Ministry for Primary Industries
Manatū Ahu Matua

Risk Management Proposal:

Partial review of Malus import requirements in the Importation of Nursery Stock Import Health Standard (155.02.06)

FOR PUBLIC CONSULTATION

November 2020

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Submissions

The Ministry for Primary Industries (MPI) invites comment from interested parties on proposed changes to import requirements in the *Malus* schedule in the import health standard (IHS) 155.02.06[1]: Importation of Nursery Stock, which is supported by this risk management proposal.

The purpose of an import health standard is defined as follows in section 22(1) of the Biosecurity Act 1993 (the Act): "An import health standard specifies requirements that must be met to effectively manage risks associated with importing risk goods, including risks arising because importing the goods involves or might involve an incidentally imported new organism".

In accordance with Section 23 of the Act, MPI must consult with interested parties before issuing or amending IHS under section 24A of the Act. Therefore, MPI therefore seeks formal comment on the proposed import requirements.

The following points may be of assistance in preparing comments:

- Wherever possible, comments should be specific to a particular section/requirement of the IHS;
- Where possible, reasons, data and supporting published references to support comments are requested.
- The use of examples to illustrate particular points is encouraged.

MPI encourages respondents to forward comments electronically. Please include the following in your submission:

- The title of the consultation document in the subject line of your email;
- Your name and title (if applicable);
- Your organisation's name (if applicable); and
- Your address.

Send submissions to: plantimports@mpi.govt.nz.
If you wish to forward submissions in writing, please send them to the following address.

Plant Germplasm Imports
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All submissions must arrive by close of business on 18/12/2020. Submissions received by the closure date will be considered during the development of the final standard. Submissions received after the closure date may be held on file for consideration when the issued standard is next revised/reviewed.

Official Information Act 1982

Please note that your submission is public information and it is MPI policy to publish submissions and the review of submissions on the MPI website. Submissions may also be the subject of requests for information under the Official Information Act 1982 (OIA). The OIA specifies that information is to be made available to requesters unless there are sufficient grounds for withholding it, as set out in the OIA. Submitters may wish to indicate grounds for withholding specific information contained in their submission, such as the information is commercially sensitive or they wish personal information to be withheld. Any decision to withhold information requested under the OIA is reviewable by the Ombudsman.

[1] MINISTRY FOR PRIMARY INDUSTRIES, STANDARD 155.02.06, Importation of Nursery Stock. https://www.biosecurity.govt.nz/dmsdocument/1152-nursery-stock-import-health-standard

Purpose

(1) The purpose of this risk management proposal (RMP) is to:

a) describe alternative risk management options that have been considered for **only** those pests that require woody indexing under the current version of the IHS;

b) show how measures proposed in the draft standard will appropriately manage biosecurity risks and are consistent with New Zealand's domestic legislation and international obligations; and

c) provide information to support the consultation on the draft standard (appendix 1).

(2) The RMP is not itself the subject of consultation. The requirements of the draft standard are the subject of public consultation. This risk management proposal supports the draft standard and should be read in full, and in conjunction with the draft standard, to understand the rationale behind the proposed import requirements and the import health standard development process undertaken by MPI. However, MPI will accept comments and suggestions on the RMP in order to improve future consultations on the draft standard.

Objective

(3) MPI's objective for reviewing the requirement for woody indexing, currently in place for *Malus* plants for planting, is to identify the most appropriate phytosanitary measures to manage the biosecurity risks associated with some pests.

Scope of this risk management proposal

(4) This partial review of import requirements for *Malus* plants for planting assesses the risk management measures **only** for organisms that require woody indexing in the current *Malus* schedule of the IHS, namely one species of virus, three viroids, one phytoplasma, and four diseases of unknown aetiology (DouA).

(5) The review does not include the following:

a) Assessment of the risk management measures for pests that do not require woody indexing;

b) Identification of risk management measures for new or emerging pests;

NOTE: A check of the MPI Emerging Risks Register did not identify any new or emerging risks that are unmanaged on *Malus* plants for planting.

c) Changes to the IHS format and layout;

d) Consideration of the regulatory status of any pests associated with *Malus* other than diseases of unknown aetiology.

Background

(6) *Malus* plants for planting are eligible for import as dormant cuttings and plants in tissue culture. Currently, *Malus* plants for planting can be imported from MPI-approved offshore facilities into Level 2 post entry quarantine (PEQ) for a minimum growing period of six months active growth, or from non-approved facilities into Level 3B PEQ for a minimum growing period of 36 months.

a) *Malus* plants for planting imported from approved offshore facilities enter a lower level of quarantine for a reduced period because some risk management measures are applied offshore prior to export (for example this includes doing woody indexing);

b) Woody indexing takes at least three years to complete (offshore or onshore); therefore, it prolongs obtaining access to new plant material with concomitant increases in costs.

(7) The revised IHS for *Prunus* plants for planting (issued January 2020[2]), established different measures for managing the risk of some viruses and diseases of unknown aetiology, for which woody indexing was previously required. In the case of diseases of unknown aetiology, it was understood that the measure of woody indicator testing was no longer considered commensurate with the risk posed by these diseases. This was largely because:

a) Woody indexing can provide false negatives and inconsistent results;

b) The positive woody indexing results should be verified by other tests, such as molecular assays;

c) Woody indexing may not provide any additional information about whether a pest is present in a particular plant if reliable alternative measures (such as PCR) are available.

(8) *Malus* and *Prunus* plants for planting have similar risk profiles for some classes of pests (e.g. viruses and viroids). In the current *Malus* IHS, there are one virus, three viroids, one phytoplasma and four diseases of unknown aetiology that require woody indexing. Similar risk management measures for pests previously requiring woody indexing in *Prunus* plants for planting may be applicable for *Malus* plants.

(9) Except for DouA, the proposed measures in the draft standard do not suggest any changes in the overall level of protection and are considered consistent with the current appropriate level of protection for *Malus* established by MPI over many years. For DouA, the proposed measures may provide a lower level of protection compared to the current requirement in the *Malus* IHS. However, considering the drawbacks outlined in paragraph (7), the proposed measures are considered commensurate with the level of risk associated with DouA associated with *Malus*.

(10) Potential benefits of reviewing the woody indexing requirements for *Malus* plants for planting include:

a) Removing potentially unnecessary import requirements for imports of *Malus* germplasm; and

b) Facilitating imports of new *Malus* varieties by reducing the quarantine period and import costs.

Current phytosanitary requirements for *Malus* pests that require woody indexing

(11) At present, woody indexing is required to manage, or partially manage risk from the following regulated pests of *Malus* plants for planting (Table 1):

Table 1. Inspection, Testing and Treatment Requirements for *Malus* in relation to pests require woody indexing

Virus	
Cherry rasp leaf virus	Woody indexing **or** herbaceous indexing **AND** PCR
Viroids	
Apple dimple fruit viroid	Woody indexing **AND** PCR
Apple fruit crinkle viroid	Woody indexing **AND** PCR
Apple scar skin viroid	Woody indexing **AND** PCR
Phytoplasmas	
'*Candidatus* Phytoplasma mali'	Woody indexing **AND** nested PCR using universal phytoplasma primers
Diseases of unknown aetiology	
Apple dead spur agent	Woody indexing
Apple rough skin agent	Woody indexing
Apple russet wart agent	Woody indexing
Apple star crack agent	Woody indexing

[2] *Prunus* Plants for Planting, MPI.IHS.PRUNUS.PFP, 23 January 2020. https://www.biosecurity.govt.nz/dmsdocument/39488/direct

Source information

(12) This RMP is based on information in the MPI Import Risk Analysis: *Viruses, Viroids, Phytoplasma, Bacteria and Diseases of Unknown Aetiology on Malus Nursery Stock from all Countries, 2012*.

(13) Citations relating to additional information are included as footnotes. Other information sources include the following:

a) Risk Management Proposal: Prunus Plants for Planting (June 2019), particularly the basis for changing measures relating to woody indexing.

Domestic and international setting

(14) Maintaining plant health is a key outcome of New Zealand's biosecurity system. The system is regulated by MPI, through the Biosecurity Act 1993. Section 22 of the Act describes the purpose and requirements of an IHS and outlines the types of matters that should be considered in an IHS.

(15) The phytosanitary import requirements proposed in this RMP and the draft standard are aligned with international standards, guidelines, and recommendations[3], as per New Zealand's obligations under Article 3.1[4] of the World Trade Organisation (WTO)[5] Agreement on the Application of the SPS Agreement. This sets in place rules that protect each country's sovereign right to take the measures necessary to protect the life or health of its people, animals, and plants while at the same time facilitating trade.

(16) MPI is committed to the use of science-based risk assessments to inform the decisions about how to manage the risks associated with the international movement of goods.

Risk management approach

(17) This section of the RMP includes descriptions of:

a) The proposed requirements for screening of regulated pests that require woody indexing under the current *Malus* schedule;

b) The proposed requirements for post entry quarantine if MPI does remove the requirement for woody indexing;

c) How the measures proposed in the draft standard will appropriately manage biosecurity risks; and

d) Impacts of proposed measures on the import pathway.

(18) MPI is proposing to remove the requirement for woody indexing to manage the pests listed in Table 1 above. This is because woody indexing is now widely seen as being of limited benefit (Legrand, 2015[6]) for the following reasons:

a) Woody indexing can provide false negative and inconsistent results. This means that the absence of symptoms in indicator plants does not necessarily prove that imported plants are

[3] Note that international standards, guidelines or recommendations referred to in the WTO agreement are those of Codex, OIE (World Organisation for Animal Health) and the IPPC.
[4] Agreement on Subsidies and Countervailing Measures, Article 3.1. https://www.wto.org/english/docs_e/legal_e/24-scm_01_e.htm#ArticleIII
[5] World Trade Organization, Agreement on Subsidies and Countervailing Measures
[6] Legrand, P. (2015). Biological assays for plant viruses and other graft-transmissible pathogens diagnoses: a review. EPPO Bulletin, 45(2), 240-251.

free from the target regulated pests (Cieślińska and Rutkowski, 2008[7]; Stouffer and Fridlund, 1989[8]);

b) While woody indexing has shown negative results on pear and apple trees, PCR testing of the same plants for the same disease gave a positive result, showing that PCR method is more sensitive and reliable for detecting viruses in tested plants (Laviña et al., 2010[9]);

c) Even when woody indexing returns a positive result, it is recommended that the result is verified using another type of test (e.g. PCR);

d) Woody indexing relies heavily on the climate conditions and indicator cultivars for development of the symptoms (Constable et al., 2013[10]);

e) Woody indexing is time-consuming (at least three years for *Malus* under the existing IHS) and is expensive.

(19) It is acknowledged that woody indexing has the potential to identify new or emerging pests (e.g. viruses, viroids, and phytoplasmas), or variants of existing pest species that may not be detected by PCR or herbaceous indexing. However, balancing this against the limitations identified above, MPI no longer considers this method should be a requirement to manage the regulated pests on *Malus* plants for planting.

Proposed testing for viruses

(20) There is one virus species, *Cherry rasp leaf virus* (CRLV), currently managed on *Malus* plants for planting by either woody indexing and PCR, OR herbaceous indexing and PCR. The proposal is to remove woody indexing as an optional test and retain the requirements for PCR AND herbaceous indexing to manage the risk of CRLV. This is justified because:

a) PCR is highly specific and sensitive and is known to be an effective method to detect CRLV (Osman et al., 2017[11]);

b) Herbaceous indexing will provide additional assurance that plants are free from variant strains of CRLV that may not be detected using PCR;

c) PCR AND herbaceous indexing manage CRLV in the current *Malus* IHS and provide the desired level of protection. This measure is also consistent with the requirements in the IHS for *Prunus* plants for planting as consulted on in June 2019; and

d) Herbaceous indexing, using the same indicator species, is also used to manage other pests in the current *Malus* IHS (including *Tomato bushy stunt virus* and *Tomato ringspot virus*), so this measure will not result in any additional cost.

Proposed testing for viroids

(21) Three species of viroids, *Apple dimple fruit viroid*, *Apple fruit crinkle viroid*, and *Apple scar skin viroid* are currently managed on *Malus* plants for planting by woody indexing AND PCR. The proposal is to remove woody indexing as a mandatory test and retain the requirement for PCR to manage the risk of these viroids. This is justified for the following reasons:

a) Although *Apple dimple fruit viroid, Apple fruit crinkle viroid,* and *Apple scar skin viroid* may express symptoms in indicator plants used for woody indexing (CPC, 2007[12]), disease

[7] Cieślińska, M., Rutkowski, K. P., (2008). Effect of *Apple chlorotic leaf spot virus* on yield and quality of fruits from 'Golden Delicious' and 'Sampion' apple trees. Acta Horticulture. 781, 119-124. https://doi.org/10.17660/ActaHortic.2008.781.17

[8] Stouffer, R. F., and Fridlund, P. R. (1989). Indexing using woody indicators. Pages 255-265 in: Virus and Virus like Diseases of Pome Fruits and Simulating Non-infectious Disorders. P. R. Fridlund, ed. Wash. State Univ. Coop. Ext. Serv. Pullman.

[9] Laviña, A., Sabaté, J., Batlle, A. (2010). Evaluation of detection methods for Virus, Viroids and Phytoplasmas affecting pear and apple. 21st International Conference on Virus and other Graft Transmissible Diseases of Fruit Crops, Julius-Kühn-Archiv, 424-427.

[10] Constable, F. E., Connellan, J., Nicholas, P., Rodoni, G.C. (2013). The reliability of woody indexing for detection of grapevine virus-associated diseases in three different climatic conditions in Australia. *Australian Journal of Grape and Wine Research*, 19: 74-80.

[11] Osman F, Al Rwahnih M, Rowhani A (2017). Real-time RT-qPCR detection of Cherry rasp leaf virus, Cherry green ring mottle virus, Cherry necrotic rust mottle virus, Cherry virus A and Apple chlorotic leaf spot virus in stone fruits. Journal of Plant Pathology. 99:279–285.

[12] Crop Protection Compendium on Internet (CPC) 2007. CAB INTERNATIONAL, Wallingford, UK; http://www.cabi.org/compendia/CPC/

symptoms expressed in indicator plants may not be specific for identification of the causative agent of the disease and further testing may be required.

i) *Apple dimple fruit viroid* and *Apple scar skin viroid* have been found in co-infections for which PCR was required to discriminate between the two pathogens (*Malus* Import Risk Analysis[13]).

b) There are primers specific for detection of *Apple dimple fruit viroid*, *Apple fruit crinkle viroid*, and *Apple scar skin viroid*. These primers are known to capture the range of known genetic diversity within each species of viroid, designed around the conserved regions of the viroids genomes to discriminate between different viroids, and can be checked regularly against databases to ensure primers continue to capture known genetic diversity.

c) *Apple scar skin viroid* is known to naturally infect *Malus* and *Prunus*. During consultation for *Prunus* plants for planting IHS in June 2019, PCR testing was agreed as a requirement to manage risk from this pest. Based on the above information, MPI consider PCR testing will appropriately manage the risk of this pest on *Malus* plants for planting in the absence of woody indexing.

Proposed testing for phytoplasmas

(22) There is one phytoplasma species, '*Candidatus* Phytoplasma mali', currently managed on *Malus* plants for planting by woody indexing AND PCR. The proposal is to remove woody indexing as a mandatory test and retain the requirement for PCR to manage the risk of '*Candidatus* Phytoplasma mali'. This is justified for the following reasons:

a) Universal PCR primers can detect all known species of phytoplasmas and are known to be highly sensitive.

i) These primers have been designed around highly conserved regions of phytoplasma genomes and they can be regularly checked against the sequences of all isolates in the public sequence database, to ensure ongoing effective detection of any phytoplasma that may be present in imported plants.

ii) Detection of '*Candidatus* Phytoplasma mali' using PCR as a standalone test is consistent with the requirement recently consulted on in the IHS for *Prunus* plants for planting and also the requirement for detection of phytoplasmas in the Nursery Stock IHS (e.g. for *Fragaria*, *Rosa*, *Rubus*, and *Vaccinium* where biological indexing is not needed).

Proposed measures for diseases of unknown aetiology (DouA)

(23) There are four DouA (Apple dead spur agent, Apple rough skin agent, Apple russet wart agent, and Apple star crack agent) currently managed on *Malus* plants for planting by woody indexing AND growing season inspection. While these agents can exhibit symptoms on leaves, the most visible symptoms occur on fruit which was the basis for recommending woody indexing of susceptible indicator plants (*Malus* Import Risk Analysis, 2012[14]).

(24) Removing woody indexing as a mandatory test to detect DouA may be justified based on the following characteristics:

a) There is uncertainty around how effective woody indexing is to detect DouA, because:

[13] Import Risk Analysis: Viruses, Viroids, Phytoplasma, Bacteria and Diseases of Unknown Aetiology on *Malus* Nursery Stock from all Countries, 2012, https://www.teururakau.govt.nz/dmsdocument/2873/direct

[14] Import Risk Analysis: Viruses, Viroids, Phytoplasma, Bacteria and Diseases of Unknown Aetiology on *Malus* Nursery Stock from all Countries, 2012, https://www.teururakau.govt.nz/dmsdocument/2873/direct

i) there is no information on the reliability of graft inoculation of the DouA infected plants onto susceptible indicator plants; and

ii) Even if disease symptoms are observed on woody indicators, if the organism causing the disease symptoms is unknown (which is the case for all diseases of unknown aetiology), there is no practical way to confirm exactly which disease of unknown aetiology is present or to validate the result with a different type of test. This may make it difficult to make regulatory decisions, especially if there are no signs of adverse effects on the originally imported plants (as opposed to the indicator species);

b) DouA symptoms are more likely to be displayed on susceptible cultivars, which is where the diseases would have the most impact. Consequently, the spread of the diseases is likely to be easily managed through the removal of any contaminated, symptomatic lines, and any impacts are only likely to affect the *Malus* industry.

(25) Taking into consideration the above characteristics, and learning from the review of the import health standard for *Prunus* plants for planting, MPI proposes to manage the risk from DouA in *Malus* plants for planting through one of two options, as described below. MPI asks all submitters to clearly identify in their submission which option they prefer, and why this is their preferred option; this will help us come to an informed decision about which measure to include in the amended import health standard.

Option 1: Growing season inspection in post entry quarantine

a) Under this option, MPI will remove the requirement for woody indexing, and instead rely on growing season inspection in post entry quarantine to manage risk from these pests.

i) Given the restricted host range and the limited potential for these diseases to spread other than by mechanical or graft transmission (based on current information), which means that the risk associated with DouA is lower than for other regulated pests, MPI is proposing to apply fewer interventions than in the existing standard to manage risk from DouA;

ii) It is known that many cultivars may not display symptoms, and that for some of the above pests (*Apple rough skin agent*, *Apple russet wart agent* and *Apple star crack agent*) symptoms seem more likely to become visible on fruit. As such, applying growing season inspection in PEQ as the sole risk management tool may not manage all risk associated with the introduction of these diseases, especially given that plants will not bear fruit whilst in post entry quarantine;

iii) It is noted that there is significant uncertainty around the biology, distribution and epidemiology of *Apple dead spur agent*, *Apple rough skin agent*, *Apple russet wart agent*, and *Apple star crack agent*. Despite this uncertainty, growing season inspection alone is considered sufficient to manage the risk from these four DouA, given the characteristics of these pests (as described in detail in the import risk analysis);

iv) If symptoms are seen when plants are held in post entry quarantine, MPI will attempt to identify the causal agent of any symptoms and will decide on whether any phytosanitary actions need to be taken depending on the regulatory status of the identified pest(s). This is the approach already taken for 15 other DouA that are listed as regulated pests in the *Malus* schedule;

v) Under this option, all DouA will continue to be classified as regulated pests. This means that, if any of these diseases were detected in the wider environment, industry and MPI would need to decide whether it was necessary to initiate a biosecurity response to manage risks associated with the detection. It is possible that this could lead to controls being imposed (for example restrictions on the movement of plant material from infected sites), both while a decision was being made, and if any

subsequent pest control activities were undertaken. Given the nature of the diseases under discussion here, it is considered unlikely that there would be any market access implications if these diseases were introduced to New Zealand (given the low impact of the diseases, and because exporting fruit out of New Zealand would not be a viable method of introducing the pest to new countries).

NOTE: Similar principles to those supporting the changes to manage the DouA on the *Prunus* plants for planting also apply on the *Malus* import pathway. During the public consultation for the *Prunus* plants for planting IHS review, industry supported the removal of woody indexing and relying on growing season inspection to manage the risk of DouA.

Option 2: Risk management by industry

a) Under this option, MPI would de-regulate all diseases of unknown aetiology of *Malus*; they would no longer be listed in the import health standard and would be recorded as non-regulated in MPI's pest and disease databases. As well as removing the four DouA under discussion here, the additional 15 DouA that are regulated pests of *Malus* would also be de-regulated under this option[15].

   i) In this case if the diseases were detected in post entry quarantine, or in the wider environment, industry would need to choose for themselves whether to manage the risk from these pests. MPI would not require any disease control to be undertaken, and official controls would not be an option. Because the diseases would be non-regulated, there would be no obligation on individual growers to report the presence of these pests to authorities if they were detected;

   ii) It is noted that, because they are currently not known to be present in New Zealand, all DouA of *Malus* would be considered new organisms from the perspective of the Hazardous Substances and New Organism (HSNO) Act. However, this would not be expected to prevent plants from receiving a biosecurity clearance if a DouA was detected in post entry quarantine. This is because, in such cases, these types of pest can be deemed an "incidentally imported new organism" as defined in section 2(1) of the Hazardous Substances and New Organisms Act 1996;

   iii) Because there is still considerable uncertainty around the biology and aetiology of these diseases, including uncertainty regarding modes of transmission (i.e. given that the causal agent and/or a vector has not been identified), it is possible that a disease could spread more widely than expected before it was detected. This could limit the effectiveness of post-border management by industry;

   iv) The reason this approach could be considered for DouA of *Malus* is because spread of diseases that are only graft transmissible is likely to be able to be easily managed through the removal of any contaminated, symptomatic lines, and because any impacts are only likely to be on the *Malus* industry. It is also noted that, for this type of disease, any infected material imported for research and development (e.g. breeding programmes) is less likely to result in significant impacts, as disease impacts would be resolved before any material is made available for commercial distribution.

Proposed requirements for post entry quarantine

(26) The import risk analysis in 2012 led to the length of quarantine period being increased from 24 months to 36 months, solely because of including the requirement for woody indexing for some

[15] Note that information about the remaining 15 diseases of unknown aetiology of *Malus* is available in the 2012 import risk analysis. This includes information about the length of time required to detect these pests based on growing season inspections,

pests of *Malus*. Prior to this change, 24 months quarantine with regular plant health inspections in PEQ in New Zealand, was seen as sufficient to manage risk.

a) Based on this information MPI is proposing reverting to the shorter, 24-month, quarantine period for imports from non MPI-approved sources; also proposing that imports from MPI-approved sources will combine risk management offshore and onshore to achieve a similar level of protection. These options will retain the same level of protection as was previously established for all pests other than those under consideration in this document.

b) MPI does not consider it prudent to reduce the quarantine period below the previously established 24-month length in the absence of further risk analysis. In particular this is because, under the current standard, growing season inspection is the only measure used to manage risk from regulated fungi and oomycetes of *Malus* plants in post entry quarantine. It is also an important supplementary measure to help manage risk from other classes of regulated pest. Without additional risk analysis, it is not possible to assess whether risk from fungi and oomycetes would be appropriately managed if the quarantine period was further reduced.

(27) It is important to keep in mind that MPI has not considered making any changes to the level of protection required for pests such as bacteria, fungi and oomycetes as part of this review. The level of protection for these pests remains the same as established in previous reviews of *Malus* import requirements. This level of protection differs to that recently established for some other pathways (e.g. when MPI reviewed import requirements for *Actinidia* and *Prunus* plants for planting). Although beyond the scope of this partial review, we do not rule out making such changes in the future, for example if we undertake a comprehensive review of the entire *Malus* import health standard.

Requirements for plants from MPI-approved offshore facilities

(28) *Malus* plants for planting can be obtained from MPI-approved offshore facilities under Part 3.1 of the *Malus* schedule. All currently approved offshore facilities, as listed below, have been able to complete woody indexing as a pre-export measure:

a) Central Attivita Vivaistiche (CAV), Italy;

b) Canadian Food Inspection Agency (CFIA), Centre for Plant Health, Canada;

c) Centre Technique Interprofessionnel des Fruits et Legumes (CTIFL), France;

(29) Under the existing *Malus* schedule, plants are held in each offshore facility for a minimum of three years prior to export (for woody indexing to be completed). During this time, mother plants (from which cuttings would be taken for export to New Zealand) will be maintained in a screenhouse and tested for some viruses and virus-like pests. There will be no specific offshore measures to manage the risk from bacteria, fungi and oomycetes. However, the following generic measures that are applied at each offshore facility help to reduce the level of risk from these classes of pest:

i) Plant health is monitored, with inspections over the three-year period while woody indexing is being completed. This means that visible symptoms of any pests and diseases that are present in plants introduced to the facility may be detected before plant material is exported to New Zealand, and preventative or curative pesticide treatments (e.g. insecticide or fungicide) may be applied to help maintain plants in a healthy state. However, the drawback to this is that fungicide treatments may not eradicate a pest, and may result in infections being supressed, and hence going undetected prior to export;

ii) Plants will be grown in sterilised or inert medium and out of contact with the ground. Watering will generally be done using drip irrigation. This will reduce the likelihood of association with some (but not all) fungi, bacteria and oomycetes;

iii) All facilities have a commercial incentive to produce high health material. This is because their primary purpose is to supply their country's domestic industry with high quality plants for commercial fruit production.

Based on the above activities, under the existing *Malus* schedule, plants obtained from approved facilities must spend a further six months of active continuous growth in a Level 2 PEQ facility in New Zealand before they become eligible for biosecurity clearance. During this time, testing that is not done prior to export is completed, and plants are subject to frequent growing season inspections by the PEQ facility operator and an MPI inspector.

(30) The proposal to remove woody indexing means *Malus* plants for planting will be able to spend less time in an MPI-approved offshore facility prior to export to New Zealand. So, we are proposing two options to manage the risk from importing from MPI-approved offshore facilities, with specific minimum periods that plants must have been in the facilities before they are eligible for import to New Zealand. This is because, without woody indexing, a facility may be able to complete all pre-export testing required by MPI within six or seven months. If plants are exported after spending only around six months at an offshore facility, there will be less certainty that those plants are free from regulated pests for which no specific phytosanitary measures are applied, e.g. fungi. This will change the risk profile of plants exported to New Zealand; residual biosecurity risk is likely to be higher in the absence of woody indexing.

(31) Taking the above into consideration, if the requirement for woody indexing is removed from the *Malus* schedule, MPI is proposing including two options of PEQ for importing *Malus* plants for planting from MPI-approved offshore facilities. Both options are considered to attain the same level of protection as is achieved under the existing requirements for *Malus* plants for planting obtained from an MPI-approved offshore facility.

a) **Option 1:** *Malus* plants to be held for a minimum period of two growing seasons at an offshore facility, followed by a minimum of six months active continuous growth in Level 2 PEQ in New Zealand.

i) During the two growing seasons at an offshore facility plants will be tested for some, but not all, viruses and virus-like pests (the exact testing done will differ between facilities). They will also be subjected to the generic risk management measures described in paragraph (29). Plants will be actively growing for one growth cycle in each growing season at the offshore facility, and will undergo a period of winter dormancy in between growing seasons. Under this option, dormant cuttings are expected to be available for export to New Zealand at the end of the second season in the offshore facility. Based on this, the risk associated with these plants will be lower than that of plants from non-approved sources. However, risk may be higher than for plants exported from MPI-approved offshore facilities under the current IHS, where plants are held for a minimum of three years at each offshore facility prior to export;

ii) MPI's judgement is that, if plants are held in an offshore facility for two growing seasons, and then for a further 6 months active continuous growth in a Level 2 PEQ facility, this will achieve a similar level of protection to that intended to be achieved before the requirement for woody indexing was added to the *Malus* schedule in 2012. It is also expected to provide a similar level of protection as is achieved when importing plants from non-approved sources into a Level 3B facility for a period of 24 months (as described below).

It is noted that, even before the *Malus* schedule was updated in 2012 to make the requirement for woody indexing mandatory, each offshore facility approved to export *Malus* plants to New Zealand was required to complete woody indexing prior to export. Depending on the facility, the agreement with MPI specified that plants had to be held at the offshore facility for a minimum of either two, or three, growing seasons prior to export.

iii) Main considerations when proposing the above requirements are that plants are likely to be free from most viruses and virus-like pests (because there will be some offshore risk management of these pests prior to export). However, there is a higher likelihood of bacteria, fungi and oomycetes being present than under the existing standard. This is because plants will have been held in containment for less time than under the current *Malus* schedule, and no specific risk management activities are applied for these bacteria, fungi and oomycetes. Because of this, it is considered prudent to clearly specify the duration for which plants must be held and inspected in the offshore facility before they can be exported to New Zealand, in order to maximise the likelihood of detecting symptoms of these types of pest.

As noted elsewhere, another key consideration here is the need to maintain the same level of protection for bacteria, fungi and oomycetes as has previously been established under the current *Malus* schedule, given that risk management measures for these pests should not be reconsidered without a risk analysis of those classes of pest.

b) **Option 2:** *Malus* plants at each offshore facility to be held for a minimum period of one growing season for screening and testing, followed by a minimum period of 12 months growth in Level 3A PEQ in New Zealand. This 12 month period must include at least one period of continuous active growth for a minimum of six months.

i) During the single growing season offshore, the same testing and generic risk management activities described in paragraph (29) will be undertaken. Once plants enter dormancy, and after all testing agreed on between MPI and the relevant offshore facility has been completed, plants will become eligible for export to New Zealand without any further testing or inspection. Under this option, dormant plant material is expected to become available for export to New Zealand at the completion of the first growing season in the offshore facility.

ii) Because plants will spend less time in an offshore facility, residual biosecurity risk will be higher than under the existing *Malus* schedule, and also higher than under Option 1 described above (because there will have been a much shorter period of time during which plants are inspected for disease symptoms, and less time for infected plants to display symptoms of disease). As such, regulated pests that may not be able to be contained within a Level 2 PEQ facility (for example including spore- or water-borne pests) are considered more likely to be present under this option. However, risk associated with these plants will be less than when plants are imported from a non-approved source. Taking this into account, it is proposed that under this option plants should be imported into a Level 3A PEQ facility (as it has greater capacity to contain spore and water borne pests) and held for a minimum of 12 months (including a six month period of active continuous growth) before they can be considered for biosecurity clearance. This will enable risk from pests with no specific risk management prior to export to be managed by growing season inspection, and is expected to provide a suitable level of physical and operational containment to minimise the likelihood of these types of pest escaping from the facility if they are present.

iii) Although risk will be less than when plants are imported from a non-approved source, it is recognised that sporulating organisms such as fungi (which may not be contained within a Level 3A greenhouse based solely on the physical requirements for this level of facility) could still be present. As such, the following operational measures are proposed to help manage this risk in Level 3A PEQ:

- Contingency plans must be developed to help contain any spore borne disease organisms within the facility if disease symptoms are observed; and

- Overhead irrigation will be prohibited, to minimise the chance of fungal spore dispersal and escape from the facility;
- These measures are the same as those determined for other commodities imported into Level 3A PEQ (including *Prunus* and *Vaccinium*).

In contrast, risk from any waterborne pests will be managed by the physical containment requirements of a Level 3A facility, given that all wastewater must be treated before discharge from the facility.

iv) The proposal to include an option to hold plants in a Level 3A facility is not seen as increasing the level of protection required for *Malus* plants for planting from MPI-approved offshore facilities (as noted elsewhere, any reassessment of the level of protection is beyond the scope of this project). Instead it is seen as providing an alternative import pathway that will achieve a similar level of protection to option one. This option may be beneficial to importers because plants will be able to be imported into New Zealand sooner than under option 1, and held for a longer period in PEQ in New Zealand. This would give importers more opportunity to multiply plant material during the quarantine period, before plants receive a biosecurity clearance. This may be beneficial in that it could allow importers to release more material at the completion of post entry quarantine, and hence allow more rapid multiplication of new varieties. Importing plants into a Level 3A facility will also allow importers to more reliably control environmental conditions, which may help to optimise plant growth, and therefore minimise the total amount of time plants spend in PEQ.

(32) Both of the above options are expected to provide a level of protection similar to that achieved under the *Malus* schedule before the requirement of woody indexing became compulsory in 2012, and similar to that for plants from non-approved sources (as described below).

(33) The proposed approach for offshore risk management is also consistent with the key principal of ensuring that, when plants are obtained from an MPI-approved offshore facility, risk is managed to the same level as when the entire quarantine process is undertaken in New Zealand (i.e. the combination of offshore and onshore risk management for plants from MPI-approved offshore facilities will achieve the same biosecurity outcome as when risk is managed onshore, in Level 3B post entry quarantine, with all testing and growing season inspections done in New Zealand).

Existing requirement for continuous active growth

(34) It is noted that during a pre-consultation meeting with industry members on 10 September 2020, stakeholders commented on the existing requirement for *Malus* plants from MPI-approved offshore facilities to undergo six months of "active *continuous* growth" in Level 2 PEQ.

(35) MPI's understanding is that the requirement for continuous active growth is stipulated as a requirement in this schedule so that, when plants are obtained from an MPI-approved offshore facility, the period of observation and growing season inspection in New Zealand can encompass an entire season of growth (i.e. growth during spring, summer and late-summer/autumn). This is considered necessary in order to maximise the chances of detecting pest symptoms that may be most evident late in the growing season. As such, we do not consider it appropriate to remove this requirement without undertaking additional analysis work.

a) In the absence of this requirement, it is likely that plants would become eligible for clearance without late-summer/autumn growth being observed in New Zealand. This is because imported plants are expected to only grow for around 2 months in their first season in post entry quarantine in New Zealand before entering dormancy. In the absence of the requirement for continuous active growth, when growth resumes in the second growing season, plants could then be considered for release after 4 months growth in the second growing season, and before late-summer/autumn growth became evident. That is

considered to provide ineffective risk management because pests that induce symptoms late in the growing season would not be detectable.

Requirements for plants from non-approved sources

(36) *Malus* plants for planting can be obtained from non-approved sources in any country as per Part 3.2 of the *Malus* schedule in the draft standard.

(37) For plants from non-approved sources, it is proposed that the minimum quarantine period is reduced from 36 months growth in a Level 3B greenhouse to 24 months growth in a Level 3B greenhouse. This is the minimum amount of time that will be needed to screen plants for regulated pests, it is consistent with the minimum PEQ requirements established in the previous version of the *Malus* IHS before woody indexing became mandatory in 2012. A level 3B facility is expected to reliably contain any pests that may be associated with imported *Malus* plant material.

(38) Removing the requirement for woody indexing may increase the feasibility of importing from non-approved sources by reducing costs. Furthermore, at present, the only Level 3B facility in New Zealand (operated by MPI) does not have the capacity to do woody indexing, meaning that import from non-approved sources is not feasible under the existing *Malus* schedule.

Implications of reducing the period of post entry quarantine.

(39) The 2012 risk analysis concluded that, for regulated phytoplasmas, viroids and viruses listed in the *Malus* schedule, growing season inspection was unlikely to be an effective phytosanitary measure. This is because all of these pests can remain latent or symptomless in *Malus*. As such, the proposed reduction in the length of the quarantine period is not considered to reduce the likelihood of detecting these pests if they are present in imported plant material as these are managed through diagnostic testing (PCR and/or herbaceous indexing).

(40) With regards to the likelihood of detecting DouA it is possible that, if these diseases are retained as regulated pests, the likelihood of detection in PEQ will be lower. However, taking into account the risk profile of all 19 DouA listed in the *Malus* schedule, and the uncertainty around whether growing season inspection is an effective measure for all of these pests (as outlined in the 2012 risk analysis), a period of 24 months in quarantine is considered more commensurate with the risk than the previously established period of 36 months.

(41) As discussed elsewhere, implications of reducing the quarantine period have not been considered for bacteria, fungi and oomycetes; this is because the level of protection for these remains the same as that established under the previous version of the *Malus* schedule.

(42) Any consignments currently held in post entry quarantine will need to comply with the requirements of the import health standard at the time a biosecurity clearance is issued. This means that any consignments currently held in post entry quarantine that become due for clearance prior to the standard being amended will need to meet existing requirements for woody indexing. If a consignment currently in post entry quarantine is cleared after the standard is amended, the requirements of the new version of the standard will apply.

Appendix 1

Proposed changes in RED

Malus

Note: The entry conditions in this schedule only apply to species in the Plants Biosecurity Index listed under Import Specifications for Nursery Stock as "see 155.02.06 under *Malus*", and are additional to those specified in sections 1, 2 and 3 of the import health standard.

1. Type of *Malus* nursery stock approved for entry into New Zealand

Cuttings (dormant); plants in tissue culture

Malus can be imported into Level 2 post entry quarantine from MPI-approved facilities, or into Level 3B post entry quarantine from non-approved facilities.

2. Pests of *Malus*

Refer to the pest list.

3. Entry conditions for:

3.1 *Malus* cuttings and tissue culture from offshore MPI-approved facilities in any country

An offshore approved facility is a facility that has been approved to the Standard PIT.OS.TRA.ACPQF to undertake phytosanitary activities. For *Malus*, the approved facility operator must also have an agreement with MPI on the phytosanitary measures to be undertaken for *Malus*. Refer to the "Inspection, Testing and Treatment Requirements for *Malus*".

(i) *Documentation*

Phytosanitary certificate: a completed phytosanitary certificate issued by the NPPO of the exporting country must accompany all *Malus* nursery stock exported to New Zealand.
Import permit: an import permit is required.

(ii) *Phytosanitary requirements*

Before a phytosanitary certificate is issued, the NPPO of the exporting country must be satisfied that the following activities required by MPI have been undertaken.

The *Malus* cuttings / plants in tissue culture [choose ONE option] have been:

- inspected in accordance with appropriate official procedures and found to be free of any visually detectable regulated pests.

AND

- treated for regulated insects and mites as described in section 2.2.1.6 of the basic conditions within 7 days prior to shipment [cuttings only].

AND

- held and tested for/classified free from specified regulated pests as required in the agreement between MPI and the [name of the MPI-approved facility].

AND

- held in a manner to ensure that infestation/reinfestation does not occur following inspection and testing at the approved facility, and certification.

(iii) *Additional declarations to the phytosanitary certificate*

If satisfied that the pre-shipment activities have been undertaken, the exporting country NPPO must confirm this by recording the treatments applied in the "Disinfestation and/or Disinfection Treatment" section [cuttings only] and by providing the following additional declarations to the phytosanitary certificate:

"The *Malus* cuttings / plants in tissue culture [choose ONE option] have been:

- held and tested for/classified free from specified regulated pests as required in the agreement between MPI and the [name of the MPI-approved facility].

AND

- held in a manner to ensure infestation/reinfestation does not occur following inspection and testing at the approved facility, and certification."

(iv) *Post-entry quarantine*

PEQ: All *Malus* nursery stock must be imported under permit into post-entry quarantine in a Level 2 or Level 3A greenhouse facility approved to the Facility Standard: Post Entry Quarantine for Plants (PEQ.STD).

Quarantine Period and Inspection, Testing and Treatment Requirements: The nursery stock will be grown:

(i) for a minimum period of six months (active continuous growth) in a Level 2 post-entry quarantine greenhouse, following a minimum period of two growing seasons in an offshore MPI-approved facility. Plants will be inspected, treated and/or audit-tested for regulated pests, at the expense of the importer.

OR

(ii) for a minimum period of 12 months (including at least one period of six months active continuous growth) in a Level 3A post-entry quarantine greenhouse, following a minimum period of one growing season in an offshore MPI-approved facility. Plants will be inspected, treated and/or audit-tested for regulated pests, at the expense of the importer.

- Requirements at the level 3A quarantine facility:
    - Plants must be irrigated using a method which prevents water coming into contact with plant foliage (such as drip irrigation). Overhead irrigation must not be used.
    - Contingency plans must be developed to identify actions that will be taken to contain the propagules of any fungal or oomycete disease organisms in the event of disease symptoms becoming evident during the quarantine period. These plans must be recorded in the facility operating manual.

For tissue cultures, the post-entry quarantine period begins when tissue cultures are deflasked into the PEQ greenhouse. The total quarantine period in New Zealand is an indicative minimum quarantine period and this period may be extended if material is slow growing, pests are detected, or treatments/testing are required.

Guidance
The import permit will identify the length of the quarantine period and level of post-entry quarantine for plants imported from an offshore MPI-approved facility. This will depend on how long plants are held at the offshore facility before they are exported to New Zealand, as follows:

- If plants are held at the offshore facility for a minimum of two growing seasons prior to export, the minimum quarantine requirements will be six months active continuous growth in a Level 2 post-entry quarantine facility.
- If plants are held at the offshore facility for a minimum of one growing season prior to export, the minimum quarantine requirements will be 12 months (including at least one period of six months active continuous growth) in a Level 3A post-entry quarantine facility.

3.2 *Malus* cuttings and tissue culture from non-approved facilities in any country

(i) *Documentation*
Phytosanitary certificate: a completed phytosanitary certificate issued by the NPPO of the exporting country must accompany all *Malus* nursery stock exported to New Zealand.
Import permit: an import permit is required.

(ii) *Phytosanitary requirements*
Before a phytosanitary certificate is issued, the NPPO of the exporting country must be satisfied that the following activities required by MPI have been undertaken.

The *Malus* cuttings / plants in tissue culture [choose ONE option] have been:

- inspected in accordance with appropriate official procedures and found to be free of any visually detectable regulated pests.

AND

- treated for regulated insects and mites as described in section 2.2.1.6 of the basic conditions within 7 days prior to shipment [cuttings only].

AND

- held in a manner to ensure that infestation/reinfestation does not occur following certification.

(iii) *Additional declarations to the phytosanitary certificate*
If satisfied that the pre-shipment activities have been undertaken, the exporting country NPPO must confirm this by recording the treatments applied in the "Disinfestation and/or Disinfection Treatment" section [cuttings only]. No additional declarations are required.

(iv) *Post-entry quarantine*
PEQ: All *Malus* nursery stock must be imported under permit into post-entry quarantine in a Level 3B greenhouse facility approved to the Facility Standard: Post Entry Quarantine for Plants (PEQ.STD).

Quarantine Period and Inspection, Testing and Treatment Requirements: The nursery stock will be grown for a minimum period of 24 months in a post-entry quarantine greenhouse. For tissue cultures, the quarantine period begins when tissue cultures are deflasked into the PEQ greenhouse. During this time, imported material will be inspected, treated and/or tested for regulated pests as specified in the "Inspection, Testing and Treatment Requirements for *Malus*", at the expense of the importer. These times are indicative minimum quarantine periods and may be extended if material is slow growing, pests are detected, or treatments/testing are required.

Pest List for *Malus*

For organisms intercepted that are not listed within this pest list refer to the Biosecurity Organisms Register for Imported Commodities to determine regulatory status.

REGULATED PESTS (actionable)

Insect	
Insecta	
Coleoptera	
Attelabidae	
Rhynchites caeruleus	apple twig cutter
Bostrichidae	
Amphicerus bicaudatus	apple twig borer
Apate monachus	black borer
Buprestidae	
Agrilus mali	apple wood borer
Agrilus spp.	bark borers
Chrysobothris femorata	flatheaded apple tree borer
Chrysobothris mali	Pacific flatheaded borer
Chrysobothris spp.	flat-headed borers
Sphenoptera lafertei	flatheaded peach tree borer
Cerambycidae	
Aeolesthes sarta	Quetta borer
Apriona germarii	mulberry longicorn beetle
Apriona japonica	mulberry borer
Bacchisa fortunei	pear borer
Batocera rufomaculata	red-spotted longhorn beetle
Phryneta spinator	
Curculionidae	
Anthonomus piri	apple bud weevil
Eremnus atratus	black weevil
Eremnus cerealis	western province grain worm
Eremnus setulosus	grey weevil
Scolytidae	
Hypothenemus obscurus	apple twig borer
Scolytus japonicus	Japanese bark beetle
Scolytus rugulosus	fruit bark borer
Diptera	
Cecidomyiidae	
Resseliella oculiperda	red bud borer
Thomasiniana oculiperda	red bud borer
Hormptera	
Aphididae	
Aphis spiraecola	spiraea aphid
Diaspididae	
Chrysomphalus aonidum	Florida red scale
Chrysomphalus dictyospermi	Spanish red scale
Diaspidiotus africanus	grey scale
Lepidoptera	
Cossidae	
Coryphodema tristis	quince trunk borer
Gelechiidae	
Recurvaria syrictis	bud moth
Gracillariidae	
Marmara elotella	apple barkminer
Marmara pomonella	apple fruitminer
Oecophoridae	
Cryptophasa melanostigma	fruit tree borer
Pyralidae	
Euzophera semifuneralis	American plum borer

Ostrinia nubilalis	European corn borer
Sesiidae	
Thamnosphecia pyri	apple bark borer
Synanthedon scitula	pecan tree borer
Mite	
Arachnida	
Acarina	
Eriophyidae	
Aculops malus	eriophyid mite
Eriophyes mali	Willamette spider mite
Phyllocoptes mali	eriophyid mite
Cenopalpus chitraliensis	bryobia mite
Cenopalpus haqii	banana mite
Cenopalpus orakiensis	Bailey's apple rust mite
Cenopalpus pulcher	flat scarlet mite
Tenuipalpidae	
Brevipalpus lilium	false spider mite
Brevipalpus obovatus	privet mite
Tenuipalpus taonicus	Pacific mite
Rhinotergum schestovici	mite
Tetranychidae	
Eotetranychus carpini	false spider mite
Eotetranychus uncatus	Lewis spider mite
Eotetranychus willamettei	hazel mite
Oligonychus gossypii	tetranychid mite
Oligonychus newcomeri	spider mite
Oligonychus yothersi	avocado red mite
Tetranychus canadensis	four spotted spider mite
Tetranychus kanzawai	Kanzawa spider mite
Tetranychus mcdanieli	McDaniel spider mite
Tetranychus schoenei	Schoenei spider mite
Amphitetranychus viennensis	hawthorn spider mite
Tydeidae	
Tydeus spp.	tydeid mites
Fungus	
Ascomycota: Ascomycetes	
Diaporthales	
Valsaceae	
Diaporthe tanakae (anamorph Phomopsis tanakae)	pear canker
Leucostoma auerswaldii	leucostoma canker
Diatrypales	
Diatrypaceae	
Eutypella sorbi	stem disease
Dothideales	
Mycosphaerellaceae	
Mycosphaerella pyri (anamorph Septoria pyricola)	leaf fleck of pear
Mycosphaerella tulasnei	rot
Schizothyriaceae	
Schizothyrium perexiguum	greasy blotch
Erysiphales	
Erysiphaceae	
Pleochaeta mali	powdery mildew
Heotiales	
Dermateaceae	
Diplocarpon mali	black spot
Pezicula perennans	perennial canker
Sclerotiniaceae	
Grovesinia pyramidalis (anamorph Cristulariella moricola)	target spot
Monilinia laxa f. sp. *mali*	brown rot
Monilinia mali	monilinia leaf blight
Monilinia fructigena (anamorph Monilia fructigena)	European brown rot
Sclerotinia spp.	neck rot
Rhytismatales	

Cryptomycetaceae	
Potebniamyces pyri (anamorph *Phacidiopycnis piri*)	Phacidiopycnis rot
Sordariales	
Chaetomiaceae	
Chaetomium spp.	fruit rot
Taphrinales	
Taphrinaceae	
Taphrina bullata	leaf blister
Xylariales	
Xylariaceae	
Biscogniauxia marginata	nailhead canker
Daldinia vernicosa	wood rot
Xylaria mali	black root rot
Ascomycota: Saccharomycetes	
Saccharomycetales	
Endomycetaceae	
Endomycopsis mali	rot
Basidiomycota: Basidiomycetes	
Agaricales	
Coprinaceae	
Coprinus psychromorbidus	coprinus rot
Tricholomataceae	
Armillaria mellea	armillaria root rot
Armillaria ostoyae	armillaria root rot
Armillaria tabescens	armillaria root rot
Ceratobasidiales	
Ceratobasidiaceae	
Ceratobasidium stevensii	thread blight
Ganodermatales	
Ganodermataceae	
Ganoderma lucidum	wood rot
Hymenochaetales	
Hymenochaetaceae	
Phellinus pomaceus	white heart rot
Lachnocladiales	
Lachnocladiaceae	
Scytinostroma galactinum	white root rot
Polyporales	
Corticiaceae	
Corticium koleroga	thread blight
Cyphellaceae	
Maireina marginata	wood decay
Meripilaceae	
Phlebia radiata	wood decay
Trametes ochracea	wood decay
Poriales	
Coriolaceae	
Ceriporia spissa	wood rot
Coriolopsis gallica	white rot
Fomes fomentarius	wood decay
Fomitopsis pinicola	brown cubical rot
Laetiporus sulphureus (anamorph *Sporotrichum versisporum*)	brown cubical rot
Lenzites betulina	wood decay
Oxyporus latemarginatus	wood decay
Oxyporus similis	wood decay
Stereales	
Atheliaceae	
Butlerelfia eustacei	storage rot
Sistotremataceae	
Phymatotrichopsis omnivorum	Texas root rot
Basidiomycota: Urediniomycetes	
Uredinales	
Pucciniaceae	

Gymnosporangium clavipes	quince rust
Gymnosporangium cornutum	rust
Gymnosporangium fuscum	European pear rust
Gymnosporangium globosum	American hawthorn rust
Gymnosporangium hemisphaericum	rust
Gymnosporangium libocedri	Pacific Coast pear rust
Gymnosporangium nelsonii	Rocky Mountain pear rust
Gymnosporangium nidus-avis	rust
Gymnosporangium nootkatense	yellow cypress rust
Gymnosporangium shiraianum	rust
Gymnosporangium spp.	cedar apple rust
Gymnosporangium tremelloides	common juniper gall rust
Gymnosporangium yamadae	Japanese apple rust
Gymnosporangium juniperi-virginianae	cedar apple rust
Unknown Uredinales	
Roestelia fenzeliana	rust
Roestelia levis	rust
Basidiomycota: Ustomycetes	
Platygloeales	
Platygloeaceae	
Helicobasidium mompa	violet root rot
Mitosporic Fungi (Coelomycetes)	
Sphaeropsidales	
Sphaerioidaceae	
Cytospora schulzeri	bark disease
Dothiorella mali	fruit rot
Phomopsis truncicola	blight
Phyllosticta solitaria	apple blotch
Phyllosticta spp.	leaf spot
Pyrenochaeta mali	fruit rot
Sphaeropsis pyriputrescens	Sphaeropsis rot
Mitosporic Fungi (Hyphomycetes)	
Hyphomycetales	
Dematiaceae	
Alternaria mali	alternaria blotch
Alternaria spp.	
Helminthosporium papulosum	black pox
Cladosporium spp.	mouldy core
Epicoccum spp.	mouldy core
Stemphylium spp.	
Ulocladium spp.	cladosporium rot
Moniliaceae	
Aspergillus spp.	coloured moulds
Botrytis mali	fruit rot
Cephalosporium carpogenum	fruit rot
Cephalosporium spp.	
Penicillium spp.	rot
Ramularia macrospora	bellflower leaf spot
Verticillium spp.	verticillium wilt
Tuberculariales	
Tuberculariaceae	
Fusarium spp.	
Unknown Hyphomycetes	
-	
Oidium spp.	powdery mildew
Oomycota: Oomycete	
Peronosporales	
Peronosporaceae	
Phytophthora capsici	fruit rot of peppers
Phytophthora palmivora	black rot
Bacterium	
Schizomycetes	
Pseudomonadales	

	Pseudomonadaceae	
	Pseudomonas syringae pv. *papulans*	blister spot
Virus		
	Cherry rasp leaf virus	
+	*Tomato bushy stunt virus*	
	Tomato ringspot virus	
Viroid		
	Apple dimple fruit viroid	
	Apple fruit crinkle viroid	
	Apple scar skin viroid	
Phytoplasma		
	'*Candidatus* Phytoplasma asteris'	Apple sessile leaf phytoplasma
	'*Candidatus* Phytoplasma mali'	Apple proliferation phytoplasma
Disease of unknown etiology (may be removed from this table depending on the outcome of this consultation)		
	Apple blister bark agent	
	Apple brown ringspot agent	
	Apple bumpy fruit agent	
	Apple bunchy top agent	
	Apple dead spur agent	
	Apple decline	
	Apple freckle scurf agent	
	Apple green dimple and ring blotch agent	
	Apple junction necrotic pitting agent	
	Apple McIntosh depression agent	
	Apple narrow leaf agent	
	Apple Newton wrinkle agent	
	Apple pustule canker agent	
	Apple red ring agent	
	Apple rosette agent	
	Apple rough skin agent	
	Apple russet wart agent	
	Apple star crack agent	
	Apple transmissible internal bark necrosis agent	

Inspection, Testing and Treatment Requirements for *Malus*

ORGANISM TYPES	MPI-ACCEPTABLE METHODS	
Insects	Visual inspection **AND** approved insecticide treatments as described in section 2.2.1.6 of the Basic conditions [cuttings only]	
Mites	Visual inspection **AND** approved miticide treatments as described in the section 2.2.1.6 of the Basic conditions [cuttings only] **or** binocular microscope inspection in PEQ [plants in tissue culture only]	
Fungi	All cuttings must be dipped in 1% sodium hypochlorite for 2 minutes upon arrival in the post entry quarantine facility. Growing season inspection in PEQ for symptom expression	
Oomycete	All cuttings must be dipped in 1% sodium hypochlorite for 2 minutes upon arrival in the post entry quarantine facility. Growing season inspection in PEQ for symptom expression	
Bacteria		
Pseudomonas syringae pv. *papulans*	All cuttings must be dipped in 1% sodium hypochlorite for 2 minutes upon arrival in the post entry quarantine facility. Growing season inspection for symptom expression **AND** PCR	
Viruses		
Cherry rasp leaf virus	Herbaceous indexing (*Chenopodium quinoa* and *Chenopodium amaranticolor*) **AND** PCR	
Tomato bushy stunt virus	Herbaceous indexing (*Chenopodium quinoa* and *Chenopodium amaranticolor*)	
Tomato ringspot virus	Herbaceous indexing (*Chenopodium quinoa* and *Chenopodium amaranticolor*) **AND** ELISA **or** PCR	
Viroids		
Apple dimple fruit viroid	PCR	
Apple fruit crinkle viroid	PCR	
Apple scar skin viroid	PCR	
Phytoplasmas		
'*Candidatus* Phytoplasma asteris' (Apple sessile leaf phytoplasma)	Nested PCR or real time PCR using universal phytoplasma primers	
'*Candidatus* Phytoplasma mali' (Apple proliferation phytoplasma)	Nested PCR or real time PCR using universal phytoplasma primers	
Diseases of unknown aetiology	One of the following options, depending on the outcome of this consultation	
Apple blister bark agent	Growing season inspection	Deregulation
Apple brown ringspot agent	Growing season inspection	Deregulation
Apple bumpy fruit agent	Growing season inspection	Deregulation
Apple bunchy top agent	Growing season inspection	Deregulation
Apple dead spur agent	Growing season inspection	Deregulation
Apple decline	Growing season inspection	Deregulation
Apple freckle scurf agent	Growing season inspection	Deregulation
Apple green dimple and ring blotch agent	Growing season inspection	Deregulation
Apple junction necrotic pitting agent	Growing season inspection	Deregulation
Apple McIntosh depression agent	Growing season inspection	Deregulation
Apple narrow leaf agent	Growing season inspection	Deregulation
Apple Newton wrinkle agent	Growing season inspection	Deregulation
Apple pustule canker agent	Growing season inspection	Deregulation
Apple red ring agent	Growing season inspection	Deregulation
Apple rosette agent	Growing season inspection	Deregulation
Apple rough skin agent	Growing season inspection	Deregulation
Apple russet wart agent	Growing season inspection	Deregulation
Apple star crack agent	Growing season inspection	Deregulation

Apple transmissible internal bark necrosis agent	Growing season inspection	Deregulation

Notes:

1. **Pest free area or Pest free place of production** endorsements for regulated viruses, viroids, phytoplasmas, and diseases of unknown etiology must be assessed by MPI prior to permit issue. The exporting NPPO must endorse additional declarations on the phytosanitary certificate, to be considered equivalent to testing in post entry quarantine.
2. The **unit for testing** is defined in section 2.3.2.1.
3. **Tissue culture plantlets** must be deflasked and grown in a post entry quarantine greenhouse, only material from the greenhouse is to be selected for testing.
4. **Growing season** is defined as an extended period of plant growth that includes environmental conditions equivalent to spring (longer wetter days and colder temperatures), summer (longer dryer days and warm temperatures), and autumn (shorter wetter days and warm but cooling temperatures).
5. **Virus testing** is to be conducted on new spring growth.
6. **Phytoplasma and bacteria testing** is to be conducted at the end of the summer growth period.
7. **Herbaceous indicator hosts:** *Chenopodium quinoa* and *Chenopodium amaranticolor*. Two plants of each herbaceous indicator species must be used in each test. Herbaceous indicator plants must be grown at 18-25°C before and after inoculation and must be shaded for 24 hrs prior to inoculation. Maintain post-inoculated indicator species under appropriate glasshouse conditions for at least 4 weeks. Inspect inoculated indicator plants at least twice per week for symptoms of virus infection.
8. **Testing protocols** for tests completed in New Zealand are described in the *Malus* (Apple) Post-Entry Quarantine Testing Manual, which can be viewed on the website:

   http://www.mpi.govt.nz/protection-and-response/laboratories/plant-health-and-environment-laboratory/publications/
9. **Inspection** of the *Malus* plants by the operator of the PEQ facility for signs of pest and disease must be at least twice per week for the first three months of active growth, and during spring and autumn. All other times of active growth (summer), plants should be inspected once per week. A record of inspections carried out by the Operator is to be kept and made available to the MPI Inspector on request.
10. **Other internationally recognised testing methods** may be accepted by MPI with prior notification.