Ministry for Primary Industries
Manatū Ahu Matua

Risk Management Proposal:

Proposed phytosanitary measures for the management of pospiviroids on the importation of seeds for sowing and plants for planting

FOR PUBLIC CONSULTATION

2 March 2020

New Zealand Government

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Submissions

The Ministry for Primary Industries (MPI) invites comments from interested parties on the proposed changes to:

a) the Import Health Standard (IHS) 155.02.05: *Seeds for sowing*, and measures for the importation of *Petunia* sp. and *Solanum lycopersicum*; and

b) the IHS 155.02.06: *Importation of Nursery Stock*, and measures for the importation of *Brunfelsia undulata*, *Calibrachoa spp.*, *Cestrum* sp., *Gloxinia gymnostroma*, *Nematanthus wettsteinii*, *Petunia* sp., *Pittosporum tobira*, *Verbena* sp., and *Vinca minor*.

The proposed changes aim to manage the biosecurity risks associated with:

- *Columnea latent viroid* (CLVd);
- *Tomato apical stunt viroid* (TASVd);
- *Tomato chlorotic dwarf viroid* (TCDVd); and
- *Tomato planta macho viroid* (TPMVd).

The proposed measures to manage these pospiviroids are:

a) "Pest Free Area" declaration, **or**
b) "Pest Free Place of Production" declaration, **or**
c) seed/plant testing

These measures will provide an appropriate level of protection and assurances that imported seeds for sowing and plants for planting are free from CLVd, TASVd, TCDVd, and TPMVd, while allowing importers to continue to import these viroids' host plants from countries where the viroids are known to occur.

An IHS "specifies requirements to be met for the effective management of risks associated with importing risk goods, including risks arising because importing the goods involves or might involve an incidentally imported new organism" (section 22(1) Biosecurity Act 1993).

The following points may be of assistance in preparing comments:

- Wherever possible, comments should be specific to a particular change in IHS requirements or a question asked in this document (referencing section numbers or commodity names as applicable).
- 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.

Please send submissions to: PlantImports@mpi.govt.nz

However, should you wish to forward submissions in writing, please send them to the following address to arrive by close of business on 2 April 2020:

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Ministry for Primary Industries
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Wellington 6140
New Zealand

Submissions received by the closure date will be considered during the development of the final IHS. Submissions received after the closure date may be held on file for consideration when the issued IHS is next revised/ reviewed.

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Purpose

1. The purpose of this Risk Management Proposal (RMP) is to:
   - Summarise the known biosecurity risks associated with the pospiviroids:
     - *Columnea latent viroid* (CLVd);
     - *Tomato apical stunt viroid* (TASVd);
     - *Tomato chlorotic dwarf viroid* (TCDVd); and
     - *Tomato planta macho viroid* (TPMVd).
   - Propose the phytosanitary measures to manage those risks on the seed for sowing and plants for planting pathways.

2. This RMP provides information to support the consultation on the draft amendment to the two Import Health Standards (IHSs), under section 23(3) of the Biosecurity Act (1993).The RMP is not itself the subject of consultation. However, the Ministry for Primary Industries (MPI) will accept comments and suggestions on the RMP in order to improve future IHS consultations.

Background

3. Seeds for sowing and plants for planting are two pathways that are currently unmanaged for four pospiviroids (a genus of viroids) identified through MPI's Emerging Risks System: *Columnea latent viroid* (CLVd), *Tomato apical stunt viroid* (TASVd), *Tomato chlorotic dwarf viroid* (TCDVd), and *Tomato planta macho viroid* (TPMVd).

4. Pospiviroids have a circular, single-stranded, ribonucleic acid (RNA) of 360 to 363 nucleotides depending on the strain that can infect plant cells, replicate themselves, and cause disease. They lack capsid protein and detectable messenger RNA activity (MPI, 2012).

5. Pospiviroids can be transmitted in four different ways: mechanically, via seed, via insect and via vegetative propagation (MPI, 2019a, b). There are reports of TASVd and TCDVd being spread by bumblebees in glasshouse. The exact mode of transmission is unknown, but the bee-viroid interaction appears to be non-specific. Therefore, there is potential for other pospiviroids to be transmitted by bumblebees within and between crops in infected pollen (MPI, 2019b).

6. These viroids primarily affect tomato plants (*Solanum lycopersicum*), but they can also be naturally found in other host plants (MPI, 2012; MPI, 2019a, b).

7. Overseas, infection of tomato crops with pospiviroids have caused considerable economic losses, ranging from reduced crop yield to total crop losses (MPI, 2012; MPI, 2019b).

8. In New Zealand, tomato plants are grown commercially and by home gardeners, both in glasshouses and outdoors. Overseas, pospiviroids have caused disease outbreaks in tomato crops grown in glasshouses with similar conditions to those grown in New Zealand (MPI, 2019b).

9. Pospiviroids are not known to cause visible symptoms on infected or contaminated seeds and ornamental plants. (MPI, 2012; MPI, 2019a, b).

10. Viroids are known for their ability to infect herbaceous and woody hosts, including many ornamentals, which act as symptomless carriers (British Columbia Ministry of Agriculture, 2018), and can be a channel for the entry and establishment of pospiviroids (EFSA, 2011).

11. According to EFSA (2011), between 1997 and 2010, a number of pospiviroids were reported by the European Union (EU) in the Europhyt database as being intercepted from ornamental plants. It is known that pospiviroids are systemically spread inside the host plant, meaning they will be present in all tissues of their hosts. Therefore, the importation of infected plants for planting, including cuttings and tissue culture of known ornamental host species, represents a distinct pathway for entry and establishment.
12. Current visual inspections at the border will not be able to detect infected plants and/or seeds, which could aid in spreading pospiviroids to other uninfected susceptible plants.
13. At present, New Zealand imports plants for planting and seeds for sowing of host species of these four viroids from countries where the viroids are known to be present, but the current import requirements do not specifically manage the biosecurity risks associated with these organisms.
14. In 2012, import requirements were put in place for CLVd, TASVd, TCDVd, and TPMVd on tomato seeds for sowing in Australia.
15. In September 2019, the United States (US) amended import requirements for tomato and pepper seeds for sowing to prevent the entry and establishment of these four viroids.
16. Similarly, in 2019 Taiwan added these pospiviroids to their Quarantine pest list.
17. In January 2020, Thailand announced phytosanitary import requirements to manage CLVd, TASVd, TCDVd, and TPMVd on tomato seeds for sowing from March 2020.

Columnea latent viroid (CLVd)

18. CLVd causes disease in tomato crops. Its other natural hosts are six ornamental plants, from which three species are currently allowed to be imported into New Zealand (i.e. listed on the Plant Biosecurity Index (PBI)): *Brunfelsia undulata*, *Nematanthus wettsteinii* and *Gloxinia gymnostroma* (MPI, 2019b).
19. Tomato plants infected with CLVd were reported to be stunted, their leaves became distorted and had a yellow or bronze colour (MPI, 2019b).
20. CLVd is not known to occur in New Zealand and is recorded as a regulated pest in BORIC (MPI, 2019b). CLVd is part of the Biosecurity New Zealand's current priority list of pest and diseases of concern to plant health, posing a serious threat to known hosts if it were to establish in New Zealand (MPI, 2019c).
21. CLVd is confirmed present in Canada, France, Ghana, Italy, Mali, the Netherlands, Portugal, Thailand, and the US. It was eradicated from Belgium and the United Kingdom (UK) (MPI, 2019b).
22. New Zealand imports tomato seeds for sowing and *G. gymnostroma* plants for planting from countries were this viroid is known to be present: France, Italy, the Netherlands, Thailand, and the US (MPI, 2019b).

Tomato apical stunt viroid (TASVd)

23. TASVd causes disease in tomato crops. It has also been known to affect the ornamental plant *Cestrum* sp., which is eligible for importation into New Zealand (MPI, 2012).
24. Symptoms in tomatoes include stunting, apical proliferation, apical leaf narrowing and yellowing, leaf crinkling, tissue brittleness, and necrosis. The fruits can be considerably reduced in size and have pale red discolouration (MPI, 2012).

25. TASVd is not known to be present in New Zealand (MPI, 2012) and, as well as CLVd, is also part of the Biosecurity New Zealand's current priority list of pest and diseases of concern to plant health (MPI, 2019c).

26. This viroid has a wide geographical distribution with records in Africa, Asia and Europe (EPPO, 2019).

27. New Zealand imports tomato seeds from countries were this viroid is present: Belgium, Israel, and the Netherlands.

Tomato chlorotic dwarf viroid (TCVd)

28. TCDVd's main host is tomato, but it is also known to naturally infect the ornamental plants *Calibrachoa* sp., *Petunia* sp., *Pittosporum tobira*, *Verbena* sp., and *Vinca minor*, all of which can be imported into New Zealand (MPI, 2012; MPI, 2019a).

29. Commercially grown tomato plants infected with TCDVd have chlorotic leaves, reduced leaf size, smaller and sometimes deformed fruit, and overall bunchiness and dwarfing. Such symptoms are likely to reduce the yield and marketability of tomato crops (MPI, 2012; MPI, 2109a).

30. TCDVd is not known to be present in New Zealand, and is recorded as a regulated pest in BORIC. There are specific measures on *Solanum lycopersicum* as seeds for sowing in the IHS 155.02.05: *Seeds for sowing* to manage the risk of introduction via this pathway.

31. This viroid is present in Czech Republic, France, India, Mexico, Slovenia, Spain, and the US. It has been eradicated from Canada and Japan (MPI, 2012; MPI, 2019a).

32. New Zealand imports ornamental host seeds for sowing and plants for planting from countries where TCDVd is known to occur: Spain, India and the US.

Tomato planta macho viroid (TPMVd)

33. TPMVd infects tomatoes. The other reported natural host of TPMVd is the wild potato species *Solanum cardiophyllum*, which is not allowed to be imported into New Zealand (MPI, 2109b).

34. Tomato plants infected with TPMVd suffer from severe stunting, discolouration and drying of old leaves and strong epinasty of leaves and leaflets. More flowers and fruits are produced compared to healthy plants, however the fruits remain small and have no marketable value (MPI, 2019b).

35. TPMVd is not known to occur in New Zealand and is listed as a regulated pest in BORIC (MPI, 2019b).

36. This viroid is present in Canada and Mexico, and tomato seeds are imported into New Zealand from both countries (MPI, 2019b).

Commodity description

37. The species identified as unmanaged hosts for CLVd, TASVd, TCDVd, and TPMVd are shown in table 1.

38. These species are eligible for importation into New Zealand from all countries under the IHS 155.02.05: *Seeds for sowing* and/or IHS 155.02.06: *Importation of Nursery Stock*, with no specific requirements to manage these viroids:

Table 1: Hosts of *Columnea latent viroid* (CLVd), *Tomato apical stunt viroid* (TASVd), *Tomato chlorotic dwarf viroid* (TCDVd), and *Tomato planta macho viroid* (TPMVd), without measures to manage these viroids.

Natural host	Unmanaged pathway	Pospiviroid
Brunfelsia undulata	plants for planting	CLVd
Gloxinia gymnostroma	plants for planting	CLVd
Nematanthus wettsteinii	plants for planting	CLVd
Solanum lycopersicum	seeds for sowing	CLVd, TPMVd, TASVd
Cestrum sp.	plants for planting	TASVd
Petunia sp.	plants for planting, seeds for sowing	TCDVd
Verbena sp.	plants for planting	TCDVd
Vinca minor	plants for planting	TCDVd
Calibrachoa sp.	plants for planting	TCDVd
Pittosporum tobira	plants for planting	TCDVd

Trade

39. Tomato is an important crop for New Zealand. In 2018, the domestic sales of tomatoes were worth $208.5 million, and the exports were worth $12.7 million (FreshFacts, 2018).

40. *Petunias* are one of the most common garden plants found throughout New Zealand, and are popularly used as potted colour, garden bedding plants and in ornamental hanging baskets. Industry estimates nursery production supply chains to be grossed at $15-20 million across both vegetative and seed varieties (MPI, 2017).

41. Hosts of these four pospiviroids are currently imported into New Zealand as plants for planting and/or seeds for sowing from countries where the viroids are known to be present. Table 2 shows imports into New Zealand of the known pospiviroid hosts as plants for planting and seeds for sowing between 2016 and 2019:

Table 2: Imports into New Zealand of known hosts of *Columnea latent viroid* (CLVd), *Tomato apical stunt viroid* (TASVd), *Tomato chlorotic dwarf viroid* (TCDVd), and *Tomato planta macho viroid* (TPMVd) between 2016 and 2019.

Natural host	**Unmanaged pathway**	**Pospiviroid**	**Total number of exporting countries (2016-2019)**	**Name of the country (ies) of export** (Countries in bold have one of the pospiviroid)	**Total number of imports (2016-2019)**	**Last importation**
Brunfelsia undulata	plants for planting	CLVd	No recorded imports			
Calibrachoa sp.	plants for planting	TCDVd	7	Australia, Germany, Japan, Netherlands, Poland, **Spain**, **United States**	51	2019
Cestrum sp.	plants for planting	TASVd	No recorded imports			
Gloxinia gymnostroma	plants for planting	CLVd	-	**Netherlands**	-	2012 (2 consignments)
Nematanthus wettsteinii	plants for planting	CLVd	No recorded imports			
Petunia sp.	plants for planting,	TCDVd	8	Australia, Germany, Israel, Japan, Netherlands, Poland, **Spain**, **United States**	55	2019
	seeds for sowing	TCDVd	15	Australia, China, Germany, Guatemala, **India**, Indonesia, Israel, Japan, Kenya Netherlands, Poland, **Spain**, Sri Lanka, United Kingdom, **United States**	871 (seed lots)	2019
Pittosporum tobira	plants for planting	TCDVd	No recorded imports			
Solanum lycopersicum	seeds for sowing	CLVd, TPMVd, TASVd	27	Australia, **Belgium**, Bolivia, Brazil, **Canada**, Chile, China, **France**, Germany,	1,380 (seed lots)	2019

				Guatemala, **India**, **Israel**, **Italy**, Japan, Kenya, **Mexico**, Morocco, **Netherlands**, Peru, Serbia, **Spain**, Taiwan, Tanzania, **Thailand**, United Kingdom, **United States**, Vietnam		
Verbena sp.	plants for planting	TCDVd	5	Australia, Germany, **Spain,** United Kingdom, **United States**	24	2019
Vinca minor	plants for planting	TCDVd	-	**United States**	-	2002 (1 consignment)

Current requirements

Seeds for sowing

42. Current import requirements for hosts eligible to be imported as seeds for sowing are shown in table 3:

Table 3: Current phytosanitary requirements for the import of known ornamental hosts of the four pospiviroids as seeds for sowing.

Commodity	**Schedule**	**Phytosanitary requirements**	**Quarantine Pest (s)**
Solanum lycopersicum	*Solanum lycopersicum*	'pest free area (PFA)'; OR 'pest free place of production (PFPP)'; OR 'testing'	*Pepino mosaic virus, Potato spindle tuber viroid, Tomato brown rugose fruit virus, Tomato chlorotic dwarf viroid.*
Petunia sp.	*Petunia*	-	-

Plants for planting

43. Current import requirements for hosts eligible to be imported as plants for planting are shown in table 4:

Table 4: Current phytosanitary requirements for the import of known ornamental hosts of the four pospiviroids as plants for planting.

Commodity	Schedule	Phytosanitary requirements	Quarantine Pest (s)
Brunfelsia undulata	*Solanum*	PFA; OR PFPP; OR 'parent stock testing'	*Potato spindle tuber viroid*
Calibrachoa sp.	*Solanum*	PFA; OR PFPP; OR 'parent stock testing'	*Potato spindle tuber viroid*
Cestrum sp.	*Solanum*	PFA; OR PFPP; OR 'parent stock testing'	*Potato spindle tuber viroid*
Gloxinia gymnostroma	L2 (basic)	-	-
Nematanthus wettsteinii	L2(basic)	-	-
Petunia sp.	*Petunia*	PFA; OR PFPP; OR 'parent stock testing'	*Potato spindle tuber viroid*
		'country freedom'; OR PFA; OR PFPP	*Phytophthora palmivora*
Pittosporum tobira	*Aesculus*	PFA; OR 'an approved PFPP'	*Phytophthora ramorum*
		'country freedom'; OR PFA or PFPP AND testing in PEQ	*Xylella fastidiosa*
Verbena sp.	*Verbena*	'country freedom'; OR PFA; OR PFPP	*Phytophthora tentaculata,*
		Treated with dicofol at the rate of 0.7g a.i. per litre of water"	*Tetranychus kanzawai*
		'country freedom'	*Uredinales*
		'country freedom'; OR PFA or PFPP AND testing in PEQ	*Xylella fastidiosa*
Vinca minor	*Acacia*	'country freedom'; OR PFA or PFPP AND testing in PEQ	*Xylella fastidiosa*

Source information

44. In the development of the risk management proposal the following information was used to identify the appropriate measures to manage the entry and establishment of TCDVd, TPMVd and CLVd into New Zealand:

    a) MPI risk analyses and technical advice:
        - MPI Import Risk Analysis: Tomato and *Capsicum* seed for sowing from all countries (2012);
        - MPI Technical advice from Risk Analysis team for *Tomato chlorotic dwarf viroid (*2019);

- MPI Pest Risk Assessment: *Columnea latent viroid* and *Tomato planta macho viroid* associated with imported tomato seed for sowing and tissue culture of host plants (2019);

b) MPI's Emerging Risk System;

c) Relevant literature and database searches; and

d) Key references and sources of information and analyses from other countries for the same commodity or pests.

International setting

45. Where possible, phytosanitary measures are aligned with international standards, guidelines, and recommendations as per New Zealand's obligations under Article 3.1 of the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), WTO 1995 and section 23(4)(c) of the Biosecurity Act 1993.

46. The SPS Agreement states that phytosanitary measures must not discriminate unfairly between countries or between imported or domestically produced goods, and where there is a choice of phytosanitary measures to reduce risk to an acceptable level, WTO members must select the least trade restrictive measure.

Objective

47. MPI's objective is to ensure the known biosecurity risks associated with CLVd, TASVd, TCDVd, and TPMVd on seeds for sowing and plants for planting of the known hosts *Brunfelsia undulata*, *Calibrachoa* sp., *Cestrum* sp., *Gloxinia gymnostoma, Nematanthus wettsteinii, Petunia* sp., *Solanum lycopersicum, Pittosporum tobira, Verbena* sp., and *Vinca minor* are managed appropriately and consistently with New Zealand's domestic legislation and international obligations.

Summary of Risk

48. MPI considers risk organisms as regulated on the commodity if they are:

a) present in the exporting country and absent from New Zealand (or under official control); and

b) likely to be present on the pathway if the risk is unmitigated; or

c) known to be associated with the commodity (as per previous risk analyses); and

d) their hosts include species which are present in New Zealand; and

e) they are climatically able to establish in New Zealand; and/or

f) they are likely to cause unwanted economic impacts to New Zealand.

Columnea latent viroid (CLVd)

Likelihood of entry into New Zealand

Tomato

49. *CLVd* is highly likely to enter New Zealand on infected or contaminated tomato seeds because the viroid is known to be present in internationally traded tomato seeds, and a large numbers of tomato seeds are imported into the country, including from countries where CLVd is known to be present (MPI, 2019b). Viroids do not cause symptoms on

infected or contaminated seeds. Therefore, infected seeds are unlikely to be detected at the border (MPI, 2019b).

50. Between 2008 and 2016, Constable et al. (2019) detected CLVd in 19 lots of tomato seeds arriving in Australia using reverse-transcription PCR. The geographic distribution of CLVd reflected by the seed testing results was consistent with its known distribution, with the exception of a detection in tomato seeds sent from the Middle East (country not specified). This suggests that infection of crops may go unnoticed/unreported and that the geographic distribution may be wider than reported (MPI, 2019b).
51. Constable et al. (2019) identified low levels of viroid contamination in these seed lots. They concluded that, in such scenarios, if insufficient seed numbers are tested the viroids may not be detected, but the risk of introduction remains (MPI, 2019b).
52. In the US, between November 2018 and September 2019, shipments of tomato seeds from several countries also tested positive for CLVd, among other pospiviroids (APHIS, 2019).
53. Tomato seeds can be imported into New Zealand from all countries (IHS 155.02.05). The majority of imported tomato seeds (by volume) come from 're-exporter' countries, such as the Netherlands (MPI, 2012). Therefore, the true country of origin in some cases may not be known. Between 2008 and 2019 the greatest volume of seeds came from the Australia, China, the Netherlands, and the US (MPI, 2012; MPI, 2019b).
54. It is estimated at least 2.75 million seeds are imported per year (MPI, 2012). Therefore, even at low levels of viroid contamination, there is the potential for at least some seeds contaminated or infected with CLVd to enter New Zealand (MPI, 2019b).

Ornamental plants

55. This viroid has been reported to asymptomatically infect natural ornamental hosts. Of these, *Brunfelsia undulata*, *Gloxinia gymnostoma* and *Nematanthus wettsteinii* can be imported as plants for planting, including tissue culture, from all countries into New Zealand (IHS 155.02.06). Other reported ornamental hosts of CLVd are not permitted to be imported (MPI, 2019b).
56. CLVd may enter New Zealand via infected tissue culture of selected ornamental host plants, as the viroid is reported to asymptomatically infect ornamental species. The likelihood of entry into New Zealand through ornamental plants is low due to low trade volumes (MPI, 2019b).
57. Infected tissue culture of host ornamental plants is unlikely to be detected at the time of export or during visual inspection at the New Zealand border as no symptoms would be visible (MPI, 2019b).
58. No information was found on seed transmission of CLVd in known ornamental host plants (MPI, 2019b).

Likelihood of exposure in New Zealand

59. CLVd would be able to successfully complete its life cycle on a suitable host if it were to enter New Zealand undetected on contaminated/infected tomato or tissue culture of selected ornamental hosts (MPI, 2019b).
60. Systemically infecting plant viroids do not have to leave the import pathway to achieve exposure because successful exposure is considered to be when a contaminating organism becomes associated with a suitable host in New Zealand that allows it to complete a normal life cycle (MPI, 2019b).

61. Plants produced from imported germplasm are likely to be propagated in favourable conditions and may be multiplied. Conditions favouring plant growth favour the persistence and survival of associated pathogens (MPI, 2018). Therefore, CLVd entering on host germplasm is likely to replicate and persist in the resulting plants (MPI, 2019b).

Likelihood of establishment in New Zealand

62. CLVd is likely to be able to establish and spread in New Zealand, but it may be restricted to indoor growing sites. Disease outbreaks of the viroid have been reported in glasshouse tomato crops grown under similar conditions to New Zealand.

63. The New Zealand climate is unlikely to support overwintering of the viroid in outdoor grown plants because temperature is the key factor for viroid replication and symptom expression, with both enhanced as the temperature increases to above 20 °C to (at least) 35 °C (Hadidi et al., 2003; MPI, 2019b).

64. There are reports of other pospiviroids to be transmitted by bumblebees therefore, there is the potential for other pospiviroids, such as CLVd, to be transmitted by bumblebees within and between crops in infected/contaminated pollen. There is high uncertainty, however, due to the limited number of studies (MPI, 2019b).

65. CLVd was experimentally shown to be transmitted by artificial pollination to healthy eggplants (*Solanum melongena*) with CLVd-infected pollen. Infected seeds produced by this method then produced infected seedlings (Bhuvitarkorn and Reanwarakorn, 2019; MPI, 2019b).

Tomato

66. In New Zealand, 408 ha of commercial tomato (*Solanum lycopersicum*) crops are grown outdoors. The majority of these crops are grown in Hawke's Bay. There are also outdoor commercial production sites in Whangarei, Auckland and Christchurch (MPI, 2012). The northern regions have maximum, mean daily temperatures above 20 °C from November to January (during the tomato growing season), and Christchurch during December and January (NIWA data). Therefore, temperatures that support viroid replication and symptom development occur during the cropping season (MPI, 2019b).

67. There is uncertainty as to whether CLVd would persist outdoors over the winter as tomato crops are not grown during this time and the low temperatures do not favour viroid replication. Therefore, there is the potential for transient populations of CLVd to exist outdoors. However, the establishment of the viroid outdoors, beyond one growing season, is unlikely (MPI, 2019b).

68. CLVd is only reported from outdoor tomato plants grown in Mali and Ghana (Batuman and Gilbertson, 2013; Batuman et al., 2013). These countries have poor climate similarity to New Zealand (CMI 0.3–0.4 and CMI 0.4–0.5) (MPI, 2019b). A score of 0.7 or above is considered to represent a climate similar enough to New Zealand to support establishment.

69. In Europe there are several reports of CLVd disease occurring in glasshouse tomato crops, including in Belgium (eradicated), France, the Netherlands, and the UK (eradicated) (Sansford and Morris, 2009; Nixon et al., 2010; Steyer et al., 2010). Due to the controlled conditions and warmer temperatures within glasshouses, the viroid may establish anywhere in New Zealand where tomatoes are grown continuously in such conditions (MPI, 2019b).

70. CLVd is transmitted through tomato seeds to seedlings (Matsushita and Tsuda, 2016). Therefore, some seedlings grown from CLVd contaminated seed are likely to become infected with the viroid (MPI, 2019b).

71. Matsushita and Tsuda (2016) demonstrated seed transmission in tomato. Transmission rates in four different tested cultivars ranged between 0% and 100%. Therefore, seed transmission may be cultivar dependent (MPI, 2019b).

72. Outbreaks of CLVd in four tomato crops of the same cultivar in the UK were linked to imported contaminated seed (Sansford and Morris, 2009; Nixon et al., 2010; Fox and Monger 2011). CLVd is also mechanically transmitted (Hadidi et al., 2003; Jones et al., 2014), therefore it has the potential to be spread by workers handling the crops, by plant-to-plant contact, the use of contaminated tools and machinery, and by graft inoculation (MPI, 2019b).

73. The viroid has been reported to spread rapidly through tomato crops. During an outbreak in the UK symptoms were initially identified in three plants, but by the end of the growing season 50–60% of the total crop was symptomatic (Sansford and Morris, 2009; Nixon et al., 2009; FERA 2010). Spread in the UK and the Netherlands is thought to be a result of workers handling the crops (Verhoeven et al., 2004; MPI, 2019b).

Ornamental plants

74. Ornamental plants can be asymptomatically infected with CLVd (Sansford and Morris, 2009; EFSA, 2011). Asymptomatic hosts play a critical role in the transmission of CLVd because it can only be detected if the host plants are tested, complicating surveillance and phytosanitary control of production processes and consignments.

75. As pospiviroids affect plants systemically, it is assumed that tissue culture material can provide a pathway for CLVd to enter New Zealand.

76. Australia's pest risk analysis states that, outside contaminated tomato seeds, another possible cause for the introduction of pospiviroids, including CLVd, in tomato crops is via ornamental plants. This is due to pospiviroid detection on these hosts (DAWR, 2018).

Impact

77. CLVd is likely to cause impacts of economic value to New Zealand through impacts on tomato production. Other economically important hosts such as potato and pepper could also be impacted if natural infection occurs (MPI, 2019b).

78. *B. undulata*, *G. gymnostoma* and *Nematanthus wettsteinii* although asymptomatic hosts, can act as reservoirs for the viroid. It is assumed that the likelihood of viroid transmission to tomato plants is low, it is not known if the same can be applied to other economically important hosts (MPI, 2019b).

79. Experimental work with different isolates of CLVd from ornamental hosts, i.e. *B. undulata* and *N. wettsteinii*, were shown to be transmissible to tomato plants (FERA, 2010).

80. Initially, CLVd was only found in ornamental species. However, during the period of 1988 and 2002, six isolates of CLVd infecting seven different varieties of tomato were reported. The infection rate with CLVd varied in different cultivars from less than 1% to as high as 90% (Verhoeven et al., 2004; Singh and da Silva, 2006).

81. Observations during an outbreak of CLVd in the UK found that although quality of the fruit of the infected tomato crop was not affected, yield losses were reported (Sansford

and Morris, 2009; FERA, 2010). However, this is based on one grower comparing 2006 yields to 2007 when the outbreak occurred. It was concluded that the viroid had potential to cause significant yield losses in the UK tomato industry (Sansford and Morris, 2009). No information on crop losses due to CLVd outbreaks countries other than the UK could be found (MPI, 2019b).

82. Yield losses of 26–100% have been reported during experimental studies in tomato plants infected with the viroid (Marach 2008, cited in DAWR 2018; MPI, 2019b).

83. There is the potential for CLVd to infect native solanaceae plants, although this is highly uncertain due to the lack of studies. As the viroid has only been identified causing symptoms in tomato, infection of these plants may be asymptomatic (MPI, 2019b).

84. Although no natural infections were reported, CLVd is reported to experimentally infect other economically significant hosts. If natural infection were to occur economic impacts could be seen due to loss of production:

    i. Experimentally infected eggplants (*Solanum melongena*) showed symptoms of stunting, reduced leaf size, cupping of flowers, reduced pollen production and fruit size (Bhuvitarkorn and Reanwarakan, 2019; MPI, 2019b).

    ii. Potato (*Solanum tuberosum*) plants experimentally infected with CLVd showed symptoms similar to *Potato spindle tuber viroid* (PSTVd) infected potatoes (Singh et al., 1992; Verhoeven et al., 2004). Crop losses could be similar to those for PSTVd, which have been estimated as 1% of the total potato crop in the US (Owens and Verhoeven, 2009). However, there have been no reports of natural potato infection by CLVd and no evidence of transmission under field conditions (Verhoeven et al., 2004; MPI, 2019b).

    iii. Cucumber (*Cucumis sativus*) is also described as an experimental host of CLVd. Infection by the viroid is described as causing symptoms, however details are not given (Hammond et al., 1989). It is assumed that symptomatic infection would lead to yield losses (MPI, 2019b).

Tomato apical stunt viroid (TASVd)

Likelihood of entry into New Zealand

85. TASVd could enter New Zealand with imports of tomato seed for sowing, as this viroid has been demonstrated to be seed transmitted in tomatoes; but also via the importation of plants for planting species of the genus *Cestrum* (Antignus et al., 2007 cited in MPI, 2012).

86. The likelihood of entry is high, but the proportion of seeds and plants for planting infected with TASVd is highly uncertain (MPI, 2012).

87. TASVd was recorded in commercial glasshouses and in commercial seed lots, being intercepted once in tomato seeds exported from the US to Israel (EPPO 2010; MPI, 2012). TASVd was detected on seed lots of tomatoes destined for Australia and later on glasshouse tomatoes in Italy (Constable et al., 2019; EPPO, 2019).

88. This viroid is consistently reported since 2003 in various countries in tomato and ornamental plants: Austria, Croatia, Finland, France, Germany, Israel, Italy, the Netherlands, Poland, Senegal, Slovenia, and Tunisia (EPPO, 2019).

89. *Cestrum* sp. is recorded by Verhoeven et al. (2008, cited in MPI, 2012) as a natural ornamental host of TASVd in the Netherlands. This record originates from an EPPO

reporting from 2006 when TASVD was detected in symptomless *Cestrum* sp. under glasshouses.

90. TASVd has been consistently found in tomato glasshouses in Israel causing severe losses (Antignus et al., 2007 cited in MPI, 2012). TASVd was also recorded in commercial tomato production facilities in Tunisia (Verhoeven et al., 2006). Furthermore, although TASVd has only been reported as present from a few countries (Cote d'Ivoire, Belgium, Ghana, Indonesia, Israel, the Netherlands, Senegal, Slovenia, and Tunisia), it is likely that TASVd is present in other countries where it has not yet been detected or reported (MPI, 2012).

91. Seed-lots and plants for planting entering New Zealand are considered to originate from all over the world, including from countries that are known to have TASVd in tomatoes (e.g. Israel, the Netherlands) (MPI, 2012).

92. It seems unlikely that symptomatic plants would be used for high value commercial seed production. In reality, the proportion of seeds infected with TASVd is likely to be variable from consignment to consignment and over time is highly uncertain. As large volumes of tomato seed are imported into New Zealand, TASVd may enter New Zealand through this pathway (MPI, 2012).

93. As pospiviroids affect plants systemically, it is assumed that tissue culture material can provide a pathway for TASVd to enter New Zealand.

94. As a visual inspection of a consignment of tomato seeds will not enable detection of contaminated seeds, it is considered highly likely that if tomato seeds exported to New Zealand are infected with TASVd, then TASVd will enter New Zealand (MPI, 2012).

95. The same rationale can be applied for *Cestrum* sp. as plants for planting. Visual inspection of a consignment of *Cestrum* sp. will not enable the detection of contaminated plants, i.e. tissue culture. Therefore it is highly likely that if *Cestrum* sp. plants for planting exported to New Zealand are infected with TASVd, then TASVd will enter New Zealand.

Likelihood of exposure in New Zealand

96. If TASVd entered New Zealand in imported tomato seed, most plants arising from the infected seed are likely to be infected because the seed-to-seedling transmission rate is high (MPI, 2012).

97. If TASVd entered New Zealand in imported *Cestrum* sp. plants for planting, the grown plants and clones generated from these plants will be infected because the viroid is systemic in the plant, meaning that it can be found in all parts of the plant.

98. A transmission experiment conducted by Antignus et al. (2007, cited in MPI, 2012) showed that 24 out of 30 tomato seedlings propagated from seeds taken from TASVd-infected tomato plants tested positive for the viroid. This represents 80% infection. The generation of an infected plant from an infected seed is considered to be completion of the exposure pathway (MPI, 2012).

99. In the context of millions of seeds being planted in New Zealand over time, the likelihood of TASVd exposure to a tomato seedling is considered to be high (MPI, 2012).

Likelihood of establishment in New Zealand

100. Establishment in this section is assessed on the basis that TASVd has already been exposed to (or infected) a new host plant. TASVd establishment in the environment is

affected by the number of tomato plants exposed to (infected with) TASVd and whether that number is above the threshold for concern (MPI, 2012).

101. As TASVd can readily spread within a tomato crop as a result of routine crop handling and maintenance, even if there is only one initial exposure (infection) event, it is likely to result in tens to hundreds of additional exposures in the tomato crop, depending on what setting the initial exposure has occurred in (i.e. potentially hundreds of exposures in a commercial greenhouse, or in a commercial outdoor crop of table tomatoes, or in an outdoor, commercial field crop; and potentially tens of exposures in a home garden setting). These numbers of exposures are considered to be above the threshold for concern (MPI, 2012).

Commercial glasshouses

102. In commercial glasshouses in New Zealand, TASVd in plants grown from infected seeds is likely to be spread through the glasshouse mechanically by contaminated workers' hands or equipment, or by bumble bees. In New Zealand bumble bees are used to pollinate commercially grown tomato plants (W. Zwart, pers. comm., 2011; MPI, 2012).

103. Outbreaks in other countries demonstrate that TASVd can spread quickly through a glasshouse. For example, in an outbreak of TASVd in Tunisia initially only 5% of plants in a production facility showed symptoms but the number of symptomatic plants increased quickly to 100% as temperatures increased in the facility (Verhoeven et al., 2006). It is not known if TASVd is ever symptomless in tomatoes but possibly it is similar to *Potato spindle tuber viroid* (PSTVd) (MPI, 2012).

104. The viroid could establish for a season in New Zealand glasshouses, but is highly likely to be destroyed when plants are destroyed and the glasshouse disinfected at the end of the season. If there was an outbreak of TASVd in a glasshouse tomato crop, there is a low likelihood that infection could be moved from one glasshouse tomato crop to another glasshouse tomato crop, or to tomatoes growing outdoors. The primary mechanism of spread would be by mechanical transmission by sap, on the hands or equipment of workers (MPI, 2012).

Outdoor crops

105. For outdoor crops of commercially grown field tomato plants, there is a high probability of spreading throughout the field, through a combination of bumblebee activity, and on workers hands or equipment because field tomatoes will be checked by workers on a regular basis and leaves are touched for nearly all plants during crop scouting (checking for insect pests and looking for symptoms due to pathogens or nutrient deficiency) (MPI, 2012).

106. Also, the viroid could be spread from machinery operated in the field i.e. during spraying. The likelihood that TASVd would be spread to alternative host plants, such as *Brugmansia sp.*, *Cestrum* sp. and *Solanum jasminoides*, which are described as weeds in New Zealand (Ogle and Lovelock, 1989; Popay et al., 2010; Bay of Plenty Regional Council, 2011) before crops are destroyed at the end of the growing season is uncertain (MPI, 2012).

107. Infections of TASVd in perennial or weedy annual species could establish if bumblebees visit flowers of suitable host plants, rather than non-host plants. If populations of these plants are infected they could act as a reservoir for TASVd, where infection is symptomless in all of these hosts (Verhoeven et al., 2008a and 2008b; Olivier et al., 2011; MPI, 2012).

Home Gardeners

108. Home gardeners growing plants from commercially purchased infected seeds or seedlings could spread TASVd throughout their own tomato crop mechanically, or it could spread via bumble bee activity (MPI, 2012).

109. Home gardeners often save the seeds harvested from plants grown using purchased seeds. Gardeners may also distribute harvested seeds which, if collected from infected plants, could be moved around the country and provide a source of infection. This is the major way that infection could travel long distances within New Zealand (MPI, 2012).

110. Seed may not be collected from obviously infected plants, but there is a possibility that infected plants may be symptomless (like some plants grown from seeds infected with PSTVd). Furthermore, home gardeners may not be aware of symptoms of viroids, or be aware that they shouldn't collect seeds from diseased plants (MPI, 2012).

111. As with commercial crops of tomatoes, it is assumed here that TASVd can be spread from tomatoes in the home garden to other host plants, such as *Brugmansia* sp., *Cestrum sp*. and *S. jasminoides* by bumblebees (MPI, 2012).

112. It is conceivable that these plants may occur in home gardens, and they may be trimmed and maintained using tools that have become contaminated with TASVd through exposure to tomato plants. Therefore, there is a low-moderate likelihood that TASVd could be spread from tomato plants in home gardens to other host plants (MPI, 2012).

113. The likelihood of TASVd establishing in tomato crops where the initial infection occurs, and for that season, is considered to be high (MPI, 2012).

114. The likelihood of TASVd establishing in the New Zealand environment (beyond one season) is uncertain but considered to range from low to moderate, and is most likely to originate from the occurrence of TASVd in home garden tomato crops; and from outdoor commercial crops assuming that bumblebees can transmit TASVd trans-species (MPI, 2012).

Impact

115. Affected tomato plants in Israel showed shortened internodes (bushy appearance), leaf deformation and yellowing, reduced fruit size, pale red discoloration of fruit. Up to 100% disease incidence could be observed with heavy yield losses (MPI, 2012).

116. Based on the description of damage caused by TASVd, it is estimated that if TASVd became established in New Zealand crops, the yield losses are likely to be similar to those caused by other viroids such as PSTVd or TCDVd. Other direct costs to the tomato industry may include costs of detection and eradication of the viroid from crops (MPI, 2012).

117. The Indonesian strain of TASVd and the Israeli isolate (TASVd-Is) are reported to cause severe symptoms and crop losses in tomato (Antignus et al., 2002 and 2007). The outbreak of TASVd in a commercial glasshouse in the Netherlands in May 2011 resulted in heavy damage on plants (EPPO, 2011b cited in MPI, 2012).

118. Consequences for commercial growers are mostly independent of environmental establishment of TASVd, and could arise every year simply through the importation and growing of infected seed (MPI, 2012).

119. The viroid has been reported to asymptomatically infect ornamental *Cestrum* sp. that can be imported to New Zealand as tissue culture. However, the likelihood is low due to low trade volumes (MPI, 2019b).

120. Infected tissue culture of host ornamental plants is unlikely to be detected at the time of export or at the border as no symptoms would be visible (MPI, 2019b).

Tomato chlorotic dwarf viroid (TCDVd)

Likelihood of entry into New Zealand

121. Although the main host of TCDVd is *Solanum lycopersicum* (tomato), TCDVd may enter New Zealand on other infected or contaminated natural hosts, such as ornamental plants for planting.
122. It is assumed that tissue culture material can provide a pathway for TCDVd to enter New Zealand as pospiviroids infect plants systemically.
123. A detection of TCDVd from *Petunia* sp. leaves at a plant breeding facility in Illinois has been reported; the plants originated in California (CDFA, 2015). No further reports of the viroid in California were found. The viroid has also recently been detected in glasshouse grown tomatoes in Hawaii (Olmedo-Velarde, 2019; MPI, 2019a).

Seeds for sowing

124. Matsushita and Tsuda (2016) mechanically inoculated *Petunia* hybrid plants with TCDVd isolated from infected tomato plants. The seeds were harvested from the *Petunia* hybrids 3-5 months following inoculation. These seeds were grown for 2-3 months and the resulting plants tested for TCDVd contamination. Of the sampled plants, seven of the 28 (25%) were found positive for TCDVd. As the seeds were sown directly after collecting from the infected plants, it is not known if the viroid was present within the seed or as a contaminant on the seed coat (MPI, 2019a).
125. Early work by the same authors (2014), observed that the closely related PSTVd directly infects the embryo and endosperm of *Petunia* sp. seed during seed development. As both viroids are closely related, it seems likely that TCDVd will also infect the embryo and endosperm of *Petunia* sp. seed (MPI, 2019a).
126. A visual inspection of a consignment of *Petunia* seeds will not enable detection of seeds contaminated with TCDVd (MPI, 2012).
127. In the context of millions of seeds being imported into New Zealand over time, the likelihood of *Petunia* seed infected with TCDVd entering New Zealand is considered to be high, but the proportion of those seeds that are infected with TCDVd is highly uncertain.

Plants for planting

128. The viroid is symptomless in the ornamental hosts described above (CDFA, 2015). There is little information available regarding the nature of the viroid infection in these hosts (MPI, 2012).
129. In Slovenia, *Petunia* plants found to be TCDVd positive had been reproduced via cuttings (Marn and Pleško, 2010). TCDVd is a systemic pathogen and occurs throughout the plant (CDFA, 2015). The most efficient method of transmission of TCDVd is thought to be mechanical methods, for example by contact with contaminated clothing, pruning tools, farming equipment and between neighbouring plants (British Columbia Ministry of Agriculture, 2018; MPI, 2019a).

130. The closely related PSTVd is readily transmitted by propagation of infected tubers, cuttings and micro-plants. The widespread occurrence of PSTVd in Russia was attributed to the large-scale propagation of infected in vitro plants (CABI, 2019). There is very little known about the epidemiology, host specificity and host-pathogen interactions of TCDVd. It is thought that TCDVd is likely to exhibit pathogenicity properties similar to the closely related PSTVd (BCMA, 2018; MPI, 2019a).

131. As *Petunia* plants infected with TCDVd are symptomless (James et al., 2008; Marn and Pleško, 2010; Shiraishi et al., 2013), visual inspection of plants used for germplasm will not prevent infected plants being used for propagative material.

Likelihood of exposure in New Zealand

132. TCDVd would be able to successfully complete its life cycle if a suitable host were to enter New Zealand undetected on contaminated/infected seeds or tissue culture of selected ornamental hosts.

133. Successful exposure is considered to be when a contaminating organism becomes associated with a suitable host in New Zealand that allows it to complete a normal life cycle. For systemic pathogens in plant propagative material and seeds, the concept is assessed differently, because the imported plants themselves are transferred directly to the wider environment. Therefore, the pathogen does not have to leave the import pathway to find a suitable host to complete its lifecycle (MPI, 2018; MPI, 2019b).

Seeds for sowing

134. This assessment is made on the basis that contaminated seeds have entered New Zealand. Exposure of the TCDVd to a host plant simply requires seed-to-seedling transmission to occur, i.e. that a *Petunia* plant derived from a seed is infected. The imported *Petunia* seed would be planted in glasshouses or outside, and a new plant would be generated. The percentage of those plants that would be infected with TCDVd depends on the seed to-seedling transmission rate (MPI, 2012).

135. The reported transmission rate of TCDVd in seeds is of 25% (Matsushita and Tsuda, 2016). In the context of millions of seeds being planted in New Zealand over time, the likelihood of exposure of TCDVd to a host plant is considered to be moderate.

Plants for planting

136. Plants produced from imported germplasm are likely to be propagated in favourable conditions and may be multiplied. Conditions favouring plant growth also favour the persistence and survival of associated pathogens (MPI, 2018). Therefore, TCDVd entering on host germplasm is likely to replicate and persist in the resulting plants.

Likelihood of establishment in New Zealand

137. This section assesses establishment on the basis that TCDVd has already been exposed to (or infected) a new host plant. TCDVd establishment in the environment is affected by the number of *Petunia* plants exposed to (infected with) TCDVd and whether that number is above the threshold for concern (MPI, 2012).

138. As TCDVd can readily spread within a *Petunia* crop as a result of routine crop handling and maintenance, even if there is only one initial exposure (infection) event, it is likely to

result in tens to hundreds of additional exposures in the *Petunia* crop, depending on what setting the initial exposure has occurred in (i.e. potentially hundreds of exposures in a commercial greenhouse, and potentially tens of exposures in a home garden setting). These numbers of exposures are considered to be above the threshold for concern (MPI, 2012).

139. Establishment of TCDVd in New Zealand requires the following scenarios, some of which depend on viroid transmission to other host species:

    i. Persistence of the infected *Petunia* plant and/or infected crop; or

    ii. Contaminated/infected seeds or tissue culture derived from the original host plant must generate infected new *Petunia* plants in subsequent seasons; or

    iii. The viroid must be transmitted to other host species that can either persist longer than one season (e.g. perennials), or generate seeds contaminated with the viroid (MPI, 2012).

140. If TCDVd infects a *Petunia* plant, the viroid persists systemically within the plant and is considered established in the environment until the plant dies (MPI, 2012). The movement of infected plants for planting and seeds of *Petunia* could spread the viroid to new areas.

141. *Petunia* plants could act as reservoirs of TCDVd if they were infected. Infected plants are symptomless, and as TCDVd is easily transmitted mechanically during routine crop handling and maintenance, it is highly likely that TCDVd will spread throughout a *Petunia* crop (MPI, 2012). Because of this ability, transmission from ornamental plants to crop plants such as tomato is also possible, include if farm equipment and/or tools are shared.

142. A glasshouse-based experiment demonstrated that the bumblebee *Bombus ignitus* transmit TCDVd between tomato plants via their pollination activities, with a transmission efficiency ranging from 20-50% (Matsuura et al., 2010). The specific transmission mechanism is yet to be determined, but evidence from Matsuura and collaborators (2010) suggests that TCDVd is mechanically transmitted when the bumblebees grasp the anthers with their mandibles.

143. This mechanism would enable trans-species transmission of TCDVd by bumblebees (MPI, 2012), potentially spreading the viroid to economically important hosts, such as tomato.

Impact

144. TCDVd could potentially establish in New Zealand under local conditions. Ornamental hosts can act as reservoirs for the viroid, aiding in its spread via pollination and movement of infected material across the country. As reported in the Australia's risk analysis, the movement of TCDVd-infected crop residues to new areas, and their disposal near tomato, weed or other susceptible hosts could result in the mechanical transfer of the viroid to those hosts and result in its spread (MPI, 2012; MPI, 2019a; DAWR, 2018).

145. TCDVd can cause damage to infected tomato plants, and possibly other infected species, and so can potentially cause unwanted impacts in New Zealand (MPI, 2012; MPI, 2019a).

146. According to MPI (2019a), the economic impacts and yield losses associated with TCDVd infection have not been investigated. The prevalence of symptoms in infected locations may be used to predict likely impacts:

i. In France, 20-25% of tomato plants in a glasshouse showed symptoms associated with TCDVd infection (Candresse et al., 2010). Three samples were tested and were positive for TCDVd.

ii. In Japan 3,000 of 66,000 tomato plants showed symptoms (Matsushita et al., 2008). It is not known how many samples were tested.

iii. In a Hawaiian glasshouse growing tomatoes, plants were observed showing symptoms associated with viroid infection. In some of the plant bays 100% of plants were symptomatic. Two symptomatic plants were sampled, each sample consisting of three leaflets from different leaves and were found positive for TCDVd (Olmedo-Velarde et al., 2019).

147. The Californian Department of Food and Agriculture consider TCDVd a high risk of causing economic impact. Their assessment concluded that 'TCDVd can potentially lower tomato crop value, yield, and can influence normal cultural practices' (MPI, 2012; MPI, 2019a).

148. Even though *Petunias* are asymptomatically infected by this viroid, these plants are the most commonly grown ornamental plants in New Zealand, with a high market value (MPI, 2017). As such, this industry could be seriously affected if *Petunias* were to be destroyed due to confirmed risks to tomato crops.

149. As tomatoes and petunias are commonly grown by home gardeners the viroid would likely also have social impacts. This may be through reduced production or (MPI, 2019a).

Tomato planta macho viroid

Likelihood of entry into New Zealand

150. TPMVd may enter New Zealand on infected or contaminated tomato seed as these show no symptoms of infection. Therefore, infected seeds are unlikely to be detected at the border by visual inspection (MPI, 2019b).

151. Large quantities of tomato seeds are imported into New Zealand, including from countries where TPMVd is reported. It is estimated at least 2.75 million seeds are imported per year (MPI, 2012). Therefore, it is possible that at least some of the seeds will be contaminated with TPMVd (MPI, 2019b).

152. The viroid has been reported causing disease of tomatoes (*Solanum lycopersicum*) in Mexico and Canada (Ling and Bledsoe, 2009; Ling and Zhang, 2009). Tomato seeds are imported to New Zealand from both countries (MPI, 2019b).

153. Although Constable et al. (2019) did not detect TPMVd in any of the PCR-tested tomato seed lots imported into Australia between 2008 and 2016, low levels of contamination with other viroids were detected. They concluded that if insufficient seed numbers are tested, the viroids may not be detected, but the risk of introduction remains (MPI, 2019b).

Likelihood of exposure in New Zealand

154. TPMVd would be able to successfully complete its life cycle in a suitable host were it to enter New Zealand undetected on contaminated/infected seeds (MPI, 2019b).

155. Successful exposure is considered to be when a contaminating organism becomes associated with a suitable host in New Zealand that allows it to complete a normal life cycle (MPI, 2018; MPI, 2019b).

156. For systemic pathogens that infect or contaminate seeds, the concept is assessed differently, because the imported plants themselves are transferred directly to the wider environment. Therefore, if seed transmission occurs, the pathogen does not have to leave the import pathway to find a suitable host to complete its lifecycle (MPI, 2018; MPI, 2019b).

157. Seeds for sowing are planted in greenhouses or outdoors, under conditions suitable for plant growth. As seed transmission of TPMVd has been reported, a percentage of the resulting plants are likely to be infected with the viroid (MPI, 2019b).

Likelihood of establishment in New Zealand

158. TPMVd is likely to be able to establish and spread in New Zealand, but it may be restricted to indoor growing sites (MPI, 2019b).

159. Disease outbreaks of this viroid have been reported in glasshouse tomato crops grown under similar conditions to New Zealand (MPI, 2019b). Due to the controlled conditions and warmer temperatures within glasshouses, the viroid may establish anywhere in the country where tomatoes are grown in such conditions (MPI, 2019b). In New Zealand 120 ha of commercial tomato crops are grown in glasshouses, producing a total of 42,400 tonnes of tomatoes in 2018 (FreshFacts, 2018). Therefore, host plants under suitable conditions are likely to be present for the viroid to establish in New Zealand (MPI, 2019b).

160. As with CLVd, the New Zealand climate is unlikely to support overwintering of the viroid in outdoor grown plants because disease occurrence of TPMVd in outdoor plants appears to be limited to regions with an average temperature above 22 °C. Such areas with those conditions are reported to have a disease incidence of 5–45%, whereas fields with an average temperature below 22 °C are not usually affected (Jones et al., 2014; MPI, 2019b).

161. There is uncertainty as to whether TPMVd would persist outdoors over the winter in New Zealand as tomato crops are not grown during this time and the temperatures do not favour viroid replication. Therefore, there is the potential for transient populations of TPMVd to exist outdoors. However, the establishment of the viroid outdoors, beyond one growing season, is unlikely (MPI, 2019b).

162. It is known that TPMVd can be transmitted by infected seed and has been reported to spread rapidly in crops. TPMVd has been demonstrated to be transmitted through tomato (*Solanum lycopersicum*) seeds to seedlings (Yanagisawa and Matsushita, 2017). Therefore, some seedlings grown from TPMVd contaminated seed are likely to be infected with the viroid.

163. Yanagisawa and Matsushita (2017) tested four tomato cultivars for seed transmission of TPMVd. In three of the cultivars (Chika, Pepe and Sun Cherry) seed transmission of the viroid was not observed. The viroid was transmitted at a rate of 4.4% in the Yellow Pear cultivar.

164. As with other plant viroids, TPMVd is transmitted mechanically (Galindo et al., 1982; Jones et al., 2014) and therefore can be spread by workers handling the crops, plant-to-plant contact, the use of contaminated tools and machinery, and by graft inoculation.

165. Ling and Zhang (2009) reported an outbreak in tomato greenhouses in Mexico, which spread rapidly through the crop. Initially the outbreak was found in one 5 ha building. It quickly spread to two additional 5 ha greenhouses and by the end of the year approximately 5% of tomato plants over 35 ha were infected.

166. *Myzus persicae* has been reported to transmit TPMVd to tomato crops from wild plants, such as *Physalis affinis foetens* and *Solanum rostratum*. The rate of transmission was reported to be as high as 97% after a 24 hour acquisition period (Galindo, 1989 cited in EFSA, 2011).

Impact

167. In Mexico the disease is commonly called 'Planta macho' (male plant) because the infected plants do not produce marketable fruit (Galindo et al., 1982). In some years severe damage and occasionally total crop losses have been described (Galindo et al., 1982; MPI, 2019b).

168. Tomato plants are widely grown by home gardeners in different parts of the country, both outdoor and in glasshouses (MPI, 2012). Therefore establishment of TPMVd may also have social impacts.

Risk Management

169. The pospiviroids a) *Pepper chat fruit viroid* (PCFVd) in *Capsicum* seeds, b) *Potato spindle tuber viroid* (PSTVd) in *Solanum*, potato, tomato and *Capsicum* seeds and *Chrysanthemum, Dahlia, Diascia, Persea, Petunia, Solanum* and potato as plants for planting, and c) *Tomato dwarf chlorotic viroid* (TCDVd) in tomato seeds are regulated in New Zealand in the import health standard(s) 155.02.05: *Seeds for sowing* and 155.02.06: *Importation of Nursery Stock*.

170. The current measures require that known hosts as seeds for sowing allowed for import into New Zealand must have a phytosanitary certificate endorsed with an additional declaration for 'pest free area' or 'pest free place of production' or 'tested using an appropriate method' with exception of potato which is required to be grown under a post-entry quarantine facility. Known hosts as plants for planting eligible to be imported into New Zealand must have the phytosanitary certificate endorsed with an additional declaration for 'pest free area' or 'pest free place of production' or 'tested by PCR'. These measures were imposed to minimize the risk of PCFVd, PSTVd and TCDVd entering New Zealand.

171. *Columnea latent viroid* (CLVd), *Tomato apical stunt viroid* (TASVd), *Tomato chlorotic dwarf viroid* (TDCVd), *and Tomato planta macho viroid* (TPMVd) are very similar in their biology, morphology, host range and symptoms, so the application of similar requirements for the mitigation of risk is reasonable.

172. Further options to mitigate the risk of these viroids include assurances by the importers that their seed sources are from healthy planting material grown and sourced from areas where the virus historically has not been reported. Importers can also source seed from reputable producers that follow good cultural practices and employ parent plant testing during seed production.

OPTIONS ANALYSIS

Pest free area (PFA)

173. CLVd, TASVd, TCDVd, and TPMVd have a wide distribution, so PFA declarations will only be possible for countries where these viroids are not present. For the countries where PFA can be declared for CLVd, TASVd, TCDVd, and TPMVd, this measure offers

assurance that consignments are free from these pathogens. Care needs to be taken by suppliers to source certified disease-free seed and plants for planting prior to planting.

174. Guidelines for the determination of a PFA can be found in the International Standards for Phytosanitary Measures (ISPM) 4.

Pest free place of production (PFPP)

175. PFPP systems are a practical alternative for specific quarantine pathogens which have visible symptoms. During the growing season, an official inspection by the exporting National Plant Protection Organization (NPPO) for disease symptoms and/or parent plant testing for the absence of specific quarantine pests needs to be used for the official endorsement of PFPP on the phytosanitary certificate.

176. *Solanum lycopersicum, Petunia*, *Brunfelsia undulata, Calibrachoa* sp., *Cestrum* sp., *Gloxinia gymnostroma*, *Nematanthus wettsteinii, Verbena* sp., *Vinca minor,* and *Pittosporum tobira* plants may show no symptoms in the field. Due to the high impact that CLVd and TCDVd can cause on the tomato and *Petunia* industries of New Zealand, MPI requests that the PFPP option utilises growing season testing of parent plants, using a NPPO approved testing method and sampling regime.

177. Tomato plants are able to display visual symptoms of TPMVd, CLVd and TASVd infection, for example severe stunting, apical proliferation, yellowing leaves, reduced yield and strong epinasty of leaves and leaflets (Galindo et al., 1982). As a result, to manage the risk of CLVd, TASVd and TPMVd on tomato seeds, PFPP using parent plant visual inspection or testing during the growing season will provide satisfactory means to ensure that consignments of seeds produced in the designated production area are free from these viroids.

178. Guidelines for the determination of a PFPP can be found in the ISPM 10.

Seed and plants for planting testing

179. Sensitive and accurate diagnostic tests are available which can be applied to commercial seed lots and plants for planting to provide assurance that the seeds and the plants are free of CLVd, TASVd, TCDVd, and TPMVd.

180. Tomato and *Petunia* seed lots can be tested using an NPPO approved testing method offshore, with testing endorsed on the phytosanitary certificate, or on arrival in New Zealand.

181. As ornamental hosts are known to be asymptomatic hosts of CLVd, TASVd and TCDVd, growing season inspection while in Post-Entry Quarantine (PEQ) will not be adequate to identify the presence of this pathogen.

182. Testing for the ornamental host plants will be performed in PEQ if importers cannot secure a PFA or PFPP declaration endorsed on the phytosanitary certificate.

183. Bulbs do not have the option of testing in PEQ as:

- Most bulbs are imported from approved schemes, with the risk being managed offshore; and
- Testing for the pospiviroids involve the destruction of the bulbs.

Feasibility & Practicality of Measures

184. The New Zealand industries of tomato and *Petunia* would benefit from the measures implemented to mitigate the risk of importing regulated viroids into New Zealand as they could have significant impacts on production.

185. PFA declarations should be possible for countries where these viroids have not been recorded as present.

186. PFPP declarations may be possible for countries where these viroids are present, but where a production area has been identified as free from the pathogens through growing season visual inspection of parent plants or testing of parent plants.

187. PFPP declarations, as well as testing, will enable importers to continue to import CLVd, TASVd, TCDVd, and TPMVd host plants as seeds for sowing and plants for planting from countries where these viroids are known to occur.

188. Seed testing allows access to seed produced for international markets and gives a practical option for importing stored inventory of seed where country of origin is not specified and/or growing season inspections have not previously been undertaken. The limitations include the cost and efficacy of testing.

189. The cost for testing for the four pospiviroids plus PSTVd at the Plant Health and Environment Laboratory (PHEL) will vary depending on the commodity and the pathogens to be tested. Available tests at PHEL can detect a single viroid or a group:

    - RT-qPCR PSTVd test: detects PSTVd, TPMVd and TCDVd (sequencing will be required if a sample is positive).
    - RT-qPCR test CLVd: detects CLVd.
    - RT-qPCR test TASVd: detects TASVd.

190. Testing individual plants (or a bulk of up to 5 plants) for one pospiviroid starts at $195.00 (GST excluded). The cost for testing a seed lot will vary depending on whether the sample also requires virus testing. The estimated cost for testing 3000 seeds with subsampling for one pospiviroid starts at $720.00 (GST excluded).

191. Seeds should be submitted untreated. In the rare event that seeds are treated pre-export, an additional cost of $105.00 (GST excluded) will apply to each treated seed lot as washing will be required before testing.

192. The proposed phytosanitary measures described here are already successfully operating on other commodities in the IHS 155.02.05: *Seeds for sowing* and IHS 155.02.06: *Importation of Nursery Stock*. For example, on *Solanum* seeds for sowing and *Chrysantemum* plants for planting.

193. These measures will provide an appropriate level of protection and assurances that imported seeds for sowing and plants for planting are free from CLVd, TASVd, TCDVd, and TPMVd.

Proposed IHS requirements *Seeds for sowing*

194. Current specific requirements for *Solanum lycopersicum* already include measures for the following pospiviroids: *Potato spindle tuber viroid* (PSTVd) and *Tomato chlorotic dwarf viroid* (TCDVd). The addition of CLVd, TASVd and TPMVd will allow for the harmonization of measures for all the pospiviroids on the tomato seeds for sowing pathway. This will guarantee consistency of approach domestically, but also internationally.

195. Based on the evaluation of measures for the management of CLVd, TASVd, TCDVd, and TPMVd on the seed for sowing pathway, the following amendment to the requirements for the import of *Solanum lycopersicum* and *Petunia* sp. as seed for sowing is proposed:

a) "Pest Free Area" declaration, **or**

b) growing season testing of parent plants for TCDVd on *Petunia* seeds; growing season inspection of parent plants or testing of parent plants for CLVd, TASVd and TPMVd declaration on tomato seeds, **or**

c) seed testing, using a NPPO approved method endorsed on the phytosanitary certificate.

196. These proposed requirements will also affect the current measures in place for PSTVd and TCDVd on tomato seeds.

Plants for planting

197. Current requirements for ornamental plants for planting already include measures for the pospiviroids *Potato spindle tuber viroid* (PSTVd). The addition of CLVd, TASVd and TPMVd will allow for the harmonization of measures for all the pospiviroids on the plants for planting pathway. This will guarantee consistency of approach domestically, but also internationally.

198. Based on the evaluation of measures for the management of CLVd, TASVd and TCDVd on the plants for planting pathway, the following amendment to the requirements for the import of *Brunfelsia undulata*, *Calibrachoa* sp., *Cestrum* sp., *Gloxinia gymnostroma Nematanthus wettsteinii*, *Petunia* sp., *Pittosporum tobira*, *Verbena* sp., and *Vinca minor* as plants for planting is proposed:

a) "Pest Free Area" declaration, **or**

b) growing season testing of parent plants for:

- CLVd on *Brunfelsia undulata*, *Gloxinia gymnostroma* and *Nematanthus wettsteinii* plants for planting,
- TASVd on *Cestrum* sp. plants for planting,
- TCDVd on *Calibrachoa* sp., *Petunia* sp., *Pittosporum tobira*, *Verbena* sp., and *Vinca minor* plants for planting, **or**

c) plant testing, using a NPPO approved method during PEQ.

199. These proposed requirements will also affect the current measure in place for PSTVd on various ornamental species.

Appendix 1: Proposed amendments to the Import Health Standard 155.02.06: Seeds for Sowing

2.59 Petunia

These requirements only apply to species in the Plant Biosecurity Index listed under Import Specifications for Seed as "see 155.02.05 under *Petunia*".

Approved countries: All

Quarantine pests: *Tomato chlorotic dwarf viroid*

Import Permit: Permit not required, unless seeds are to be grown in PEQ.

PEQ: Not required, unless imported under options 2.2.2 or 2.2.3 of the MPI Protocol for Testing for the Presence of Genetically Modified Plant Material.

Approved treatment: Not required

Phytosanitary certificate: Required

2.59.1 Phytosanitary requirements

(1) If satisfied that the pre-shipment activities have been undertaken, the exporting country NPPO must confirm this by providing the certifying statement as per Part 1.5.2 of this import health standard and also the following additional declaration(s) to the phytosanitary certificate:

a) "The [insert species name] seeds for sowing have been:

i) sourced from a 'pest free area' free from *Tomato chlorotic dwarf viroid;*

OR

ii) sourced from a 'pest free place of production', where parent plants have been tested according to a NPPO approved methodology and found free from *Tomato chlorotic dwarf viroid;*

OR

iii) officially tested, on a representative sample of a minimum of 3000 seeds officially drawn according to the ISTA or AOSA sampling methodology using a NPPO approved PCR testing method, and found to be free from *Tomato chlorotic dwarf viroid*".

(2) The full scientific name of the *Petunia* species and variety, plus the appropriate common name, must be specified on the phytosanitary certificate.

2.59.2 GM seed testing

(1) In addition to the phytosanitary requirements above, all lots of *Petunia* are required to be representatively sampled, tested at an MPI approved testing laboratory, and found to be free of unapproved GM seed according to the MPI Protocol (refer to Part 1.5.3 Genetically Modified Testing Certificate).

(2) Every lot tested must be specified on the testing certificate.

Guidance:

- The MPI Protocol for Testing for the Presence of Genetically Modified Plant Material can be found at http://www.mpi.govt.nz/document-vault/10250
- More information on genetically modified seeds can also be found at https://www.mpi.govt.nz/importing/plants/seeds-for-sowing/genetically-modified-seeds/

2.59.3 **Testing requirements**

(1) Testing is required to be completed offshore prior to export, or on arrival in New Zealand.

(2) Pre-export testing for each seed lot must be endorsed by the NPPO on the phytosanitary certificate, or if tested on arrival in New Zealand, must be completed by an MPI-approved testing laboratory.

(3) Testing on-shore will be performed using an MPI-approved testing method.

2.74 Solanum lycopersicum

The following requirements only apply to species in the Plant Biosecurity Index listed under Import Specifications for Seed as "see 155.02.05 under *Solanum lycopersicum*."

Approved countries: All

Quarantine pests: *Columnea latent viroid, Pepino mosaic virus, Potato spindle tuber viroid, Tomato chlorotic dwarf viroid, Tomato brown rugose fruit virus, Tomato apical stunt viroid, Tomato plant macho viroid*

Import permit: Not required

PEQ: Not required

Approved treatment: Not required

Phytosanitary certificate: Required

2.74.1 Phytosanitary certificate - Additional declarations

(1) If satisfied that the pre-shipment activities have been undertaken, the exporting country NPPO must confirm this by providing the certifying statement as per Part 1.5.2 of this import health standard and also the following additional declaration(s) to the phytosanitary certificate:

a) "The *Solanum lycopersicum* seeds have been prepared to industry standards with thorough cleaning to remove all traces of flesh from the seeds".

AND

b) "The *Solanum lycopersicum* seeds have been:

i) sourced from a 'pest free area' free from *Pepino mosaic virus*.

OR

ii)sourced from a 'pest free place of production' free from *Pepino mosaic virus*.

OR

iii) officially tested, on a representative sample, and using appropriate methods, and found to be free from *Pepino mosaic virus"*.

AND

c) "The *Solanum lycopersicum* seeds have been:

i) sourced from a 'pest free area' free from *Columnea latent viroid, Potato spindle tuber viroid, Tomato chlorotic dwarf viroid, Tomato apical stunt viroid,* and *Tomato planta macho viroid*.

OR

ii) sourced from a 'pest free place of production' where parent plants have been visually inspected or tested according to a NPPO approved methodology and found free from *Columnea latent viroid*, *Potato spindle tuber viroid, Tomato chlorotic dwarf viroid, Tomato apical stunt viroid*, and *Tomato planta macho viroid*.

OR

iii) officially tested, on a representative sample of a minimum of 3000 seeds officially drawn according to the ISTA or AOSA sampling methodology using a NPPO approved PCR testing method, and found to be free from *Columnea latent viroid*, *Potato spindle tuber viroid, Tomato chlorotic dwarf viroid, Tomato apical stunt viroid*, and *Tomato planta macho viroid*.

AND

d) " The *Solanum lycopersicum* seeds have been:

i) sourced from a 'pest free area', free from *Tomato brown rugose fruit virus*.

OR

ii) sourced from a 'pest free place of production' free from for *Tomato brown rugose fruit virus*".

OR

iii) officially tested, on a representative sample of a minimum of 3000 seeds officially drawn according to the ISTA or AOSA sampling methodology, using an approved NPPO testing method and found free from *Tomato brown rugose fruit virus*".

2.74.2 Testing requirements

(1) Testing is required to be completed offshore prior to export, or on arrival in New Zealand.

(2) Pre-export testing for each seed lot must be endorsed by the NPPO on the phytosanitary certificate, or if tested on arrival in New Zealand, must be completed by an MPI-approved testing laboratory.

(3) Testing on-shore will be performed using an MPI-approved testing method.

Appendix 2: Proposed amendments to the Import Health Standard 155.02.05: Importation of Nursery Stock

Acacia

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 *Acacia*", and are additional to those specified in sections 1, 2 and 3 of the import health standard.

GENERAL CONDITIONS:

Approved Countries: All

Quarantine Pests: *Ceratocystis fimbriata; Phellinus noxius; Phytophthora capsici; Phytophthora palmivora; Phytophthora ramorum; Phytophthora tentaculata; Ralstonia pseudosolanacearum; Tomato chlorotic dwarf viroid; Xylella fastidiosa*

Entry Conditions:
Basic; with variations and additional conditions as specified below:

A. For Whole Plants
PEQ: Level 2
Minimum Period: 3 months

a. Conditions for *Ceratocystis fimbriata* (section 2.2.1.8)
Note: Only applies to the following genera: *Acacia* and *Passiflora*

b. Conditions for *Phytophthora capsici*
Note: Only applies to the following genus: *Portulaca*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora capsici*".
OR
ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora capsici*".
OR
iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora capsici*".

c. Conditions for *Phytophthora palmivora*[1]
Note: Only applies to the following genus: *Rosmarinus*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora palmivora*".
OR
ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora palmivora*".
OR
iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora palmivora*".

d. Conditions for Phytophthora ramorum (section 2.2.1.11)
Note: Only applies to the following species: *Veronica spicata*

e. Conditions for *Phytophthora tentaculata*
Note: Only applies to the following genera: *Artemisia* and *Mimulus*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora tentaculata*".

OR

ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora tentaculata*".

OR

iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora tentaculata*".

f. Conditions for *Tomato chlorotic dwarf viroid*
Note: Only applies to the following species: *Vinca minor*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Tomato chlorotic dwarf viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Tomato chlorotic dwarf viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Vinca minor*".

a. Conditions for *Ralstonia pseudosolanacearum*
Note: Only applies to members of the following genus: *Pelargonium*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants were sourced from a pest free area, free from *Ralstonia pseudosolanacearum)".*

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Ralstonia pseudosolanacearum".*

h. Conditions for *Xylella fastidiosa* (section 2.2.1.12)
Guidance for importers: The minimum quarantine period will be 6 months for nursery stock sourced from countries not recognised by MPI as free from *Xylella fastidiosa*

i. Conditions for *Phellinus noxius* (section 2.2.1.13)
Note: Only applies to the following species: *Artemisia capillaris; Artemisia princeps; Duranta repens; Nerium oleander;* **and** applies to all members of the *Acacia* genus

B. For Cuttings
PEQ: Level 2
Minimum Period: 3 months

a. Conditions for *Ceratocystis fimbriata* (section 2.2.1.8)
Note: Only applies to members of the *Acacia* and *Passiflora* genera

b. Conditions for *Phytophthora capsici*[1]

Note: Only applies to the following genus: *Portulaca*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora capsici*".

OR

ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora capsici*".

OR

iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora capsici*".

c. Conditions for *Phytophthora palmivora*[1]

Note: Only applies to the following genus: *Rosmarinus*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora palmivora*".

OR

ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora palmivora*".

OR

iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora palmivora*".

d. Conditions for Phytophthora ramorum (section 2.2.1.11)

Note: Only applies to the following species: *Veronica spicata*

e. Conditions for *Phytophthora tentaculata*

Note: Only applies to the following genera: *Artemisia* and *Mimulus*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora tentaculata*".

OR

ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora tentaculata*".

OR

iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora tentaculata*".

f. Conditions for *Tomato chlorotic dwarf viroid*

Note: Only applies to the following species: *Vinca minor*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Tomato chlorotic dwarf viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Tomato chlorotic dwarf viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Vinca minor*".

g. Conditions for *Ralstonia pseudosolanacearum*
Note: Only applies to members of the following genus: *Pelargonium*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants were sourced from a pest free area, free from *Ralstonia pseudosolanacearum)".*

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Ralstonia pseudosolanacearum".*

h. Conditions for *Xylella fastidiosa* (section 2.2.1.12)
Guidance for importers: The minimum quarantine period will be 6 months for nursery stock sourced from countries not recognized by MPI as free from *Xylella fastidiosa*

C. For Tissue Culture

a. Conditions for *Tomato chlorotic dwarf viroid*
Note: Only applies to the following species: *Vinca minor*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Tomato chlorotic dwarf viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Tomato chlorotic dwarf viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Vinca minor*".
Guidance for importers: Tissue culture imported under this option must be imported into a level 2 PEQ greenhouse for a minimum period of 3 months to undergo testing for the presence of *Tomato chlorotic dwarf viroid* during the quarantine period.

Conditions for *Ralstonia pseudosolanacearum*
Note: Only applies to members of the following genus: *Pelargonium*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants were sourced from a pest free area, free from *Ralstonia pseudosolanacearum)".*

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Ralstonia pseudosolanacearum".*

Conditions for *Xylella fastidiosa* on tissue culture (section 2.2.2.5)
Guidance for importers: There will be a minimum quarantine period of 6 months in a Level 2 PEQ greenhouse, for tissue cultures from countries not recognised by MPI as free from *Xylella fastidiosa*.

D. For Whole Plants, Cuttings or Tissue cultures imported into a level 3A PEQ facility

Note: Only applies to members of the following genus: *Pelargonium*

PEQ: Level 3A
Minimum Period: 3 months

a. Conditions for *Ralstonia pseduosolanacearum*
Pre-determined testing in PEQ; refer to "Inspection, Testing and Treatment Requirements for *Pelargonium*".

b. Conditions for *Xylella fastidiosa* on tissue culture (section 2.2.1.12 or 2.2.2.5)
Guidance for importers: There will be a minimum quarantine period of 6 months in a Level 2 PEQ greenhouse, for tissue cultures from countries not recognised by MPI as free from *Xylella fastidiosa*.

Inspection, Testing and Treatment Requirements

Note: Only applies to *Pelargonium* and *Vinca minor*

ORGANISM	MPI ACCEPTABLE METHODS	Comments
Insects	Visual inspection **AND** approved insecticide treatments as described in section 2.2.1.6 of the Basic conditions	Applies to whole plants and cuttings only
Mites	Visual inspection **AND** approved miticide treatments as described in the section 2.2.1.6 of the Basic conditions	Applies to whole plants and cuttings only
Bacterium		
Ralstonia pseudosolanacearum	Growing season inspection in PEQ for symptom expression AND plating on selective media OR PCR	Applies to *Pelargonium* whole plants, cuttings, and tissue culture imported into a level 3A PEQ facility
Xylella fastidiosa	Refer to section 2.2.1.12 "Measures for *Xylella fastidiosa*"	Applies to whole plants and cuttings only. Testing requirements for *Xylella fastidiosa* are identified in section 2.2.1.12.
	Refer to section 2.2.2.5 "Measures for *Xylella fastidiosa* on tissue culture"	Applies to tissue culture only. Testing requirements for *Xylella fastidiosa* are identified in section 2.2.2.5.
Viroid		
Tomato chlorotic dwarf viroid	PCR based methods	Only applies to *Vinca minor* whole plants, cuttings, and tissue culture imported into a level 2 PEQ facility

Guidance for importers: Testing in PEQ for the presence of *Tomato chlorotic dwarf viroid* is only necessary when an importer has been unable to secure one of the alternative declarations.

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 *Aesculus*", and are additional to those specified in sections 1, 2 and 3 of the import health standard.

GENERAL CONDITIONS:

Approved Countries: All

Quarantine Pests: *Phellinus noxius, Phytophthora palmivora, Phytophthora ramorum, Phytophthora tentaculata, Tomato chlorotic dwarf viroid, Xylella fastidiosa*

Entry Conditions:
Basic; with variations and additional conditions as specified below:

A. For Whole Plants
PEQ: Level 2
Minimum Period: 3 months

a. Conditions for *Phytophthora palmivora*[1]
Note: Only applies to the following genus: *Syringa*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora palmivora*".
OR
ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora palmivora*".
OR
iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora palmivora*".

b. Conditions for *Tomato chlorotic dwarf viroid*
Note: Only applies to the following species: *Pittosporum tobira*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Tomato chlorotic dwarf viroid* is not known to occur".
OR
ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Tomato chlorotic dwarf viroid*".
OR
iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Pittosporum tobira*".

c. Conditions for *Phytophthora ramorum* (section 2.2.1.11)

d. Conditions for *Phytophthora tentaculata*[1]
Note: Only applies to the following genera: *Heteromeles* and *Rhamnus*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora tentaculata*".
OR
ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora tentaculata*".
OR
iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora tentaculata*".

e. Conditions for *Xylella fastidiosa* (section 2.2.1.12)
Guidance for importers: The minimum quarantine period will be 6 months for nursery stock sourced from countries not recognised by MPI as free from *Xylella fastidiosa*

f. Conditions for *Phellinus noxius* (section 2.2.1.13)
Note: Only applies to the following species: *Fraxinus griffithii; Rhus succedanea*

B. For Cuttings

PEQ: Level 2
Minimum Period: 3 months

a. Conditions for *Phytophthora palmivora*[1]
Note: Only applies to the following genus: *Syringa*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora palmivora*".
OR
ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora palmivora*".
OR
iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora palmivora*".

b. Conditions for *Tomato chlorotic dwarf viroid*
Note: Only applies to the following species: *Pittosporum tobira*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Tomato chlorotic dwarf viroid* is not known to occur".
OR
ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Tomato chlorotic dwarf viroid*".
OR
iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Pittosporum tobira*".

b. Conditions for *Phytophthora ramorum* (section 2.2.1.11)

c. Conditions for *Phytophthora tentaculata*[1]
Note: Only applies to the following genera: *Heteromeles* and *Rhamnus*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora tentaculata*".

OR

ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora tentaculata*".

OR

iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora tentaculata*".

d. Conditions for *Xylella fastidiosa* (section 2.2.1.12)
Guidance for importers: The minimum quarantine period will be 6 months for nursery stock sourced from countries not recognised by MPI as free from *Xylella fastidiosa*

C. For Tissue Cultures

a. Conditions for *Xylella fastidiosa* on tissue culture (section 2.2.2.5)
Guidance for importers: There will be a minimum quarantine period of 6 months in a Level 2 PEQ greenhouse, for tissue cultures from countries not recognised by MPI as free from *Xylella fastidiosa*.

b. Conditions for *Tomato chlorotic dwarf viroid*
Note: Only applies to the following species: *Pittosporum tobira*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Tomato chlorotic dwarf viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Tomato chlorotic dwarf viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Pittosporum tobira*".
Guidance for importers: Tissue culture imported under this option must be imported into a level 2 PEQ greenhouse for a minimum period of 3 months to undergo testing for the presence of *Tomato chlorotic dwarf viroid* during the quarantine period.

Inspection, Testing and Treatment Requirements for *Pittosporum tobira*

ORGANISM	MPI ACCEPTABLE METHODS	Comments
Insects	Visual inspection **AND** approved insecticide treatments as described in section 2.2.1.6 of the Basic conditions	Applies to whole plants and cuttings only
Mites	Visual inspection **AND** approved miticide treatments as described in the section 2.2.1.6 of the Basic conditions	Applies to whole plants and cuttings only
Bacterium		
Xylella fastidiosa	Refer to section 2.2.1.12 "Measures for *Xylella fastidiosa*"	Applies to whole plants, cuttings only. Testing requirements for *Xylella fastidiosa* are identified in section 2.2.1.12
	Refer to section 2.2.2.5 "Measures for *Xylella fastidiosa* on tissue culture"	Applies to tissue culture only. Testing requirements for *Xylella fastidiosa* are identified in section 2.2.2.5
Viroid		
Tomato chlorotic dwarf viroid	PCR based method	Applies to whole plants, cuttings, and tissue culture imported into a level 2 PEQ facility

[1]Implementation of measures:

For consignments with a phytosanitary certificate issued on or after 25 May 2018 the requirements for *Phytophthora palmivora* and *P. tentaculata* must be met.

For consignments with a phytosanitary certificate issued no later than 24 May 2018, the requirements for *Phytophthora palmivora* and *P. tentaculata* are not mandatory.

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 *Chrysanthemum*", and are additional to those specified in sections 1, 2 and 3 of the import health standard.

GENERAL CONDITIONS:

Approved Countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden, UK, USA.

Quarantine Pests: *Phytophthora tentaculata, Potato spindle tuber viroid,* Uredinales

Entry Conditions: **Basic;** with variations and additional conditions as specified below:

A. For Whole Plants
PEQ: Level 2
Minimum Period: 3 months

a. Conditions for *Potato spindle tuber viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Potato spindle tuber viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Potato spindle tuber viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Chrysanthemum*".

b. Conditions for *Coleosporium* and *Cronatium*

Rust diseases of genus *Coleosporium* and *Cronatium* are not known to occur on _____(the host species being imported)_____ in _____ (the country in which the plants were grown) _____".

c. Conditions for *Phytophthora tentaculata*[1]

Note: Only applies to the following genus: *Argranthemum*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora tentaculata*".

OR

ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora tentaculata*".

OR

iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora tentaculata*".

B. For Tissue Cultures

As for Standard Entry Conditions for Tissue Cultures - see Section 2.2.2.

PLUS

Additional Declaration:

a. Conditions for *Potato spindle tuber viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Potato spindle tuber viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Potato spindle tuber viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Chrysanthemum*".

Guidance for importers: Tissue culture imported under this option must be imported into a level 2 PEQ greenhouse for a minimum period of 3 months to undergo testing for the presence of *Potato spindle tuber viroid* during the quarantine period.

Inspection, Testing and Treatment Requirements for *Chrysanthemum*

ORGANISM	MPI ACCEPTABLE METHODS	Comments
Insects	Visual inspection **AND** approved insecticide treatments as described in section 2.2.1.6 of the Basic conditions	Applies to whole plants and cuttings only
Mites	Visual inspection **AND** approved miticide treatments as described in the section 2.2.1.6 of the Basic conditions	Applies to whole plants and cuttings only
Viroid		
Potato spindle tuber viroid	PCR based methods	Applies to whole plants, cuttings, and tissue culture imported into a level 2 PEQ facility

Guidance for importers: Testing in PEQ for the presence of *Potato spindle tuber viroid* is only necessary when an importer has been unable to secure one of the alternative declarations.

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 *Dahlia*", and are additional to those specified in sections 1, 2 and 3 of the import health standard.

GENERAL CONDITIONS:

Approved Countries: All

Quarantine Pests: *Phymatotrichopsis omnivore, Phytophthora capsici, Potato spindle tuber viroid, Tetranychus kanzawai,* Uredinales

Entry Conditions: **Basic;** with variations and additional conditions as specified below:

A. For Whole Plants
PEQ: Level 2
Minimum Period: 3 months

a. Additional Declarations
"Rust diseases are not known to occur on *Dahlia* in _ (the country in which the plants were grown) _".
AND
"The plants have been dipped prior to export in dicofol at the rate of 0.7g a.i. per litre of water".

b. Conditions for *Potato spindle tuber viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Potato spindle tuber viroid* is not known to occur".
OR
ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Potato spindle tuber viroid*".
OR
iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Dahlia*".

c. Conditions for *Phytophthora capsici*[1]

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora capsici*".
OR
ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora capsici*".
OR
iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora capsici*".

B. For Dormant Bulbs from Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Luxembourg, The Netherlands, Portugal, South Africa, Spain, Sweden, United Kingdom:

OPTION 1:
No import permit is required.
PEQ: None

1) For bulbs produced under a MPI-approved Dutch bulb propagation scheme

a. Additional Declaration
"In addition to inspection of the dormant bulbs prior to shipment, the imported bulbs meet the requirements of the BKD Class 1 bulb certification scheme.

b. Conditions for *Potato spindle tuber viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Potato spindle tuber viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Potato spindle tuber viroid*".

c. Conditions for *Phytophthora capsici*[1]

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora capsici*".

OR

ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora capsici*".

OR

iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora capsici*".

2) For bulbs NOT produced under a MPI-approved bulb propagation scheme:

d. Additional Declaration
"In addition to inspection of dormant bulbs prior to shipment, the crop from which the bulbs were derived was inspected during the growing season according to appropriate procedures, and considered free of quarantine pests, and practically free from other injurious pests."

e. Conditions for *Potato spindle tuber viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Potato spindle tuber viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Potato spindle tuber viroid*".

a. Conditions for *Phytophthora capsici*[1]

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora capsici*".

OR

ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora capsici*".

OR

iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora capsici*".

OPTION 2:
PEQ: Level 1
Minimum Period: 3 months

a. Conditions for *Potato spindle tuber viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Potato spindle tuber viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Potato spindle tuber viroid*".

b. Conditions for *Phytophthora capsici*[1]

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora capsici*".

OR

ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora capsici*".

OR

iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora capsici*".

C. For Dormant Bulbs from the USA
No import permit is required unless the bulbs require post-entry quarantine.
PEQ: None or Level 2 (see below)

a. Additional Declarations
"In addition to inspection of dormant bulbs prior to shipment, the crop from which the bulbs were derived was inspected during the growing season according to appropriate procedures, and considered free of quarantine pests, and practically free from other injurious pests".

b. Conditions for Potato *spindle tuber viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Potato spindle tuber viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Potato spindle tuber viroid*".

c. Conditions for *Phymatotrichopsis omnivore*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The dormant tubers have been sourced from a "Pest free area", free from *Phymatotrichopsis omnivora*".

OR

ii) "The dormant bulbs have been sourced from a "Pest free place of production", free from *Phymatotrichopsis omnivora*".

AND for consignments with a "Pest free place of production" declaration for *Phymatotrichopsis omnivoria*:

- The consignment must be treated for fungi as described in Section 2.2.1.7 "Pesticide treatments for dormant bulbs". 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 of the phytosanitary certificate.

AND

- Post-entry quarantine: Upon arrival in New Zealand the dormant bulbs will require a period of at least 3 months in Level 2 post-entry quarantine

d. Conditions for *Phytophthora capsici*[1]

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora capsici*".

OR

ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora capsici*".

OR

iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora capsici*".

D. For Dormant Bulbs from Countries <u>other than</u> Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Luxembourg, The Netherlands, Portugal, South Africa, Spain, Sweden, UK, USA:
PEQ: Level 1 or Level 2 (see below)
Minimum Period: 3 months

a. Additional Declarations

"The dormant bulbs in this consignment have been:
- derived from a crop which was inspected during the growing season according to appropriate procedures and found to be free of regulated pests.

AND

- treated for regulated insects as described in section 2.2.1.7 of the basic conditions within 7 days prior to freezing, cold-storage or shipment."

b. Conditions for *Potato spindle tuber viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Potato spindle tuber viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Potato spindle tuber viroid*".

c. Conditions for *Phymatotrichopsis omnivore*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The dormant tubers have been sourced from a "Pest free area", free from *Phymatotrichopsis omnivora*".

OR

ii) "The dormant bulbs have been sourced from a "Pest free place of production", free from *Phymatotrichopsis omnivora*".

AND for consignments with a "Pest free place of production" declaration for *Phymatotrichopsis omnivoria*:

- The consignment must be treated for fungi as described in Section 2.2.1.7 "Pesticide

treatments for dormant bulbs". 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 of the phytosanitary certificate.

AND

- Post-entry quarantine: Upon arrival in New Zealand the dormant bulbs will require a period of at least 3 months in Level 2 post-entry quarantine

d. Conditions for *Phytophthora capsici*[1]

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora capsici*".

OR

ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora capsici*".

OR

iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora capsici*".

E. For Tissue Cultures

As for **Standard Entry Conditions for Tissue Cultures** - see Section 2.2.2.

PLUS:

Additional Declaration:

a. Conditions for *Potato spindle tuber viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Potato spindle tuber viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Potato spindle tuber viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Dahlia*".

Guidance for importers: Tissue culture imported under this option must be imported into a level 2 PEQ greenhouse for a minimum period of 3 months to undergo testing for the presence of *Potato spindle tuber viroid* during the quarantine period.

b. Conditions for virus diseases

"The cultures have been derived from parent stock tested and found free of virus diseases."

Inspection, Testing and Treatment Requirements for *Dahlia*

ORGANISM	MPI ACCEPTABLE METHODS	Comments
Insects	Visual inspection **AND** approved insecticide treatments as described in section 2.2.1.6 of the Basic conditions	Applies to whole plants and cuttings only
Mites	Visual inspection **AND** approved miticide treatments as described in the section 2.2.1.6 of the Basic conditions	Applies to whole plants and cuttings only
Viroid		
Potato spindle tuber viroid	PCR based methods	Applies to whole plants, cuttings, and tissue culture imported into a level 2 PEQ facility

Guidance for importers: Testing in PEQ for the presence of *Potato spindle tuber viroid* is only necessary when an importer has been unable to secure one of the alternative declarations.

[1]Implementation of measures:
For consignments with a phytosanitary certificate issued on or after 25 May 2018 the requirements for *Phytophthora capsici* must be met.

For consignments with a phytosanitary certificate issued no later than 24 May 2018, the requirements for *Phytophthora capsici* are not mandatory.

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 *Diascia*", and are additional to those specified in sections 1, 2 and 3 of the import health standard.

GENERAL CONDITIONS:

Approved Countries: All

Quarantine Pests: *Potato spindle tuber viroid*[1]

Entry Conditions: **Basic;** with variations and additional conditions as specified below:

A. For Whole Plants and Cuttings

PEQ: Level 2
Minimum Period: 3 months
Additional declaration:

a. Conditions for *Potato spindle tuber viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Potato spindle tuber viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Potato spindle tuber viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Diascia*".

B. For Tissue Cultures

As for **Standard Entry Conditions for Tissue Cultures** - see Section 2.2.2.
PLUS:
Additional Declaration:

a. Conditions for *Potato spindle tuber viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Potato spindle tuber viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Potato spindle tuber viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Diascia*".

[1] Requirements for *Potato spindle tuber viroid* will commence on 1 September 2014:
All phytosanitary certificates issued on or after 1 September 2014 must be endorsed with the correct additional declarations for *Potato spindle tuber viroid*.

Guidance for importers: Tissue culture imported under this option must be imported into a level 2 PEQ greenhouse for a minimum period of 3 months to undergo testing for the presence of *Potato spindle tuber viroid* during the quarantine period.

Inspection, Testing and Treatment Requirements for *Diascia*

ORGANISM	MPI ACCEPTABLE METHODS	Comments
Insects	Visual inspection **AND** approved insecticide treatments as described in section 2.2.1.6 of the Basic conditions	Applies to whole plants and cuttings only
Mites	Visual inspection **AND** approved miticide treatments as described in the section 2.2.1.6 of the Basic conditions	Applies to whole plants and cuttings only
Viroid		
Potato spindle tuber viroid	PCR based methods	Applies to whole plants, cuttings, and tissue culture imported into a level 2 PEQ facility

Guidance for importers: Testing in PEQ for the presence of *Potato spindle tuber viroid* is only necessary when an importer has been unable to secure one of the alternative declarations.

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 *Petunia*", and are additional to those specified in sections 1, 2 and 3 of the import health standard.

GENERAL CONDITIONS:

Approved Countries: All

Quarantine Pests: *Phytophthora palmivora, Potato spindle tuber viroid, Tomato chlorotic dwarf viroid*

Entry Conditions: **Basic;** with variations and additional conditions as specified below:

A. For Whole Plants and Cuttings
Import Permit: An import permit is required.
GM Testing Certificate: A copy of the GM testing certificate must be submitted with the import permit application.
PEQ: Level 2
Minimum Period: 3 months
Additional declaration:

a. Conditions for *Potato spindle tuber viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Potato spindle tuber viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Potato spindle tuber viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Petunia*".

b. Conditions for *Phytophthora palmivora*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora palmivora*".

OR

ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora palmivora*".

OR

iii) "The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora palmivora*".

c. Conditions for *Tomato chlorotic dwarf viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Tomato chlorotic dwarf viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Tomato chlorotic dwarf viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Petunia*".

B. For Tissue Cultures

Import Permit: An import permit is required.

GM Testing Certificate: A copy of the GM testing certificate must be submitted with the import permit application.

As for **Standard Entry Conditions for Tissue Cultures** - see Section 2.2.2.

PLUS

Additional Declarations:

a. Conditions for *Potato spindle tuber viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Potato spindle tuber viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Potato spindle tuber viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Petunia*".

Guidance for importers: Tissue culture imported under this option must be imported into a level 2 PEQ greenhouse for a minimum period of 3 months to undergo testing for the presence of *Potato spindle tuber viroid* during the quarantine period.

b. Conditions for *Tomato chlorotic dwarf viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Tomato chlorotic dwarf viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Tomato chlorotic dwarf viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Petunia*".

Guidance for importers: Tissue culture imported under this option must be imported into a level 2 PEQ greenhouse for a minimum period of 3 months to undergo testing for the presence of *Tomato chlorotic dwarf viroid* during the quarantine period.

Requirements for Genetically Modified (GM) Testing Certificates:
All varieties of *Petunia* nursery stock imported into New Zealand require a GM testing certificate, which confirms that the variety is not a new organism, as defined by the Hazardous Substances and New Organisms Act 1996 (HSNO Act 1996). A copy of the GM testing certificate must be submitted with the import permit application.

- Testing must occur at an MPI-approved or recognised laboratory, in accordance with the standard PIT-GMO-ALGMOT: *Approval of Laboratories for Genetically Modified Organism Testing*, and the *Protocol for Testing for the Presence of Genetically Modified Plant Material*.
- The GM testing certificate must include the species name and a unique identifier (e.g. variety name or lot/line number), which must be reproduced on other import documentation to support traceability.
- Sampling for the purposes of testing must be carried out in accordance with the Protocol for Testing for the Presence of Genetically Modified Plant Material.

Guidance:

- The Protocol, and a list of MPI-approved and recognised facilities, are on the website Genetically Modified Plant Material http://mpi.govt.nz/importing/plants/seeds-for-sowing/genetically-modified-seeds/

Inspection, Testing and Treatment Requirements for *Petunia*

ORGANISM	MPI ACCEPTABLE METHODS	Comments
Insects	Visual inspection **AND** approved insecticide treatments as described in section 2.2.1.6 of the Basic conditions	Applies to whole plants and cuttings only
Mites	Visual inspection **AND** approved miticide treatments as described in the section 2.2.1.6 of the Basic conditions	Applies to whole plants and cuttings only
Viroids		
Potato spindle tuber viroid	PCR based methods	Applies to whole plants, cuttings, and tissue culture imported into a level 2 PEQ facility
Tomato chlorotic dwarf viroid	PCR based methods	Applies to whole plants, cuttings, and tissue culture imported into a level 2 PEQ facility

Guidance for importers: Testing in PEQ for the presence of *Tomato chlorotic dwarf viroid* is only necessary when an importer has been unable to secure one of the alternative declarations.

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 *Solanum*", and are additional to those specified in sections 1, 2 and 3 of the import health standard.

GENERAL CONDITIONS:

Approved Countries: All

Quarantine Pests: *Columnea latent viroid*, *Potato spindle tuber viroid*, *Tomato apical stunt viroid, Tomato chlorotic dwarf viroid*

Entry Conditions: **Basic;** with variations and additional conditions as specified below:

A. For Whole Plants and Cuttings:
PEQ: Level 2
Minimum Period: 3 months

a. Conditions for *Columnea latent viroid*
Note: Only applies to the following species: *Brunfelsia undulata*, *Gloxinia gymnostroma* and *Nematanthus wettsteinii*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Columnea latent viroid* is not known to occur".
OR
ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Columnea latent viroid*".
OR
iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements".

b. Conditions for *Potato spindle tuber viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Potato spindle tuber viroid* is not known to occur".
OR
ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Potato spindle tuber viroid*".
OR
iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements".

c. Conditions for *Tomato apical stunt viroid*
Note: Only applies to the *Cestrum* genus

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Tomato apical stunt viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Tomato apical stunt viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements".

d. Conditions for *Tomato chlorotic dwarf viroid*

Note: Only applies to the *Calibrachoa* genus

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Tomato chlorotic dwarf viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Tomato chlorotic dwarf viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements".

B. For Tissue Cultures:

As for **Standard Entry Conditions for Tissue Cultures** - see Section 2.2.2.

PLUS

a. Conditions for *Columnea latent viroid*

Note: Only applies to the following species: *Brunfelsia undulata*, *Gloxinia gymnostroma* and *Nematanthus wettsteinii*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Columnea latent viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Columnea latent viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements".

Guidance for importers: Tissue culture imported under this option must be imported into a level 2 PEQ greenhouse for a minimum period of 3 months to undergo testing for the presence of *Columnea latent viroid* during the quarantine period.

b. Conditions for *Tomato apical stunt viroid*

Note: Only applies to the *Cestrum* genus

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Tomato apical stunt viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Tomato apical stunt viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements".

Guidance for importers: Tissue culture imported under this option must be imported into a level 2 PEQ greenhouse for a minimum period of 3 months to undergo testing for the presence of *Tomato apical stunt viroid* during the quarantine period.

c. Conditions for *Potato spindle tuber viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Potato spindle tuber viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where"; parent plants were tested according to an NPPO approved methodology and found free from *Potato spindle tuber viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements".

Guidance for importers: Tissue culture imported under this option must be imported into a level 2 PEQ greenhouse for a minimum period of 3 months to undergo testing for the presence of *Potato spindle tuber viroid* during the quarantine period.

d. Conditions for *Tomato chlorotic dwarf viroid*

Note: Only applies to the *Calibrachoa* genus

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Tomato chlorotic dwarf viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Tomato chlorotic dwarf viroid*".

OR

iii) "Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements".

Guidance for importers: Tissue culture imported under this option must be imported into a level 2 PEQ greenhouse for a minimum period of 3 months to undergo testing for the presence of *Tomato chlorotic dwarf viroid* during the quarantine period.

Inspection, Testing and Treatment Requirements

ORGANISM	MPI ACCEPTABLE METHODS	Comments
Insects	Visual inspection **AND** approved insecticide treatments as described in section 2.2.1.6 of the Basic conditions	Applies to whole plants and cuttings only
Mites	Visual inspection **AND** approved miticide treatments as described in the section 2.2.1.6 of the Basic conditions	Applies to whole plants and cuttings only
Viroids		
Columnea latent viroid	PCR based methods	Only applies to *Brunfelsia undulata*, *Gloxinia gymnostroma* and *Nematanthus wettsteinii* whole plants, cuttings, and tissue culture of the species imported into a level 2 PEQ facility
Potato spindle tuber viroid	PCR based methods	Applies to whole plants, cuttings, and tissue culture imported into a level 2 PEQ facility
Tomato apical stunt viroid	PCR based methods	Only applies to *Cestrum* whole plants, cuttings, and tissue culture imported into a level 2 PEQ facility
Tomato chlorotic dwarf viroid	PCR based methods	Only applies to *Calibrachoa* whole plants, cuttings, and tissue culture imported into a level 2 PEQ facility

Guidance for importers: Testing in PEQ for the presence of *Columnea latent viroid* and *Tomato chlorotic dwarf viroid* is only necessary when an importer has been unable to secure one of the alternative declarations.

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 *Verbena*", and are additional to those specified in sections 1, 2 and 3 of the import health standard.

GENERAL CONDITIONS:

Approved Countries: All

Quarantine Pests: *Phytophthora tentaculata, Tetranychus kanzawai, Tomato chlorotic dwarf viroid, Uredinales, Xylella fastidiosa*

Entry Conditions: Basic; with variations and additional conditions as specified below:

A. For Whole Plants
PEQ: Level 2
Minimum Period: 3 months

a. Conditions for *Phytophthora tentaculata*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert species name] plants in this consignment have been sourced from [insert country name], which is free from *Phytophthora tentaculata*".

OR

ii) "The [insert species name] plants in this consignment were produced in a "pest free area" for *Phytophthora tentaculata*".

OR

iii)"The [insert species name] plants in this consignment were produced in a "pest free place of production" for *Phytophthora tentaculata*".

b. Conditions for *Tomato chlorotic dwarf viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Tomato chlorotic dwarf viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Tomato chlorotic dwarf viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Verbena*".

c. Conditions for *Tetranychus kanzawai*
Additional declaration: "The plants have been dipped prior to export in dicofol at the rate of 0.7g a.i. per litre of water".

d. Conditions for Uredinales
Additional declaration: "Rust diseases are not known to occur on _ (the imported genus) _ in _ (the country in which the plants were grown) _".

e. Conditions for *Xylella fastidiosa* (section 2.2.1.12)
Guidance for importers: The minimum quarantine period will be 6 months for nursery stock sourced from countries not recognised by MPI as free from *Xylella fastidiosa*

B. For Tissue Cultures

a. Conditions for *Tomato chlorotic dwarf viroid*

One of the following Additional Declarations must be endorsed on the phytosanitary certificate:

i) "The [insert plant species] plants in this consignment have been sourced from a 'pest free area', where *Tomato chlorotic dwarf viroid* is not known to occur".

OR

ii) "The [insert plant species] plants have been sourced from a 'pest free place of production', where parent plants were tested according to an NPPO approved methodology and found free from *Tomato chlorotic dwarf viroid*".

OR

iii) Pre-determined testing in PEQ: refer to "Inspection, Testing and Treatment Requirements for *Verbena*"

Guidance for importers: Tissue culture imported under this option must be imported into a level 2 PEQ greenhouse for a minimum period of 3 months to undergo testing for the presence of *Tomato chlorotic dwarf viroid* during the quarantine period.

b. Conditions for *Xylella fastidiosa* on tissue culture (see section 2.2.2.5)

Guidance for importers: There will be a minimum quarantine period of 6 months in a Level 2 PEQ greenhouse, for tissue cultures from countries not recognised by MPI as free from *Xylella fastidiosa*.

Inspection, Testing and Treatment Requirements for *Verbena*

ORGANISM	MPI ACCEPTABLE METHODS	Comments
Insects	Visual inspection **AND** approved insecticide treatments as described in section 2.2.1.6 of the Basic conditions	Applies to whole plants and cuttings only
Mites	Visual inspection **AND** approved miticide treatments as described in the section 2.2.1.6 of the Basic conditions	Applies to whole plants and cuttings only
Bacterium		
Xylella fastidiosa	Refer to section 2.2.1.12 "Measures for *Xylella fastidiosa*"	Applies to whole plants, cuttings only. Testing requirements for *Xylella fastidiosa* are identified in section 2.2.1.12
	Refer to section 2.2.2.5 "Measures for *Xylella fastidiosa* on tissue culture"	Applies to tissue culture only. Testing requirements for *Xylella fastidiosa* are identified in section 2.2.2.5
Viroid		
Tomato chlorotic dwarf viroid	PCR based method	Applies to whole plants, cuttings, and tissue culture imported into a level 2 PEQ facility

Guidance for importers: Testing in PEQ for the presence of *Tomato chlorotic dwarf viroid* is only necessary when an importer has been unable to secure one of the alternative declarations.

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