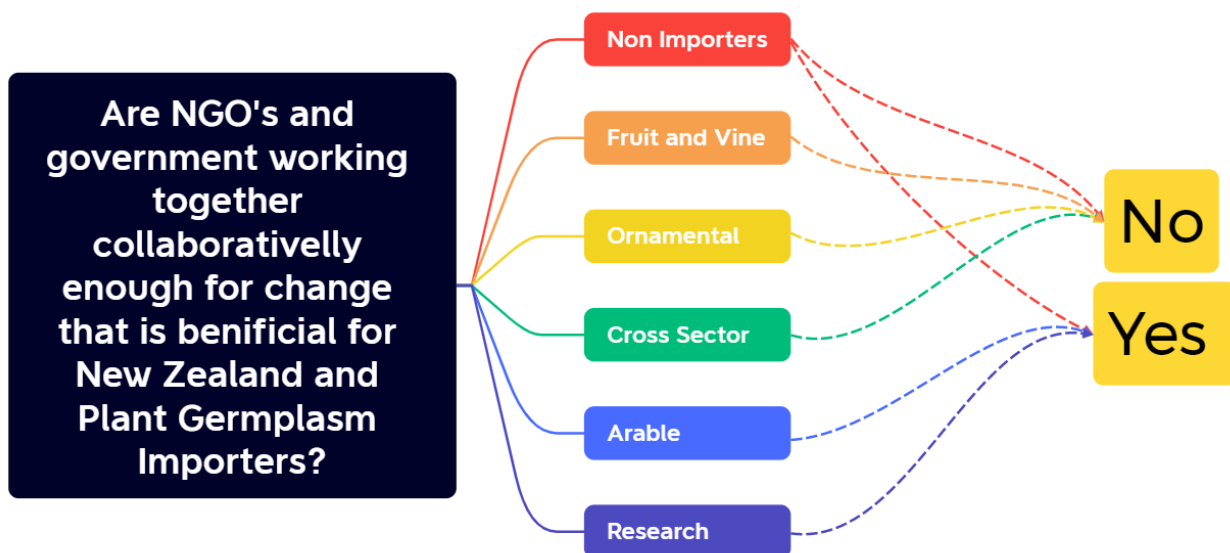


Figure 14 presents a logic chart which answers the question, "Do you believe that Government organizations and NGOs responsible for covering import pathways and legislation are collaborating enough to bring positive changes for New Zealand and plant importers?" The chart depicts the clear-cut opinion of the importers on this matter.

Figure 14 displays respondents' mixed opinions on the collaboration and agreement among stakeholders in New Zealand's plant importation sector.

The respondent of the NGO, who answered no, emphasises a lack of agreement and collaboration, pointing to the influence of the horticulture industry and policy settings focused on maximum protection with costs borne by the user. The respondent highlights resistance to change rooted in biosecurity concerns, with the horticulture industry leveraging past disease outbreaks to advocate for stringent import measures.

Contrastingly, the respondent from the same organisation who answered yes acknowledges some level of collaboration but criticises the lack of a cohesive approach among various departments within MPI. This response suggests that improvements can be made through integrated and coordinated efforts to enhance the effectiveness of collective actions.

Respondents from the fruit and vine, cross sector and ornamental categories who answered no, consistently expressed concerns about the lack of effective communication and collaboration between government organisations and industry stakeholders. They lament the government's tendency to rely on bureaucrats with limited practical knowledge and criticise the consultation process as being superficial and detached from the industry's realities.

However, respondents from arable and research provide a contrasting perspective, indicating a positive relationship between their organisations and MPI/government, characterised by good communication and pragmatic outcomes.

In summary, while there is an acknowledgment of some level of collaboration from the yes respondent, the predominant sentiment is one of inadequate collaboration and communication, particularly from the people who responded no. The disagreements are rooted in the influence of powerful industry bodies, bureaucratic red tape, and policy settings that are perceived to be overly protective and not sufficiently considerate of public benefits and the economic significance of plant imports. Improved communication, more balanced policy settings, and enhanced collaboration among all stakeholders are suggested as essential steps to overcome these challenges.

7.4.4 Visions of Positive Change

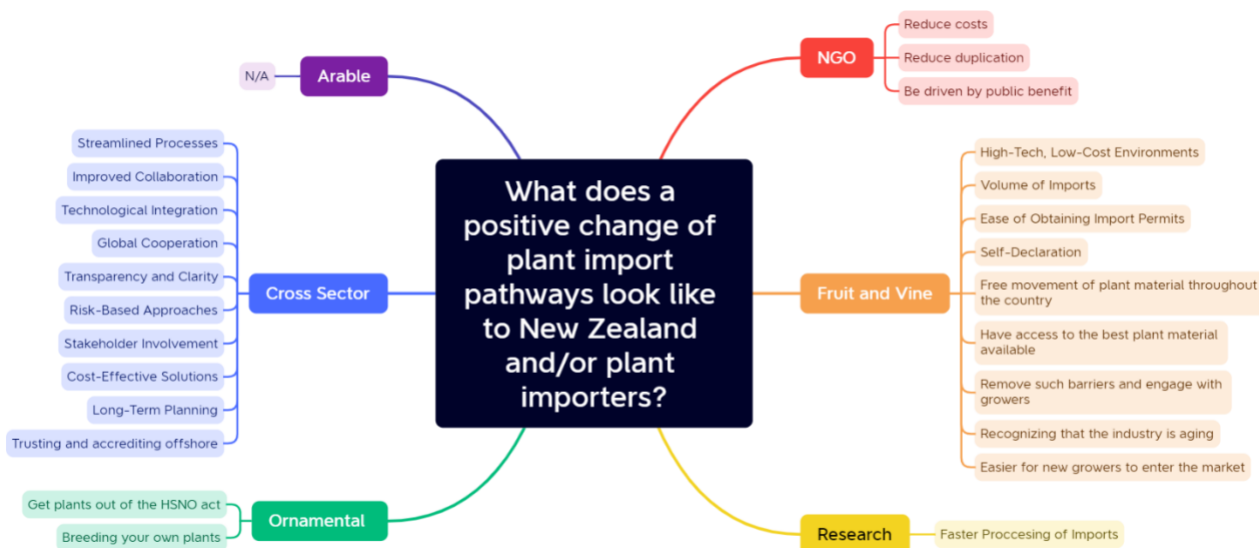


Figure 14: This mind map displays all the respondent's ideas about how they view what a positive change of import pathways would look like for New Zealand and users of the system.

In Figure 14, each of the respondents were asked what positive change of import pathways would look like for New Zealand and/or plant importers. Each category had vastly different ideas but also common themes between them.

The suggestions from the different respondents collectively emphasise the need for an overhaul in New Zealand's plant importation process to make it more efficient, user-friendly, and cost-effective, although each has a unique perspective.

Fruit and vine suggestions extensively address the process improvements needed, such as simplifying the acquisition of import permits, introducing a self-declaration system for importers, and adopting technology to create a low-cost environment for importation. This respondent emphasises balancing bureaucratic risks with innovation and progress. Cross sector suggestions, on the other hand, highlight the need for trust and accreditation offshore, pointing out the necessity to revamp specific legal frameworks like the HSNO act to fast-track the importation of breeding essentials. The focus here is more on legal and trust-building aspects than process improvement. Cross-sector suggestions also articulate a comprehensive framework for positive change encompassing streamlined processes, collaboration, technological integration, and global cooperation. This response is akin to fruit and vine suggestions but introduces elements of international partnerships and agreements, transparency, and stakeholder involvement, adding depth to the conversation by addressing both procedural and relational dynamics in the importation process.

An NGO suggestion succinctly zeroes in on reducing costs and duplication while managing risk and insists that the processes should be more driven by public benefit. This perspective, while brief, introduces an essential element of balancing cost, risk, and public benefit, highlighting the need for a holistic approach.

An ornamental suggestion highlights the issue of having access to plant material that is not in the plant biosecurity index, as mentioned in the literature review by which (Hulme, 2020), could encourage breeding within New Zealand.

In evaluating these responses, each perspective contributes to a holistic understanding of the improvements needed: simplification of processes, integration of technology, enhancement of legal frameworks, building trust, international cooperation, and ensuring that the public benefit is at the core.

7.4.5 Negative Impacts

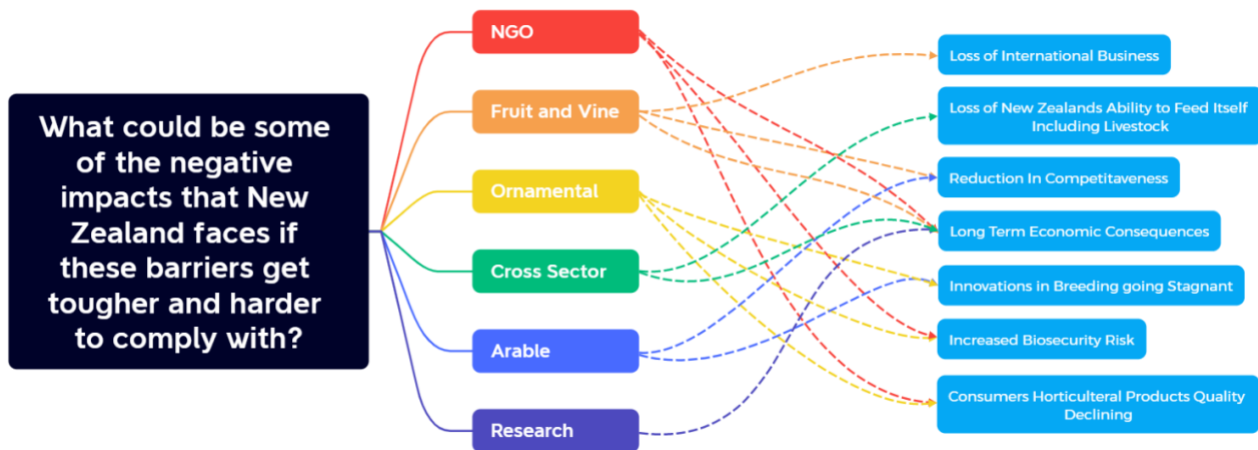


Figure 15: This logic chart displays the themes of how the respondents view negative impacts on New Zealand if barriers get tougher to comply with.

In Figure 15, the respondents were asked what they thought the negative impacts could be for New Zealand if the barriers that have been identified get tougher to comply with. There were seven common themes that emerged between the respondents.

A respondent from the NGO category is focused on the detrimental impact on New Zealand's agricultural and horticultural industry, highlighting an imminent need for a complete reset in policy settings with him saying the "political and bureaucratic dials of the import system needed to be reset to the middle". They highlight the critical situation brought about by the proposal to increase the price of testing, which, according to them, is unsustainable. They predict a bleak future for the industry unless significant changes are made, bringing in elements of increased costs and reduced safety due to tougher import barriers.

A respondent from fruit and vine discusses the common theme that there are potential impacts on export predictions and international competitiveness. They highlight a range of issues, including economic consequences, reduced innovation, and dependence on local resources. This respondent expands the conversation to include the international stage, portraying a comprehensive view of the long-term impact of strict importation regulations on the nation's global standing and economic diversity. This is also comparative to a theme shared by the ornamental and arable respondents, noting that breeding programmes will be stagnant with the risk of losing our international competitive advantage.

Another cross-sector respondent was more straightforward, echoing the concerns of a decline in competitive advantage and even going as far as suggesting that New Zealand might face "starvation" if it doesn't keep pace with technology. While this was noted in a joking tone, there is underlying seriousness behind this comment that the arable respondent shares with his comment being, "New Zealand may lose its ability to feed itself, including livestock, as they all heavily rely on imported seed".

In contrasting these perspectives, the NGO respondent seems more urgent and radical, calling for a complete reset, while fruit and vine, ornamental and cross-sector respondents take a more systematic approach, outlining the broader impacts on the economy and international trade. They add depth by including the business angle and a detailed breakdown of potential impacts across various sectors.

There is unanimity among responses on the detrimental effects of stringent import regulations, though they offer varied focal points and depth of analysis. Each response paints a comprehensive picture of an industry at risk due to current regulatory settings. The consensus is clear; without significant changes, New Zealand's agriculture, horticulture, and related sectors face a decline in competitiveness, innovation, growth, and an inability to remain self-sufficient at a local food production level.

7.5 Other Opinions Brought to Light

This final segment question is in place to find out whether respondents had any more ideas or opinions around the topic of germplasm imports.

7.5.1 Suggestions

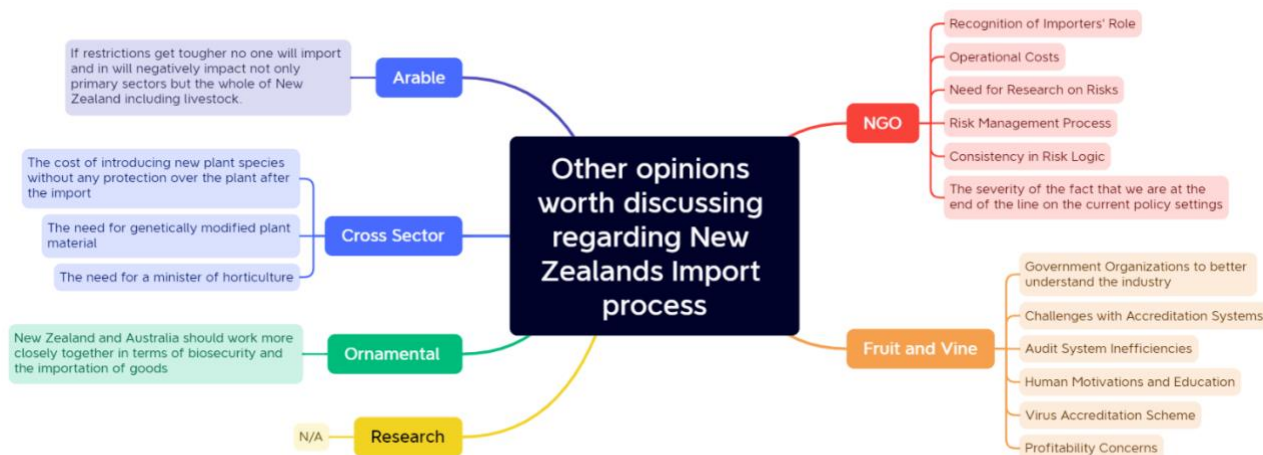


Figure 16: This mind map is a display of what other ideas the respondents thought they would like to have light shed on as a closing to the interview.

In Figure 16, all the respondents were asked a closing question of whether or not they thought there was anything else that should be brought up regarding New Zealand's import processes that I haven't touched upon. The research respondents did not have any further comments, but other categories had additional input.

One respondent from the fruit and vine category mentioned an attempt to bring in a virus accreditation scheme. Attempts to establish a virus accreditation scheme were initially successful but regressed due to operational and financial issues. The audit systems were deemed clumsy and costly, with the independent auditor requiring annual retraining. This inefficiency added an "extra layer of cost", hindering the progress made by the accreditation system. There is a clear need for a well-structured, efficient, and cost-effective system to ensure the quality and safety of imports while maintaining economic viability and this may be something worth revisiting in the future if progress can be made on some of the suggestions made in Figure 13. The thought could also be supported by the recommendation from a cross sector respondent that there is a certain need for a horticulture minister to ensure that the unique needs of the horticulture industry are adequately represented and addressed.

A respondent from the cross sector category has also mentioned that there should be a level of protection for importers who choose to go down the challenging path of introducing a new plant species on the Plant Biosecurity Index (PBI) with benefits of successful importation often being reaped by others. Once a new species has been added to the PBI, every user of the system is now able to bring in the material of the newly introduced species without any remuneration for the user that went through the process of the introduction. All with the operational costs and the dilemma between charging a premium and reducing profit, highlights the economic challenges and the need for a balanced approach to sustain the importation business.

A fruit and vine respondent made reference to the fact that the motivations and education of individuals involved in the importation process play a significant role in its success. A proactive and entrepreneurial attitude is necessary to innovate and improve the system. However, the existing challenges and inefficiencies can demotivate importers and hinder progress. He stated that "the industry is aging", alluding to the fact that a lot of the importation is managed by people with 20 to 30 plus years in this area and there are few people coming through that have the motivation and drive to continue importation businesses.

Collaboration between New Zealand and Australia is suggested as a potential solution to some of these issues. Given their similar biosecurity positions, reduced barriers and streamlined processes could enhance economic and agricultural ties. However, this requires a nuanced approach to address specific disease risks. This approach may also come at a risk to both Australia and New Zealand horticulture as a streamlined import/export pathway may lead to more fierce competition and potentially destroy the industry, similar to what happened in 1964, where there was a free exchange of material between these two countries. One respondent from the ornamental category mentioned that a New Zealand company named Duncan and Davies *“destroyed Australia’s industry by exporting because there were no restrictions into Australia and then Victoria nurserymen got together and went to the government and said, hey, this is not good, we’ve been badly beaten up by those kiwis that they’re producing plants cheaper than we can produce and they are better”*. This ultimately saw the end of the free trade of plant movements between the two countries.

All of these final suggestions still point to the complexities and challenges of New Zealand’s plant importation and accreditation systems, emphasising the need for operational efficiency, cost effectiveness, and risk management. This highlights the importance of the importer’s role, motivation, education, and the economy. This is then underlined alongside the potential benefits of collaboration between New Zealand and Australia and the necessity for improved government and industry understanding and representation.

8.0 Discussion

In this section, the data collected from the semi-structured interviews will be examined. The aim is to integrate the insights gained from those interviews with the information obtained from the literature review. Essentially, the pieces of the puzzle will be put together to gain a comprehensive understanding of the research question.

8.1 Operational Simplifications

From the semi-structured interviews that have been conducted, there is unanimous agreement on the operational inefficiencies that mar New Zealand's plant importation and application systems. Respondents of the interviews explicitly highlight the struggles encountered when trying to import new germplasm into New Zealand when there is no current import health standard that corresponds to the germplasm they wish to import. This struggle has been noted previously in the literature by Market Access Solutions (2014) by importers that have said that they would like to have a new IHS developed but advised it will take too long. Figure 9 supports the literature finding that there is a common theme that costs and the time it takes to go through the process is deemed to be a big challenge. This theme has been a documented challenge since the report conducted by *Clinehens* in (2004) where respondents in their survey also mentioned their struggles with the application process with one section of the report specifically aimed at the "*difficulties with the application process*". In this section there were several respondents who seemed to lack an accurate understanding of HSNO's requirements and other required steps in the importation process as respondents gave them information on HSNOs that *Clinehens* (2004) knew to be incorrect. While the respondents that were interviewed in this report had a clear understanding of the requirements involved with the import and application processes, most made mention that there are still fundamental flaws in the system design that are challenging to navigate.

Some of the respondents have learnt to overcome barriers of the system by simply having years of experience. This is where one respondent had fears over the succession of the industry as they view the industry had a "*lack of talent*" and "*entrepreneurial leadership*" emerging, which reiterates the theory that the industry may slow and lead to New Zealand's inability to compete on a global stage.

It would appear that most respondents are looking for a new streamlined system that has the ability to simplify all aspects of the importation process, which maybe in the form of a new IT platform that users could access for permits and germplasm information and application status. The system may also have the capability to build trust to create more accredited offshore facilities to assist in the import process. As noted by the respondents, the foundation of any system must be based on a few fundamental principles that include a transparent and user-friendly system, government officials who understand their role and the outcomes that the industry is trying to achieve, and a system that includes the participation of industry members to provide their viewpoint rather than a one-sided bureaucratic approach. Multiple respondents made points to suggest that such a system may be made possible with the advancement of high throughput gene sequencing to speed up the testing process, which is also supported by a report conducted by *Delmiglio* (2023) on new diagnostic approaches in New Zealand.

8.2 Economic Feasibility

At the core of this report is the intricate balance between maintaining biosecurity, ensuring the safety of local ecosystems, and fostering innovation and economic growth in the horticulture sector. The HSNO Act and the Plants Biosecurity Index are highlighted as critical tools in this balance, but they also bring with them considerable costs, especially for first movers and those dealing with species not already catalogued. The substantial financial burden of risk assessments, application fees, and the potential costs associated with the import health standard development are emphasized as significant barriers to innovation, putting smaller operators and new entrants at a distinct disadvantage, which also aligns with sections of Clinehens (2004) report.

The complexities and costs associated with operating offshore facilities and the reaccreditation process puts the onus on New Zealand importers to wear these costs. This adds another layer to the statement made by the cross sector respondent in Figure 14 about the trust issues between MPI and offshore facilities. However, this pathway of importation is also seen to be a simple solution in comparison to the new proposal for the PEQ pricing. There is ongoing dialogue and efforts to restructure pricing for the new PEQ L3 facility, with a focus on achieving a balance between cost recovery and affordability for importers. The various pricing options and scenarios presented by MPI reflect the complexity of the issue, emphasizing the need for a flexible and equal approach that caters to the needs and financial capabilities of different importers. However, most respondents find this view skewed. During the interviews, respondents from the cross sector and fruit and vine categories frequently brought up the concern of how significant the cost increases will be, even without being prompted by the interview questions. This indicates that the respondents are deeply worried about the potential impact of these cost increases.

One respondent mentioned that MPI's hands are tied due to legislation requiring a 50/50 cost recovery with the new pricing structure. While they are not happy with the proposal, they also understand the circumstances and are willing to operate within the costs that are looking to be set, noting that there may be opportunities outside of the government for substitutional funding for a "high value" product. While this point is made, there is an opinion that people that import ornamental products or products that are not deemed to not be "high value" will lose the opportunity to import through the PEQ L3B system as they don't have the financial backing and are not willing to take a risk on the product that may have a payback period over the course of several years. There is an underlying message that could see the industry get monopolized by people who have the funding and the intelligence to do so, which could be seen as another negative impact that could also shrink domestic business owners scope in the future.

Many respondents comment that the cost barrier is not only going to slow imports into New Zealand but completely halt them all together. This is a concerning prospect as our primary industries directly rely on the importation of new germplasm in New Zealand. One fruit and vine respondent made mention that *"the hort industry has the wool over their eyes. The repercussions of germplasm not being imported into New Zealand for new fruit varieties will be felt in 15 years time because of the length of the import/production process. Only then will the horticulture industry be concerned about no imports once it's too late"*. All the respondents are aware of the impact that their imports have to the New Zealand economy and feel that it is taken for granted.

All of these cost issues add to the negative outcomes that respondents listed in Figure 15 which paint a bleak picture of what these implications may mean for New Zealand. There is overwhelming consensus among respondents regarding the prohibitively high costs associated with plant germplasm importation. The shared sentiment highlights a need for reform, advocating for a more predictable, efficient, and financially viable regulatory framework that supports both biosecurity and the growth of the horticulture industry.

8.3 The Competitive Advantage

The underlining consequence that comes with all the negatives highlighted by the respondents is that in all aspects, whether it's international or domestic markets, there is a risk that businesses in New Zealand that rely on newly imported germplasm will begin to lose business because of their lack of access to new germplasm.

Internationally, New Zealand's "brand" is built on its "clean, green image" where the products we produce are of the highest quality because of the environment they are grown in and because of the minimal amount of chemical applications used compared to other countries as mentioned by one of the fruit and vine respondents. However, with the climate changing every year and with more adverse weather events, New Zealand needs to have access to the best quality material available so we can remain competitive on the world stage when it comes to our homegrown products. This view is also shared in the domestic market where the risk is that products are either no longer fit for purpose or the cost involved to produce the product has crept up too high to the point that an international grower can produce and import to New Zealand cheaper than what we can grow it for. As one respondent from the fruit and vine category mentioned "fruit is like fashion; it comes and goes". This point highlights the idea that if another country has access to an enhanced product that tastes and feels better, the consumer will be more likely to preference this over the lesser quality item. The risk is that we may begin to get pushed out of our own market, like what the ornamental respondent said that Duncan and Davies did to Australia in 1964 with their horticultural products.

The two angles that have been drawn to attention by the respondents, are that we either need to import new germplasm as the breeding programmes overseas are producing higher quality material that we could access, which is what the consumer ultimately wants, or we need to import new plant germplasm so we can have the opportunity to breed our own varieties of material that is fit for purpose in the New Zealand environment which is a point that the research respondent has clearly made throughout their interview. The breeding angle also creates new market opportunities for New Zealand; if research and breeding teams in New Zealand can develop new and innovative genetics that are highly desirable, we would then have the opportunity to offer a superior quality product on a global scale. Additionally, other countries might be interested in buying the genetics bred in New Zealand and grow them in their own countries. This could generate income in the form of a royalty payment to the breeder.

With the risk of losing the competitive advantage throughout the industry, all of these factors need to be taken into careful consideration as the horticultural export market revenue came to an annual revenue of \$4.5Bn (Situation and Outlook for Primary Industries June, 2023) excluding kiwifruit, due to the kiwifruit industry not relying on imports. All the respondents agree that changes are necessary to maintain the current advantage. It's important to shed light on the broader impact of importing new plant germplasm on the New Zealand economy, not just on the users who do so.

9.0 Conclusions

This research was conducted to help point out the implications and barriers that importers face when bring new plant germplasm into New Zealand while also making the users of the system aware of why New Zealand is worth protecting.

The interviews underscore unanimous agreement on the operational inefficiencies plaguing New Zealand's plant importation and application systems, with persistent issues stemming from the absence of corresponding import health standards for germplasm, time-consuming processes, and excessive costs. Concerns have also emerged regarding the industry's future due to a perceived shortage of talent and entrepreneurial leadership. There appears to be urgent need for a streamlined system, potentially an accessible IT platform, to simplify the importation process, foster trust, and accredit offshore facilities. This system should be built on principles of transparency, government understanding of industry goals, and active industry participation. Furthermore, the potential integration of high-throughput gene sequencing, as supported by recent reports, offers a promising avenue to expedite testing processes, highlighting the compelling case for operational simplifications in New Zealand's plant importation and application procedures.

When thinking of economic viability, there is intricate balance between biosecurity, ecosystem safety, and economic growth in New Zealand's horticulture sector. While the HSNO Act and the Plants Biosecurity Index are crucial tools in maintaining this balance, they come with significant costs, particularly impacting first movers and those dealing with unlisted species. The financial burden of risk assessments, application fees, and import health standard development hinders innovation and puts smaller operators and new entrants at a disadvantage. The complexities of offshore facilities and proposed PEQ pricing further exacerbate these challenges, raising concerns about the potential monopolization of the industry and the halt of germplasm imports, which are vital for New Zealand's primary industries. From the interviews it seems universally emphasize the need for reform to create a more predictable, efficient, and financially viable regulatory framework that can support both biosecurity and the growth of the horticulture industry.

There has also been emphasis placed on the significant risk of New Zealand businesses losing their competitive advantage both internationally and domestically due to the challenges associated with accessing new germplasm. The country's reputation as a producer of high-quality, environmentally friendly products is at stake, especially as climate change and adverse weather events pose challenges to traditional farming practices. To maintain competitiveness, two key strategies emerge: importing high-quality germplasm from overseas breeding programs to meet consumer demands or importing new plant germplasm for domestic breeding, potentially creating new market opportunities. The horticultural export market's annual revenue of \$4.5 billion underscores the urgency of addressing these issues. It is clear that changes are necessary to preserve New Zealand's edge in the industry, with a broader economic impact affecting the entire country, not just those directly involved in germplasm importation.

It is evident from the historical literature and most of the people involved in semi structured interviews, that there have always been strong opinions about the importation system and how it is deemed to be "broken". It is a multifaceted system that is complex with the key purpose to protect New Zealand. Respondents are eager to be heard and for a change of the system to follow. It is essential to approach these steps with care and precision and ensure that all participants in the system are involved, not just those in positions of power on councils and boards. To further enhance the system, all the vital points discussed must be thoroughly reviewed to support the ongoing efforts of groups like PGIC and NZPPI.

The resonating message that was pointed out during the interviews, is that the reason why New Zealand is known for high-value products is due to our high-quality environment and biosecurity measures. This message could be considered a blessing and a curse; however, it is important to understand what is at stake for New Zealand if a "mistake" is made in the system. While we need to embrace our the boarder controls we have in place to protect New Zealand and recognise that they play to our advantage, we also need to come to a solution that will work for all of New Zealand, not just specific industries that are threatened by biological incursion. Ultimately, there is never a "zero risk option"; however, it is about the steps put in place that can mitigate the risk. This might involve some creative thinking from fresh eyes in the industry or from emerging entrepreneurial leaders.

10.0 Recommendations

During the semi-structured interviews, the majority of the respondents suggested ways to improve the import system. While some of these ideas may be challenging to implement, there are certain key points that have already received attention and can be further improved upon.

10.1 Engaging in More Productive Collaboration

First and foremost, a primary focus to work on would be to foster closer collaboration between the industry and MPI when it comes to the frameworks and legislation behind germplasm imports. It is evident that our biosecurity settings need to be reset and built back up with collaboration at the core. This will be built by the need to have people who are actively involved in importing across all horticultural industries telling their side of the story and how the system impacts them on a day-to-day basis. Both parties need to align and share a common goal of making New Zealand a prosperous horticultural nation.

10.2 Focus on Building Capability in MPI Staff

To provide comprehensive training for biosecurity officers and other relevant personnel involved in the import process. This includes training in the use of advanced diagnostic tools, as well as updated information on emerging threats and best practices in biosecurity. Enhancing the skills and knowledge of personnel will contribute to more accurate and efficient inspections.

10.3 Explore Options of Streamlining and Standardization of Processes

There is a need to explore harmonisation of import procedures and requirements across different regions and countries. This can be achieved by adopting and implementing international standards for phytosanitary measures, as developed by the International Plant Protection Convention (IPPC). Ensuring consistency in the documentation required and the processes followed will help reduce delays and misunderstandings, ultimately making the import process smoother. As mentioned in the discussion, this may come in the form of a new IT platform. This may also help decrease the administrative cost involved with the import process.

10.4 Continual Investment in Advanced Diagnostic Technologies

Continue investing in the development and implementation of innovative and rapid diagnostic techniques for the identification of pests and pathogens. As highlighted in a report done by Delmiglio (2023), PHEL is already involved in the development of such techniques. Implementing these across all points of entry can significantly reduce the time required for inspection and testing, making the import process more efficient and significantly more cost-effective.

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Appendices

Appendix 1: Semi Structured Interview Questions

New Zealand's Quarantining System

1. Business Involvement with Plant Germplasm:
 - a. Give me a brief introduction of what your business does.
 - b. Does your business import new plant germplasm? (Go to Question D if non importer)
 - c. What type of germplasm do you import?
 - d. What have been your previous experiences with the importing of new plant germplasm?

2. Introduction of New Plant Germplasm:
 - a. Why do you bring in new plant germplasm for your business? (only ask if their business does import)?
 - b. What are your thoughts on the importance of introducing new plant germplasm for New Zealand?

Literature Review Questions

Overview – After completing a literature review on some of the key barriers that New Zealand faces, 4 common themes have emerged dating back to 2004. They are regarding the following:

- The Complexity of the HSNO (Hazardous Substances and New Organisms) Act
- Counterintuitive IHS (Import Health Standards)
- Lack of Accredited Offshore Quarantine Facilities
- All the Costs of importing new plant germplasm at every stage of the import process Including new PEQ L3 pricing.

All of these points have caused importers issues in one way or another, according to my research.

1. The Impact and Understanding of Import Barriers:

(Importers)

 - a. Have any of these barriers you potentially caused you issues in the past, present or future?
 - b. Can you briefly describe how these barriers you identified have affected you?

Non Importers start at C, Importers start at D

 - a. Do you have an understanding of the key barriers listed?
 - b. Out of the barriers that I have identified can you briefly describe the purpose that each barrier serves?
 - c. Do you think it is important that these barriers are in place?

2. Challenges, Improvements and Impacts:
 - a. Do you think there are any barriers that importers face that haven't been I haven't already listed?

- b. Do you have any suggestions on how the import pathway can be made easier?
 - c. Do you think Government organisations and NGO's that are covering import pathways and legislation are working collaboratively enough to get change that is beneficial for New Zealand and plant importers?
 - d. What does a positive change of plant import pathways look like to New Zealand and/or plant importers?
 - e. What could be some of the negative impacts that New Zealand faces if these barriers get tougher and harder to comply with?
3. Other Opinions Brought to Light:
- a. Is there anything else that you think should be brought up in regard to New Zealand's import processes that I haven't touched upon today?