Ministry for Primary Industries
Manatū Ahu Matua

Risk Management Proposal:

Oncidium Cut Flowers from Taiwan

MPI.IHS.CFF.ONCIDIUM

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New Zealand Government

Growing and Protecting New Zealand

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Submissions

The Ministry for Primary Industries (MPI) invites comment from interested parties on the proposed new import health standard (IHS) for *Oncidium* cut flowers from Taiwan which is supported by this Risk Management Proposal (RMP).

The meaning of an IHS is defined in section 22(1) of the Biosecurity Act 1993 as "An import health standard 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".

MPI therefore seeks comment on the requirements (including measures) in the proposed IHS. MPI has developed this proposal based on the available scientific evidence and assessment of this evidence. If you disagree with the measures proposed to manage the risks, please provide either data or published references to support your comments. This will enable MPI to consider additional evidence which may change how risks are proposed to be managed.

The following points may be of assistance in preparing comments:

- Wherever possible, comments should be specific to an IHS requirement (referencing section numbers or pest 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.

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 22 February 2018.

Plant Imports
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Ministry for Primary Industries
PO Box 2526
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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.

Official Information Act 1982

Please note that your submission is public information and it is MPI policy to publish submissions and the review of submissions on the MPI website. Submissions may also be the subject of requests for information under the Official Information Act 1982 (OIA).

The OIA specifies that information is to be made available to requesters unless there are sufficient grounds for withholding it, as set out in the OIA. Submitters may wish to indicate grounds for withholding specific information contained in their submission, such as the information is commercially sensitive or they wish personal information withheld.

Any decision to withhold information requested under the OIA is reviewable by the Ombudsman.

Contents

Purpose

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

a) summarise the pests associated with the import of *Oncidium* (*Oncidium* spp.) cut flowers that require measures and the strength of measure identified to manage them;
b) identify how the measures proposed in the draft import health standard (IHS) for "*Oncidium* Cut Flowers" effectively manage known biosecurity risks; and
c) explain how the proposed measures are consistent with New Zealand's domestic legislation and international obligations.

(2) The draft IHS is the subject of consultation under section 23(3) of the Biosecurity Act 1993. This RMP provides information to support the consultation on the draft IHS but is not itself the subject of consultation. However MPI will accept comments and suggestions on the RMP in order to improve future IHS consultations.

Scope

(3) This RMP lists the information and process used to determine the pest risk management measures proposed in the draft IHS for *Oncidium* Cut Flowers. The RMP includes:

- a summary of pests directly associated with *Oncidium* cut flowers at the point of export;
- a description of pre-export phytosanitary measures and their effectiveness considered for managing pests potentially associated with imported *Oncidium* cut flowers.

(4) This document is in three parts.

- Part 1 provides the background and context used to inform development of the IHS for *Oncidium* cut flowers.
- Part 2 provides information specific to the *Oncidium* cut flower pathway, and outlines the types of measures which may effectively manage risks associated with *Oncidium* cut flowers from Taiwan.
- Part 3 considers the regulated pests associated with *Oncidium* cut flowers, and determines the appropriate measure to effectively manage risks associated with importing *Oncidium* cut flowers from Taiwan.

Background

(5) *Oncidium* cut flowers are currently approved for import from Australia, Malaysia, Singapore and Thailand in the IHS 155.02.04: *Cut flowers and foliage.*

a) *Oncidium* cut flowers from Singapore and Malaysia must be prepared for export in accordance with the Singapore Assurance Certification Scheme or treated with methyl bromide within 24 hours of arrival in New Zealand (commercial consignments).

i) Accompanied consignments from Singapore Airport Duty Free carry a phytosanitary 'tag' sticker in place of a phytosanitary certificate, and each stem is inspected on arrival in New Zealand.

b) *Oncidium* cut flowers from Malaysia must also be prepared for export in accordance with the Singapore Assurance Certification Scheme or with methyl bromide within 24 hours of arrival in New Zealand (commercial consignments).
c) *Oncidium* cut flowers from Thailand must be fumigated with methyl bromide prior to arrival in New Zealand (pre-export).
d) There are currently no specific requirements for *Oncidium* cut flowers imported from Australia.

(6) Since 2010, *Oncidium* cut flowers have only been imported into New Zealand from Malaysia and Singapore (513 consignments and 23 unaccompanied consignments, respectively). Note: this does not include volumes of accompanied consignments (as outlined in 5a) i)).

(7) MPI received a request from Taiwan's Bureau of Animal and Plant Health Inspection and Quarantine (BAPHIQ) for market access for *Oncidium* cut flowers.

(8) MPI conducted a visit to Taiwan in November 2016 to assess the pathway for *Oncidium* cut flowers.

Part 1: Context

Domestic

(9) The New Zealand biosecurity system is regulated through the Biosecurity Act 1993. Section 22 of the Act describes the meaning of an IHS, and requires that the IHS specifies requirements to be met for the effective management of risks associated with importing risk goods (including plants and plant products) into New Zealand.

(10) The Ministry for Primary Industries (MPI) is the government authority responsible for the effective management of risks associated with the importation of risk goods into New Zealand (Part 3, Biosecurity Act 1993).

(11) MPI engages with interested parties and/or affected New Zealand stakeholders and the exporting country requesting market access during the development of an IHS.

(12) MPI follows MPI policies and procedures for the development of an IHS and consultation.

International

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

(14) 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.

New Zealand's Biosecurity System

(15) New Zealand operates a biosecurity system for which the phytosanitary aspect (covering plant health) is a key part.

(16) No biosecurity system is capable of reducing risk to zero. The objective of the system is to reduce to an acceptable level the likelihood of entry and establishment of regulated organisms (including pests, diseases and weeds).

(17) An organism is 'regulated' by MPI if it could cause unacceptable economic consequences (i.e. likely to cause unacceptable economic, environmental, socio-cultural or human health impacts in New Zealand) if it were to enter and establish in New Zealand, provided the following conditions are met:

a) is not present in New Zealand; or

b) it is present but under official control in New Zealand;

c) it is able to establish and spread in New Zealand.

- Entry and establishment is defined as 'introduction' by the International Plant Protection Convention (IPPC).

(18) The New Zealand phytosanitary system focuses on ensuring that the most significant pests, for example economically important fruit flies, are unlikely to ever establish in New Zealand. The system also manages risk associated with all regulated pests.

(19) The focus of the IHS for plant-based goods is to, wherever possible, manage unacceptable phytosanitary risks identified as being associated with the goods before arrival/clearance at the New Zealand border. The

expectation is that commercial consignments of plants and plant products meet New Zealand's phytosanitary import requirements on arrival (risk is managed off-shore).

(20) MPI monitors the pathway performance related to each IHS to ensure it provides the expected level of protection. This is achieved through verification and inspection activities at the border (and where possible, identification of pests detected) and audits of the export systems and critical control points contained in the *Export Plans*.

Importing Cut Flowers

(21) Cut flowers can only be imported subject to an IHS specifying the commodity, and from a country where MPI has approved the systems, programmes and standards for regulatory oversight by the National Plant Protection Authority (NPPO). The export system is subject to audit by MPI.

(22) In circumstances where regulated pests that would cause significant harm if they became established in New Zealand are associated with the commodity, MPI requires the exporting NPPO to negotiate an *Export Plan* (see paragraph 26) with MPI. Exports to New Zealand cannot occur until the *Export Plan* has been agreed by MPI.

Strength of measures

(23) Measures are required for regulated pests (see paragraph 18) where the 'probability of introduction and spread' on a pathway is unacceptable (i.e. if it is able to enter through the pathway, find a suitable host, and able to establish and spread in New Zealand).

(24) The strength of the measure required should be no more than necessary to manage the risk the organism poses. MPI has classified measures into three categories of increasing strength: *Basic Measures*, *Targeted Measures* or *MPI-Specified Measures*.

(25) The strength of measure required depends on the risk posed by the organism on the pathway. This risk is determined by a combination of the consequences the pest may cause if it was introduced into New Zealand and the likelihood that the pest will enter and establish from a pathway. For pests that would result in very high consequences, such as economically important species of fruit fly, *MPI-Specified Measures* are required. This is because these pests would cause significant negative consequences to New Zealand, even if the likelihood of them entering and establishing (risk) a transient population is low.

(26) The greater the risk of a pest, the greater the level of assurance MPI requires that the pest is not present in a consignment unless the pest has been rendered non-viable (dead or sterile from irradiation). For *Targeted* and/ or *MPI-Specified Measure* pests an *Export Plan* will be negotiated with the exporting NPPO, supported by an MPI pathway assessment visit (if required). The *Export Plan* will identify how *Targeted* and *MPI-Specified Measures* will be applied. The *Export Plan* must be approved by MPI, and is subject to audit and review by MPI.

(27) The proposed *Oncidium* cut flower IHS includes all measures accepted for pests assessed as being possibly associated with the commodity.

Part 2: Approach

Commodity Description

(28) "*Oncidium* cut flowers" is defined as an individual, commercially produced orchid stem of the genus *Oncidium*, harvested for decorative purposes.

a) *Oncidium* cut flowers do not include leaves, roots, fruit, soil, or material imported for other purposes (e.g. propagation).

(29) "Commercially produced" is defined as the production of export quality cut flowers sourced from sites that grow for export under standard cultivation, pest-management, harvesting, disinfestation and packing activities.

a) Commercially produced *Oncidium* cut flowers are graded to remove:
   - obviously damaged stems, and plant material (such as the leaves) other than what is included in the commodity description;
   - Infested, infected or damaged plant material;
   - all plant material from species other than *Oncidium* spp.

b) *Oncidium* cut flowers can be produced within protected structures or open fields.

c) Private consignments and products produced through non-commercial systems (for example, 'backyard' production) do not meet the definition of commercially produced, and are excluded from the scope of this RMP and the IHS: *Oncidium* Cut Flowers.

Information Sources

(30) The following information was used to identify risk organisms associated with *Oncidium* cut flowers from Taiwan and determine appropriate measures to manage the risk of their introduction (entry and establishment) into New Zealand:

a) Pest assessments from MPI Import Risk Analyses, with consideration of the *Oncidium* spp. pathway and the end use of the product, including:
   i) Import Risk Analysis: *Litchi chinensis* (Litchi) fresh fruit from Taiwan (MPI, 2007);
   ii) Import Risk Analysis: Fresh *Citrus* Fruit (7 species) from Samoa (MPI, 2008);
   iii) Import Risk Analysis: Pears (*Pyrus bretschneideri*, *Pyrus pyrifolia*, and *Pyrus* sp. nr. *Communis*) fresh fruit from China.(MPI, 2009a);
   iv) Import Risk Analysis: Table grapes (*Vitis vinifera*) from China (MPI, 2009b);
   v) Import Risk Analysis: Fresh Rambutan from Vietnam (2016a).
   vi) [Draft] Analysis of alternative risk management measures to import *Phalaenopsis* spp. nursery stock from Taiwan (MPI, 2010);
   vii) [Draft] Risk Assessment: Fresh cut roses (Rosa spp.) from the Republic of South Africa (MPI, 2011);
   viii) [Draft] Pest Risk Assessment: *Scirtothrips dorsalis*: chilli thrips (MPI. 2013);
   ix) Generic Pest Risk Assessment: Armoured scale insects (Hemiptera: Coccoidea: Diaspididae) on the fresh produce pathway (MPI, 2014);

b) Technical advice (MPI 2017a; MPI 2017b; MPI 2017c);

c) Taiwan *Oncidium* spp. cut flower pathway assessment (MPI, 2016b);

d) Relevant literature and database searches;

e) Industry production, harvest and post-harvest practises in the exporting country (BAPHIQ, 2013).

Assessment

(31) The above information sources were used to assess an organisms' potential to enter New Zealand via the *Oncidium* cut flower import pathway, be exposed to a suitable host, and establish and spread in New Zealand. The pest assessment process follows part 2.1 of the International Standard for Phytosanitary Measures (ISPM) 11: *Pest risk analysis for quarantine pests*, MPI import risk analysis procedures and considered:

a) Presence or absence in the exporting country;
b) Presence or absence in New Zealand;
c) Regulatory status in New Zealand;
d) Association with the commodity and pathway;
e) Potential for establishment and spread in New Zealand;
f) And potential for economic consequences in New Zealand.

(32) All organisms identified as 'pests of concern' were assessed by MPI to determine the 'probability of introduction and spread' (entry into New Zealand, exposure to suitable hosts, establishment and spread) in New Zealand (following part 2.2 of ISPM 11).

Description of measures

(33) The biosecurity system in New Zealand operates a series of components or layers (pre-border, border, and post-border) that together provide a high level of assurance that pests are unlikely to establish in New Zealand. No one part of the system is able to achieve the necessary assurance on its own. The main components in the pre-border and border system include:

a) commercial production and post-harvest activities (*Basic Measures*) to reduce pest prevalence on a commodity;

b) application of an additional measure to reduce pest prevalence on a commodity (*Targeted* and/ or *MPI-Specified Measure* where required);

c) official pre-export inspection and phytosanitary certification to verify that pre-export measures have been undertaken and effective as required by MPI and that the consignment is free from regulated pests;

d) on-arrival inspection of documentation in New Zealand to verify compliance with the IHS. Inspection of a consignment may also be conducted in New Zealand to verify pests are not present in a representative sample (e.g. no live regulated visible pests in a 600 unit sample);

e) remedial action (for example treatment) as required (e.g. if a pest is detected during on-arrival inspection).

(34) Measures of different strengths (*Basic*, *Targeted*, or *MPI-Specified*) are applied according to the risk of entry and establishment posed by a pest on the pathway and reduce the likelihood of introduction to a very low level on a consignment.

Basic Measures

(35) *Basic measures* are required to manage all organisms that could enter and establish in New Zealand. *Basic Measure* pests are pests identified through risk assessment as possibly being on the pathway. *Basic Measures* include (but are not restricted to) the following required components:

Commercial production

(36) All fresh produce for export to New Zealand, regardless of the associated pests, must be commercially produced using a quality system, recognised standard cultivation, pest management, harvest and packaging activities.

(37) Commercial production of *Oncidium* cut flowers includes:

a) Recognised standard cultivation
- production site management such as media preparation, planting, plant health monitoring, appropriate use of agrichemicals, environmental controls, management of records;
- crop hygiene practices such as in-field weed control.

b) Pest management
- pest monitoring by grower;
- management of pests and diseases by grower and includes cultural, biological and chemical controls.

c) Harvest activities
- sorting of cut flowers to remove extraneous matter (such as non-*Oncidium* plant material and soil) and non-export quality cut flowers.

d) Packaging activities
- removal of remnant soil and extraneous plant material;
- *Oncidium* cut flowers packed into new and clean material;
- product security maintained following export certification to prevent pest re-infestation.

(38) All cut flowers for export to New Zealand must be of export grade to minimise the likelihood of infested or infected cut flowers entering the supply chain.

(39) For many pests *Basic Measures* are sufficient to reduce their prevalence in a consignment to a very low level thus limiting their potential to enter, establish and spread in New Zealand if they entered undetected.

Targeted Measures

(40) *Targeted Measures* are used to manage the risk of entry and establishment of pests that are unlikely to be sufficiently managed by *Basic Measures*.

(41) Pests which present a higher risk (consequence and likelihood of introduction) require measures of a greater strength (e.g. *Targeted* Measures) compared with those pests where the risk is lower.

(42) An *Export Plan* is required for all commodities that may be associated with pests identified by MPI as requiring *Targeted Measures*. The components of an *Export Plan* may differ between countries and commodities because the growing systems and agricultural practices differ but can be similarly effective. The *Export Plan* provides a description of how the agreed *Targeted Measures* will be applied to manage these pests (where required) and is negotiated between New Zealand and the individual exporting country NPPO.

(43) *Targeted Measures* include a very wide range of options and provide MPI with the assurance that pest populations on the exported product are reduced to a level that will not enable the pest to establish a population in New Zealand.

(44) A *Targeted Measure* may also be efficacious against non-target pests.

(45) The following measures are some that may be considered for managing pests requiring *Targeted Measures*:

a) Country freedom;
- additional measures or an *Export Plan* are not required where 'country freedom' status is recognised by MPI for the export country.

b) Pest free area;

- MPI will audit the management of pest free areas for compliance with ISPM 4: *Requirements for the establishment of pest free areas*.

c) Pest free place of production;

- MPI will audit the management of pest free place of production for compliance with ISPM 10: *Requirements for the establishment of pests free places of production and pest free production sites*.

d) Pest control activities (in-field);

e) Systems Approaches;

- a Systems Approach is composed of two or more independent measures, as negotiated between MPI and the exporting country;
- independent measures may vary between exporting countries.

f) End-point treatment.

(46) *Targeted Measures* are subject to pathway assurance audits by MPI.

MPI-Specified Measures

(47) An *Export Plan* is required for all commodities that may be associated with pests identified by MPI as requiring *MPI-Specified Measures*.

(48) *MPI-Specified Measures* are required when the consequence of establishment of a pest is very high and where entry and establishment is possible as a result of the unmanaged pathway.

a) The selection of an appropriate *MPI-Specified Measure* is based largely on quantitative data that supports a high level of phytosanitary assurance. Quantitative data may be supported by qualitative information, especially with respect to approval of a systems approach.

b) A *MPI-Specified Measure* may also be effective against non-target pests.

(49) Wherever possible, MPI uses ISPMs (or regional standards if applicable) to identify the appropriate requirements for imported plant commodities.

(50) *MPI-Specified Measures* are subject to pathway assurance audits by MPI.

Certification and verification

Pre-export inspection and phytosanitary certification

(51) Pre-export inspection and phytosanitary certification by the exporting NPPO of all commercially produced fresh produce (including cut flowers and foliage) for export to New Zealand is required to provide assurances of freedom from visually detectable regulated pests. Assurance is also required that measures for pests that are not visually detectable have been applied as described in the *Export Plan*.

(52) The phytosanitary certification process includes:

a) verification that any *Basic*, *Targeted* and *MPI-Specified* Measures required by MPI have been met;

b) sampling and inspection to determine pest freedom;

i) The exporting NPPO will randomly sample and visually inspect a minimum of 600 *Oncidium* cut flower stems from each lot of 20,000 stems or more. Smaller lots will be sampled as per ISPM 31: *Methodologies for sampling of consignments*, Table 1: Table of minimum sample sizes for 95% and 99% confidence levels at varying levels of detection according to lot size, hypergeometric distribution.

ii) Inspection will involve an examination of all external parts of the flower stem and where necessary, at 10x magnification to ensure detection of cryptic or small pests. Consistent with international practice, the inspected sample must be free from regulated pests.

iii) where any live regulated pest is found in the inspected lot, an appropriate measure must be applied (for example fumigation with an efficacious chemical) or the lot must be rejected for export to New Zealand.

c) any remedial action taken as agreed with MPI.

Verification on arrival in New Zealand

(53) When a consignment arrives in New Zealand MPI will conduct a documentation check to ensure the phytosanitary certification conforms to the requirements laid out in the IHS.

(54) MPI will normally sample and inspect consignments of cut flowers on-arrival to verify the absence of regulated pests. In a few cases where a pathway is highly compliant inspections may be conducted on an audit basis. Any reduction in the level of inspection from current on-arrival levels is based on sound evidence of the compliance of a pathway.

(55) When live regulated pests are detected on consignments on arrival in New Zealand, one of the following risk management activities will be applied:

a) reshipment of the consignment;
b) destruction of the consignment; or
c) treatment of the consignment. Treatment may include:
   - re-conditioning to remove infested or infected stems; or
   - fumigation to kill regulated pests.

Part 3: Pest Risk Assessment and Management

(56) This section only includes a review of pests identified from the information sources included in paragraph (30).

(57) A summary assessment for pests of *Oncidium* spp. can be found in Appendix 1. Information on pest morphology and life history was taken from other import risk analyses (30) as it is the same regardless of the pathway. However, the ‘entry’ and ‘exposure’ assessments took into account the fresh *Oncidum* spp. cut flower pathway.

(58) Waste disposal is a key component of the exposure assessment and waste from cut flowers is significantly greater than for fresh produce and nursery stock. Therefore pests on the cut flower pathway may require a greater level of measure than required for other pathways (ISPM 32), namely fresh produce.

Summary of risk associated with the importation of *Oncidium* cut flowers from Taiwan

(59) Pests identified as potentially associated with *Oncidium* cut flowers from Taiwan were included in this assessment. These include species that use the commodity for some part of their lifecycle, as well as species where there is existing evidence to suggest they have an opportunistic association with the commodity.

(60) Pests are defined as “Any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products” (ISPM 5: *Glossary of Phytosanitary Terms*). Pests are categorised as a quarantine pest for New Zealand if the pest:

a) is not present in New Zealand or is not widely distributed and under official control; or
b) is a vector of a quarantine pest for New Zealand; or
c) is a different strain to the pests present in New Zealand and has a different impact (e.g. host range, pathogenicity); and

d) would cause unwanted harm if the pest became established in New Zealand.

(61) Assessment of the 204 pests identified as potentially associated with Orchidaceae identified 163 pests were either not present in Taiwan, present in New Zealand, or are considered a non-regulated pest; and therefore did not require further assessment.

(62) The other 41 pests were considered to be potential hazards for *Oncidium* cut flowers from Taiwan. These 41 pests were considered further (refer to Appendix 1).

(63) Twenty-nine of the pests assessed in Appendix 1 were determined to be present on *Oncidium* cut flowers during production and at the point of export. These pests present a potential risk on the Taiwan *Oncidium* cut flower import; however are unlikely to enter New Zealand, establish or spread. These pests were considered to be managed by Basic Measures and were not assessed further in the RMP.

(64) Eleven of the 41 pests were determined to present a potential risk on the Taiwan *Oncidium* cut flower import pathway, and require further discussion to determine the strength of measure required. These pests are identified in Table 1 below, and are discussed further in this section.

a) A summary of the pest risk assessments undertaken in the assessment for the 42 pests is presented in Appendix 1.

Determination of phytosanitary measures included in the draft IHS

(65) MPI requires measures to be applied to reduce, to a very low level, the risk of entry and establishment of a pest on a pathway. Attaining zero biosecurity risk is not possible in any system.

(66) Table 1 summaries the main evidence from Appendix 1, with paragraphs 66 to 77 providing justification for the level of measure required for each pest.

Table 1. Regulated pest groups associated with *Oncidium* cut flowers, supported by a summary of the evidence to support the level of measure [refer to Appendix 1 for further information and references].

Basic Measures	Targeted Measures
Acari	
Tenuipalpus pacificus - Host range restricted to orchids and ferns. - Slow moving and tends to be sedentary, dispersal most likely via air currents or movement of infested plant material. - Parthenogenesis is common in the family but uncertain for the species - Possible it can establish in the warmer regions of New Zealand. - Assessed to have a low economic impact.	*Tetranychus kanzawai* - Highly polyphagous, with 160 known hosts. - Dispersal via walking or passive dispersal via air currents or movement of infested plant material. - Arrhenotokous parthenogenesis (unfertilised eggs hatch into males, fertilised eggs hatch into females). - Possible it can establish in the warmer regions of New Zealand. - Assessed to have a moderate economic impact.
Diaspididae	
Chrysomphalus aonidum - Adults likely to be visibly detectable during phytosanitary inspection. - Polyphagous with hosts from over 77 plant families. - Crawlers are the only mobile stage for females. - Sexual reproduction. - Possible to establish in the warmer, humid regions of New Zealand or in protected environments. - Assessed to have a low economic impact.	

Basic Measures	Targeted Measures
Chrysomphalus dictyospermi - Adults likely to be visibly detectable during phytosanitary inspection: usually prefers leaves but occasionally occurs on branches. - Polyphagous with hosts from over 73 plant families. - Crawlers are the only mobile stage for females. - Obligate bisexual and parthenogenetic. - Possible to establish in the warmer regions of New Zealand or in protected environments. - Assessed to have a low economic impact. *Ischnaspis longirostris* - Adults likely to be visibly detectable during phytosanitary inspection - Polyphagous with hosts from over 77 plant families. - Crawlers are the only mobile stage for females. - Sexual reproduction only. - Possible to establish in the warmer, humid regions of New Zealand or in protected environments. - Assessed to have a low economic impact. *Ferrisia virgata* - Adults tend to reside in concealed locations, making it harder for them to be visually detected. Eggs are laid individually. - Polyphagous with hosts from 68 plant families. - Nymphs and adult females are mobile. - Sexual reproduction. - Vectoring capabilities [not known to vector any viruses associated with *Oncidium*]. - Climate may be a limiting factor for establishment, however found in tropical, subtropical and temperate regions. Adult females are capable of overwintering - Assessed to have a moderate to low economic impact. *Planococcus minor* - Adults tend to reside in concealed locations, making it harder for them to be visually detected. Eggs are laid in clusters of 100-200. - Polyphagous with a wide range of hosts. - Crawlers are the most mobile stage. - Sexual reproduction, but also likely reproduction occurs via parthenogenesis. - Possible to establish in the warmer regions of New Zealand or in protected environments. - Assessed to have a moderate economic impact.	
<u>Thysanoptera</u>	
	Thrips hawaiiensis - All life stages are very small, however presence of infestation can be obvious by response of the plant (discoloration and abnormally shaped leaves).

Basic Measures	Targeted Measures
	- Eggs are laid inside plant tissues and may not be visible during phytosanitary inspection. - Polyphagous with a wide range of hosts from 141 plant species including citrus and pipfruit. - Adults are winged, nymphs capable of crawling to suitable host material. - Can reproduce sexually and asexually. - May survive in warmer regions of New Zealand. - Assessed to have a high economic impact (if established). *Thrips palmi* - Targeted measures on other pathways - All life stages are very small, however presence of infestation can be obvious by response of the plant (discoloration, distorted and scarred tissue). - Eggs are laid inside plant tissues and may not be visible during phytosanitary inspection. - Polyphagous with a wide range of hosts including citrus. - Adults are winged, nymphs capable of crawling to suitable host material. - Reproduces sexually and parthenogenetically. - Likely to survive in warmer regions of New Zealand. - Assessed to have a high economic impact (if established). *Scirtothrips dorsalis* - All life stages are very small, however presence of infestation can be obvious by response of the plant (discoloration, scarred and distorted tissue). - Polyphagous with a wide range of hosts. - Adults are winged and capable of dispersal. - Sexual and arrhenotoky parthenogenesis reproduction. - Tropical species however reported from countries that share the same climatic similarity - Low economic (though significant to individual growers) and environmental impact
Plant Pathogens *Phytophthora palmivora* - Symptoms are likely to be visible. - Wide range of hosts, infecting more than 130 species. - Spread via water and air. - The North Island has conditions most suited to the pathogen, however the level of damage will be restricted by the level of disease expression in suboptimal conditions.	

Basic Measures

(67) The following measures are justified for the pests in paragraph 67 based on the evidence for their low risk summarised from the sources identified in paragraph 31 and summarised in Table 1 [refer to Appendix 1 for additional information]. Pests identified as requiring Basic Measures have been grouped based on taxon.

(68) *Basic Measures* are sufficient and justified to manage the following pests on the *Oncidium* cut flower import pathway:

- *Tenuipalpus pacificus*
- *Chrysomphalus aonidum*
- *Chrysomphalus dictyospermi*
- *Ischnaspis longirostris*
- *Ferrisia virgata*
- *Planococcus minor*
- *Phytophthora palmivora*

Acari (mites) [as identified in paragraph 67]

(69) *Basic Measures* are sufficient to manage the low risk posed by flat mite *Tenuipalpus pacificus* because*:*

Commercial production will reduce populations of *T. pacificus* in *Oncidium* spp. production sites to a low level and minimise the potential for introduction into New Zealand.

i. Commercial production includes monitoring for plants displaying signs/symptoms of infestation during production. This will identify affected plants, resulting in pest controls being applied (see Commercial Production).

1. Heavy infestations of *T. pacificus* cause deep pits/sunken areas, leaf discolouration and necrotic spots around the basal portion of the leaves (MPI, 2010).

Harvest, grading and packing activities will reduce the likelihood of *T. pacificus* being associated with *Oncidium* cut flowers at export to a very low level.

i. *T. pacificus* eggs are laid on leaves (MPI, 2010). The specified commodity description requires the *Oncidium* cut flower to be free from leaf material (see Commodity Description).

ii. The IHS specifies 'commercially produced' export grade cut flowers (which includes grading to remove obviously damaged stems). Heavily infested and damaged cut flowers will be removed during grading and packaging and therefore not exported (see Commodity Description).

T. pacificus are likely to be detected and managed during official pre-export inspection by the exporting NPPO (see Pre-export inspection and phytosanitary certification).

i. *T. pacificus* are reddish in colour with black patterns (Mersino, 2002) and contrast the colour of the *Oncidium* cut flowers making it obvious during visual detection.

ii. Detection of *T. pacificus* will require remedial action prior to export certification. Detection of *T. pacificus* may be managed by *Targeted Measures* required for other Acari on this pathway.

Diaspididae (Scale insects and mealybugs)

(70) *Basic Measures* are justified and sufficient to manage the low risk posed by Diaspididae (*C. aonidum, C. dictyospermi*, *F. virgata*, *I. longirostris*, and *P. minor*) because:

a) Commercial production activities will reduce populations of Diaspididae in *Oncidium* production sites to a low level.

   i) Commercial production includes monitoring for plants displaying signs/symptoms of infestation during production. Monitoring will identify obviously affected plants, resulting in pest controls being applied (see Commercial Production).

      - The behaviour of *F. virgata* and *P. minor* to seek out cryptic locations on the flower may make the mealybugs difficult to detect. *F. virgata* and *P. minor* do not produce huge quantities of sugary honeydew (PKB, 2017), however evidence of damage by mealybugs may be easily detected.

   ii) Diaspididae damage plants directly by feeding on phloem (MPI, 2014). Heavy infestations may cause wilting of leaves and stems, reduce photosynthetic efficiency and growth and plant disfigurement (MPI, 2014).

b) Harvest, grading and packing activities will reduce the likelihood of Diaspididae being associated with *Oncidium* cut flowers at export to a very low level.

   (i) Adult Diaspididae are likely to be removed during packhouse activities, as they are relatively large and visually obvious and covered by a scale. That is:

      - Adults of these species are 1.3mm or larger and covered with a distinctly coloured scale cover. (MPI, 2014; MPI, 2007; MPI, 2008).
      - Diaspididae can lay eggs (under the scale) on both the flower and stem, with nymphs and adults also present on the cut flower (MPI, 2010; MPI, 2014).

   ii) The IHS specifies 'commercially produced' export grade cut flowers (which includes grading to remove obviously damaged stems). Heavily infested and damaged cut flowers will not be export-grade and therefore will be removed during grading and packaging (see Commodity Description)

c) Diaspididae are likely to be detected and managed during official pre-export inspection by the exporting NPPO (see Pre-export inspection and phytosanitary certification).

   i) Their morphology will make them visually obvious [paragraph 69 b) (i)].
   ii) Detection of *C. aonidum, C. dictyospermi*, *I. longirostris*, and *P. minor* will require remedial action prior to export certification.

d) Detection of these species may be managed by *Targeted Measures* required for other Diaspididae on this pathway.

Plant pathogens [as identified in paragraph 66]

(71) *Basic Measures* are justified and sufficient to manage the low risk from *P. palmivora* because*:*

a) Commercial production activities will reduce the presence of *P. palmivora* in *Oncidium* production areas to a low level.

   i) Monitoring for plants displaying signs/symptoms (e.g. black lesions on rots and basal portions of the orchid pseudobulb visible to the naked eye) of infestation during production will identify affected plants, resulting in pest controls being applied (see Commercial Production).

b) Grading and packing activities would detect signs of a severe infestation of *P. palmivora* in *Oncidium* cut flowers.

   i) Symptoms of P. *palmivora* (black lesions) are visible, however a low level infection may not always be detected.
   ii) *Oncidium* cut flowers are exported free of soil, therefore removing reservoir inoculum.
   iii) The IHS specifies 'commercially produced' export grade produce (which includes grading to remove obviously damaged stems). Infested and misshapen stems will not be export-grade and therefore will be removed during grading and packaging (see Commodity Description).

c) Significant infection of *P. palmivora* is likely to be detected and managed during official pre-export inspection by the exporting NPPO (see Pre-export inspection and phytosanitary certification).

   i) Detection of *P. palmivora* will require remedial action prior to export certification.

d) *P. palmivora* is unlikely to be able to establish in New Zealand from infected stems.
   i) *Oncidium* cut flowers are exported free of soil (inoculum reservoir) [Appendix 1].
   ii) Cut flowers are usually displayed in vases of tap water, with water normally disposed of into commercial waste water systems.
   iii) Disposal to a home compost system is unlikely to expose disease to suitable hosts.
   iv) Disposal into home gardens may expose infected material to suitable hosts, however disease expressions is restricted by suboptimal temperatures [Appendix 1].

Targeted Measures

(72) The following measures are justified based on the evidence for their moderate risk to New Zealand summarised from the sources identified in paragraph 31 (also see Appendix 1). Pests have been grouped based on taxon.

(73) The following pests have been identified as requiring *Targeted Measures*:

- *Tetranychus kanzawai*
- *Scirtothrips dorsalis*
- *Thrips hawaiiensis*
- *Thrips palmi*

(74) Targeted Measures may also be effective against non-target pests that only require *Basic Measures*.

Acari (mites)

(75) *Targeted Measures* are justified and sufficient to manage *Tetranychus kanzawai* because:
   a) *T. kanzawai* poses a moderate risk [Appendix 1] to New Zealand via this pathway and is unlikely to be sufficiently managed by *Basic Measures* alone.
      i) *T. pacificus* has a limited host range, whereas *T. kanzawai* is highly polyphagous [Appendix 1].
   b) *Targeted Measures* will effectively manage risk from *T. kanzawai* either by excluding them or, removing or eliminating them from the pathway. *Targeted Measures* options include:

Pest Exclusion

   a) Pest freedom status either at the country, area or production site will effectively exclude *T. kanzawai* from the pathway. The options for pest freedom are as per the international standards for phytosanitary measures (ISPMs):
      i) Country freedom;
         - Additional measures are not required where 'country freedom' status is recognised by New Zealand for the export country.
      ii) Pest free area (PFA);
         - PFAs managed as per ISPM 4: *Pest free areas* or, based on historical absence as per ISPM 8: *Determination of pest status in an* area; and recognised as a PFA by MPI.
      iii) Pest free place of production (PFPP);
         - PFPP managed in accordance with ISPM 10: *Requirements for the establishment of pest free places of production and pest free production sites* and recognised by MPI.

Pest Removal or Elimination

   b) An effective chemical treatment targeting the pest prior to (i.e. in-field pests controls with registered acaricides), or after, harvest (i.e. methyl bromide or other fumigant) followed by visual inspection to verify pest absence will remove the risk posed by *T. kanzawai* on *Oncidium* cut flowers :

i) The small size of the mites may make them difficult to detect by visual detection. However, evidence of webbing and mite damage may be easily detected e.g. damage and yellowish spots (PKB, 2017) indicating that a treatment is required.

ii) The addition of a pre-harvest treatment will significantly reduce or remove populations of mites during production. Therefore a greater level of assurance is provided by phytosanitary inspection that the stems are free from *T. kanzawai*.

iii) An effective end-point treatment will kill any residual mites present on stems.

c) Detection of *T. kanzawai* will require remedial action, such as fumigation with methyl bromide, to eliminate them prior to export certification.

Thysanoptera (thrips)

(76) *Targeted Measures* are justified to manage Thrips (*S, dorsalis T. hawaiiensis* and *T. palmi*) because:

a) These thrips species pose a moderate risk [Appendix 1] to New Zealand via this pathway and are unlikely to be sufficiently managed by *Basic Measures* alone.

b) *Targeted Measures* will effectively manage risk these thrips either by excluding them or, removing or eliminating them from the pathway. *Targeted Measures* options include:

Pest Exclusion

c) Pest freedom status either at the country, area or production site will effectively exclude *S. dorsalis T. hawaiiensis* and *T. palmi* from the pathway. The options for pest freedom are as per the international standards for phytosanitary measures (ISPMs):

i) Country freedom;

- Additional measures are not required where 'country freedom' status is recognised by New Zealand for the export country.

ii) Pest free area (PFA);

- PFAs managed as per ISPM 4: *Pest free areas* or, based on historical absence as per ISPM 8: *Determination of pest status in an* area; and recognised as a PFA by MPI.

iii) Pest free place of production (PFPP);

- PFPP managed in accordance with ISPM 10: *Requirements for the establishment of pest free places of production and pest free production sites* and recognised by MPI.

Pest Removal or Elimination

d) An effective chemical treatment targeting thrips prior to (i.e. in-field pests controls with registered pesticides), and/or after, harvest (i.e. methyl bromide or other fumigant) followed by visual inspection to verify pest absence will remove the risk posed by thrips on *Oncidium* cut flowers :

i) The small size of thrips life stages (e.g. eggs) may make them difficult to detect by visual inspection alone.

ii) The application of an in-field control, supported by current efficacy information, will significantly reduce or remove thrips population during *Oncidium* production. Thrips are prone to developing pesticide resistance, therefore efficacy information is required to be monitored and on-going monitoring during production to verify that the pesticide application is working.

iii) An effective end-point treatment will kill any residual thrips present on stems.

e) Detection of thrips will require remedial action, such as fumigation with methyl bromide, to eliminate them prior to export certification.

Summary of Proposed Measures

(77) MPI considers the risks associated with the importation of *Oncidium* cut flowers will be effectively managed by applying risk management measures (Table 2), specifically:

- in-field practices and pest controls;
- harvest, grading and packing activities;
- pre-export inspection and certification, overseen by the exporting country NPPO.

(78) Each step in the export system reduces the likelihood of pests being present on the pathway. MPI will verify and inspect the consignment to ensure the requirements in the IHS have been met. Non-compliant consignments will be treated, re-shipped or destroyed.

(79) The measures MPI has identified as necessary to manage pests associated with *Oncidium* cut flowers are described below:

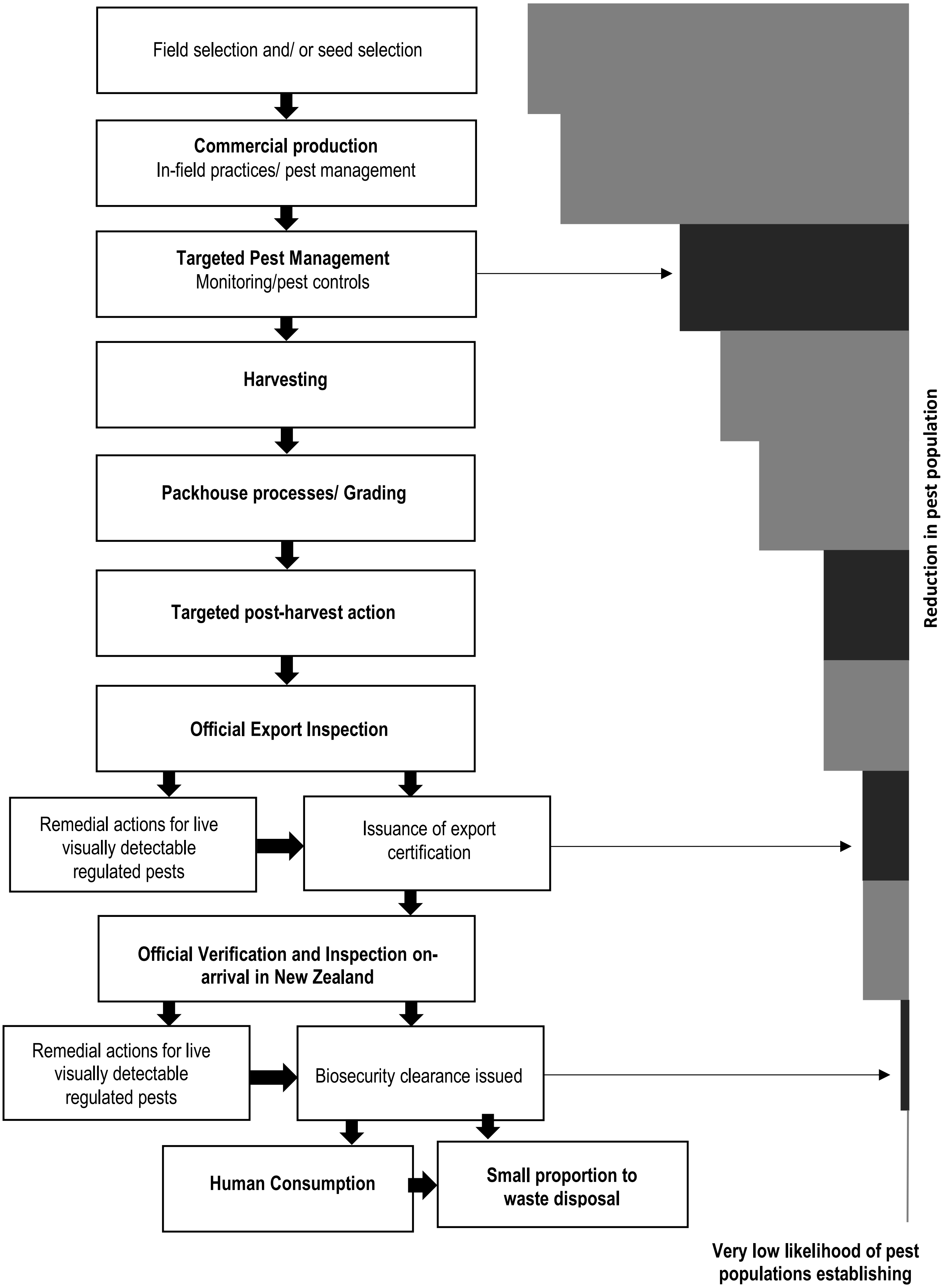
Table 2. Measure required to manage the risk associated with the *Oncidium* cut flower import pathway.

Pest	Level of Measure
Tenuipalpus pacificus *Chrysomphalus aonidum* *Chrysomphalus dictyospermi* *Ischnaspis longirostris* *Ferrisia virgata* *Planococcus minor* *Phytophthora palmivora*	Basic Measures
Tetranychus kanzawai *Scirtothrips dorsalis* *Thrips hawaiiensis* *Thrips palmi*	Targeted Measures

(80) The measures contained in the IHS are subject to regular review based on pathway compliance, emerging risk assessment, new information/intelligence, and results of audit of the export system.

(81) MPI will monitor interceptions of all regulated pests (and hitchhikers) and the appropriateness/ effectiveness of phytosanitary measures during trade.

Table 3. New Zealand biosecurity system - Layers of protection for imported fresh produce



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Appendix 1: Pest Categorisation

The pest categorisation process (table below) identifies all known major pests and diseases found to be associated with *Oncidium* cut flowers in Taiwan, determines their presence (or absence) in New Zealand, and considers if they might be associated with *Oncidium* cut flowers at export. A summary of key conclusions from the risk analysis process is included where a pest has been identified as a potential quarantine pest. Pests associated with *Oncidium* cut flowers, but not present in Taiwan, are not included in the table.

The table below follows the risk analysis process and terminology identified in part 2 of the international standard, ISPM 11: *Pest risk analysis for quarantine pests*. The table includes:

- The identity of the pest. The table is organised by order, then family.
- Conclusions from the risk analysis, including the associated justification and evidence, for:
  - Step 1: Pest categorisation.
  - Step 2: Assessment of the probability of introduction and spread.
  - Step 3: Assessment of potential economic consequences.

  Note: if at any step there is insufficient information available to determine that the organism fulfils the criteria of a quarantine pest, then the organism is discounted from the pest list and the pest risk analysis process does not continue.
- Conclusion of the pest risk assessment ('Is a measure justified?').

  Note: the level of measure required, based on the outcome of the pest risk management assessment in Part 3 of this RMP, is included in the table.

It is assumed that if a species associated with fresh pumpkin (*C. pepo*) is of concern, then the reasons for this concern would be recorded internationally (with interception data (where available), any risk analysis, scientific studies, reports of significant economic impacts). Measures must be supported by technical justification, and measures cannot be applied because there is uncertainty or a lack of available information. MPI may review the pests associated with a pathway (or their management) if new information becomes available, including in the following circumstances:

a) a change in host status;
b) pest status prevalence;
c) frequent interception on arrival in New Zealand; or
d) a new or changed risk on imported fresh pumpkin is identified by MPI's Emerging Risks System.

Some organisms may not be included on the *Oncidium* cut flowers pest list, and therefore a measure (e.g. Basic, Targeted, or MPI-Specified Measures) has not been assigned to the pest. However, if regulated organisms are intercepted on the pathway an on-arrival remedial action is required (e.g. fumigation) prior to clearance for entry into New Zealand. If no suitable or approved treatment is available, the consignment will be reshipped or destroyed. Any pests intercepted on the pathway may be retrospectively added to the pest list and will be considered as part of the next review of the IHS.

ISPM 11 requires that "The identity of the pest should be clearly defined to ensure that the [risk] assessment is performed on a distinct organism, and that biological and other information used in the assessment is relevant to the organism in question." It is recognised that a pest may still be clearly defined at genus level, as not all species are described. In this case, genera that are present in Tonga but not in New Zealand would be considered as regulated as they still pose a potential hazard to New Zealand.

Note: ISPM 5 defines 'quarantine pest' as "*a pest of potential economic importance to [New Zealand] and not yet present there, or present but not widely distributed and being officially control.*"

<table>
<tr><th colspan="2">Scientific name</th><th>Conclusion</th><th>Reason</th><th>Evidence to support</th><th>Is a measure justified?</th></tr>
<tr><td rowspan="4">Acari</td><td rowspan="4">Tarsonemus bilobatus Suski, 1965</td><td>Has the potential to be a quarantine pest on this pathway.</td><td>Tarsonemus bilobatus is associated with the pathway.</td><td>- T. bilobatus is present in Taiwan (USDA, 2012).
- Is not recorded in New Zealand (NZOR, 2017).
- Are known to be associated with Oncidium (USDA, 2012). Note: "The T. bilobatus mite feeds on fungus. The mite can then move the fungus around the greenhouse to additional plants (Gill et al., 2003). Thus, this pest may be present on the commodity but not directly associated with it" [USDA 2012].</td><td rowspan="4">Does not fulfil the criteria of being a quarantine pest on this pathway.</td></tr>
<tr><td>And has the potential to establish and spread if it entered NZ.</td><td>T. bilobatus is has the potential to enter New Zealand and being exposed to suitable hosts.</td><td>Entry:
- Mites present on the stem and flower may be difficult to detect during grading and packaging.
  - Symptoms are recorded on the leaves of the plant, including discoloured, lustrous and deformed leaves with irregular folding of the upper surface (BA, 2002). Cut flowers under this IHS are required to be free of leaf material. [Note: symptoms recorded for seedlings of cucumber and Chinese cabbage] (BA, 2002).
- It is assumed all life stages could survive transit conditions to New Zealand. T. bilobatus has been intercepted live on fresh produce arriving in New Zealand (QuanCargo, 2017).
Exposure:
- Whole Oncidium spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost providing a mechanism for T. bilobatus to be exposed to the environment.
- T. bilobatus has been reported from many plant species, bacteria and fungi cultures, llitter and soil and is considered to be primarily fungivorous (Zhang, 2003). Hosts also include seedlings of melon, watermelon, cucumber and Chinese cabbage in greenhouses in Japan (Zhang, 2003).
- Exposure will be dependent on dispersal from disposal site and the proximity of suitable hosts. T. bilobatus is likely to be limited with dispersing to a suitable host.
  - Dispersal is via passive transportation and via the movement of infested foliage or soil (BA, 2002).
Establishment and spread:
- Has a wide host range and is usually confined to crops grown in glasshouses (BA, 2002).</td></tr>
<tr><td>And has the potential to cause negative economic consequences which are sufficient to justify phytosanitary measures on this pathway.</td><td>T. bilobatus is capable of causing low level economic and environmental impacts if it established in New Zealand.</td><td>- It is known to cause injury to several ornamental flowers in greenhouses in Poland (Zhang, 2003).
- Is suspected to be a potential vector of plant diseases (BA, 2002). Dowling et al. (2010) stated that this species has been implicated as a vector or certain strains of fungi, as the mites can move fungus between hosts (USDA, 2012).</td></tr>
<tr><td colspan="3">An additional phytosanitary measures cannot be applied against a pest if it is not considered to be a quarantine pest on this pathway. Measures for the management of other mites should also manage these species. Can be re-assessed when new information is available.</td></tr>
</table>

Tenuipalpus pacificus Baker, 1945	Has the potential to be a quarantine pest on this pathway.	*Tenuipalpus pacifiicus* is associated with the pathway.	- *T. pacificus is* present in Taiwan (BAPHIQ, 2013). - Is not recorded in New Zealand (NZOR, 2017). - Are known to be associated with *Oncidium* leaves and flowers (BAPHIQ, 2013; MPI, 2010).	**Is considered a quarantine pest on this pathway.**
	And has the potential to establish and spread if it entered NZ.	*T. pacificus* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry: - Mites present on the stem and flower may be difficult to detect during grading and packaging. - It is assumed all life stages could survive transit conditions to New Zealand. *T. pacificus* has been intercepted live on cut flowers (orchids) arriving in New Zealand (MPI, 2016c). Exposure: - Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost providing a mechanism for *T. pacificus* to be exposed to the environment. - *T. pacificus* appears to have a host range restricted to orchids (MPI, 2010), therefore there may be limited hosts available in home gardens. Recent information suggests a host association with Polypodiaceae ferns (*Davallia fejeensis* and *Platycerium* sp.) (UF/IFAS 2015). However, it is not known whether endemic New Zealand orchid species would be susceptible to *T. pacificus* (MPI, 2010). - Exposure will be dependent on dispersal from disposal site and the proximity of suitable hosts. *T. pacificus* is likely to be limited with dispersing to a suitable host. - *T. pacificus* is slow moving and tends to be sedentary (MPI, 2010). Dispersal is most likely via air currents and via the movement of infested plants or other objects (MPI, 2010). Establishment and spread: - Parthenogenesis is common in Tenuipalpidae, however it is not known whether *T. pacificus* can reproduce asexually (MPI, 2010). Therefore it is assumed that both a male and female would need to be present on the cut flowers, and in close proximity to each other to found a population. - It is possible for *T. pacificus* to establish in the warmer northern parts of New Zealand (MPI, 2010).	**Measures are justified (Basic Measures)**
	And has the potential to cause negative economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*T. pacificus* is capable of causing low level economic and environmental impacts if it established in New Zealand.	- It is unknown whether this species would affect New Zealand native ferns or native orchid species. Potential economic/environmental consequence. - Establishment of *T. pacificus* in a greenhouse which commercially produces orchids could impact production and export. Management of the mite could incur additional costs. - It is assessed to have a low economic and environmental impact due to limited host and climatic range in NZ (MPI, 2010).	
Tetranychus kanzawai Kishida, 1927	Has the potential to be a quarantine pest on this pathway.	*Tetranychus kanzawai* is associated with the pathway.	- *T. kanzawai* is present in Taiwan (BAPHIQ, 2013). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (BAPHIQ 2013).	**Is considered a quarantine pest on this pathway.**

		And has the potential to establish and spread if it entered NZ.	*T. kanzawai* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry: - The small size of the mite means that the pre-export grading and packing process could miss a low level infestation, and are unlikely to be detected during pre-export inspection due to their small size. - Mites are up to 0.5 mm long (MPI, 2011). - Intercepted on cut flowers arriving in New Zealand (*Cordyline spp*. and *Heliconia* spp.) (QuanCargo, 2017). This therefore suggests that mites are capable of surviving storage and transit conditions to New Zealand. Exposure: - Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost. It is likely that there could be mites at various stages of development present at disposal sites (MPI, 2011). - Is highly polyphagous (MPI, 2009b) with 160 known hosts, including citrus, strawberry, peach and grapevine (MPI, 2011), which are common in home gardens and in close proximity to waste disposal sites. - Adults and juveniles are wingless but capable of immigrating long distances by passive dispersal (MPI, 2009b). It is possible that cut flowers will be displayed or disposed of in places with wind and air-currents that could facilitate spread to suitable hosts (MPI, 2011). Establishment and spread: - Unfertilised eggs hatch into males, while fertilised eggs hatch into females (MPI, 2009b). A single adult female would have to survive until her (all male) offspring were sexually mature to mate in order to found a population. - *T. kanzawai* reaches potential host plants either by random walking or passive dispersal (MPI, 2009a). - Most parts of New Zealand will be less than optimal for the establishment of *T. kanzawai*, with the northern, warmer parts of New Zealand likely to be the most suitable (MPI, 2009b).	**Measures are justified (Targeted Measures)**
		And has the potential to cause negative economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*T. kanzawai* is capable of causing moderate level economic and environmental impacts if it established in New Zealand.	- Establishment of *T. kanzawai* would decrease productivity of several economically important commercial crops (grapes, citrus and stone fruit). - Establishment would cause increased control costs and market access may be affected. - The potential economic impact is considered to be moderate for *T. kanzawai* (MPI, 2009b).	
Coleopte	*Lema pectoralis* Baly, 1865	Has the potential to be a quarantine pest on this pathway.	*Lema pectoralis* is associated with the pathway.	- *L. pectoralis* is present in Taiwan (Lee and Matsumura, 2013) - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with Orchidaceae (MPI, 2010; Bharathimeena, 2016). No evidence has been found to support *L. pectoralis* being associated with *Oncidium*.	**Does not fulfil the criteria of being a quarantine pest on this pathway.**

		And has the potential to establish and spread if it entered NZ.	*L. pectoralis* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry:
				- Cut flowers that are infested and displaying symptoms of *L. pectoralis* are likely to be discarded during harvest and packaging processes.
				- Larvae, pupae and adults would be visually detectable during pre-export phytosanitary inspection, however single eggs may be missed.
				    - Eggs (1.35 - 1.75mm in length) are yellowish in colour and laid on leaves and petals singularly or in groups of two to four (MPI, 2017a).
				    - Larvae are yellowish-white on average for the first to fourth instars 2.5, 4.4, 6.21 and 11.64mm in length (Kumari and Lyla, 2001).
				    - Adults are yellow and 0.9 – 1cm in length (Bharathimeena, 2016)
				- It is assumed that *L. pectoralis* could survive transit conditions to New Zealand
				Exposure:
				- Only known host is *Vanda* and *Dendrobium* orchids (Vencl and Leschen, 2014). The limited host range may limit exposure potential.
				Establishment and spread:
				- Due to the current global distribution, *L. pectoralis* is likely to be restricted to tropical areas, however it is not possible to confirm whether the species could establish in New Zealand without a full analysis with no definitive information to support potential establishment in New Zealand (MPI, 2017a).
				- Were *L. pectoralis* to enter (as eggs, larvae, or adults) and be exposed to a suitable environment, sexual maturity is attained 2-3 weeks after emergence from pupation with beetles mating many times throughout their life (Hirao *et al.*, 2001).Therefore if both sexes were present a population could be founded.
				- Known to be weak flyers, however were a population to establish the species may be able to spread to suitable areas (Bharathimeena, 2016).	

		And has the potential to cause negative economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*L. pectoralis* is capable of causing very low level economic and environmental impacts if it established in New Zealand.	- Is recorded as a major pest of orchid cultures for *Vanda* and *Dendrobium* in the Philippines (Beenen and Roques, 2010). - The potential for the beetle to cause negative economic consequences will be limited to greenhouse environments given that it has a tropical distribution.	
		An additional phytosanitary measures cannot be applied against a pest if it is not considered to be a quarantine pest on this pathway [unconfirmed host association]. Measures for the management of other quarantine pests should also manage these species. Can be re-assessed when new information is available.			
	Orchidophilus ran Morimoto, 1994	Has the potential to be a quarantine pest on this pathway.	*Orchidophilus ran* is associated with the pathway.	- *O. ran* is present in Taiwan (Prena, 2008) - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with Orchidaceae (Prena, 2008).	**Does not fulfil the criteria of being a**

		And has the potential to establish and spread if it entered NZ.	*O. ran* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry:
				- Cut flowers that are infested and displaying symptoms of *O. ran* are likely to be discarded during harvest and packaging processes.
				- Adults may be visually detectable during pre-export phytosanitary inspection
				  - Prena (2008) stated that this species is notably similar to female *O. peregrinator* and *O. epidendri*, however little information is available on the morphology of *O. ran.*
				  - Adults are black/dark grey, around 3-4mm in length (Prena, 2008).
				Exposure:
				- Recorded plant associations with Orchidaceae, Epidendroideae: *Cymbidium* sp., *Dendrobium* sp., *D. nobile*, and *Phalaenopsis* sp. (Prena, 2008). Further host information was not found, so there it is possible *O. ran* will have a limited host range which may limit exposure potential.
				Establishment and spread:
				- Distribution and climate preferences unknown for this species.
					quarantine pest on this pathway.

		An additional phytosanitary measures cannot be applied against a pest if it is not considered to be a quarantine pest on this pathway [unconfirmed host association]. Measures for the management of other quarantine pests should also manage these species. Can be re-assessed when new information is available.			
Diptera	*Contarinia maculipennis* Felt, 1933	Has the potential to be a quarantine pest on this pathway.	*Contarinia maculipennis* is associated with the pathway.	- *C. maculipennis* is present in Taiwan (Zhou *et al*., 2014) - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with Orchidaceae (Zhou *et al*., 2014). No evidence found to suggest *Oncidium* is a host.	**Does not fulfil the criteria of being a quarantine pest on this pathway.**

		And has the potential to establish and spread if it entered NZ.	*C. maculipennis* has the potential to enter New Zealand and being exposed to suitable hosts.	- Cut flowers that are infested and displaying symptoms of *C. maculipennis* are likely to be discarded during harvest and packaging processes.
				  - Larvae feed inside unopened buds, causing the buds to remain closed and become deformed and discoloured. Where a bud to open, petals would shows signs of damage (van der Gaag *et al*., 2008).
				- Larvae and adults would be visually detectable during pre-export phytosanitary inspection, however single eggs may be missed.
				  - Eggs are deposited in masses (UF, 2006).
				  - Larvae are yellowish-white and as long as 2.2 mm, with pupae 1.2 mm in length (Zhou *et al*., 2014).
				  - Pupation occurs in the soil [commodity description requires to be free of soil] (UF, 2006).
				  - Adults are 1.2-1.7 mm in length (Zhou *et al*., 2014).
				Exposure:
				- Hosts include tomato tomato (Lycopersicon esculentum), capsicum (Capsicum annuum), eggplant (Solanum melongena) (van der Gaag et al., 2008).
				- Pupation occurs in soil (UF, 2006) – infected buds would need to be exposed to soil for the lifecycle to continue.
				Establishment and spread:	

					- Likely to be a tropical species, however it is unknown whether the species could establish in warmer regions or protected environments (such as greenhouses (van der Gaag *et al*., 2008)).	
			An additional phytosanitary measures cannot be applied against a pest if it is not considered to be a quarantine pest on this pathway [unconfirmed host association]. Measures for the management of other quarantine pests should also manage these species. Can be re-assessed when new information is available.			
Hemiptera	Coccoidea: Diaspididae	*Chrysomphalus aonidum* (Linnaeus, 1758)	Has the potential to be a quarantine pest on this pathway.	*Chrysomphalus aonidum* is associated with the pathway.	- *C. aonidum* is present in Taiwan (USDA, 2012). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (USDA, 2012).	**Is considered a quarantine pest on this pathway.** **Measures are justified (Basic Measures)**
			And has the potential to establish and spread if it entered NZ.	*C. aonidum* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry: - All life stages are very small (CABI, 2017; MPI, 2014) but could be visually detectable during production and harvest. - Adult *C. aonidum* are covered with a scale (1.5 – 2.5mm) cover which is dark brown or bluish-black with a reddish brown exuviae (MPI, 2014). - Is capable of surviving transit conditions to New Zealand. Has been intercepted on cut flowers (MPI, 2014). Exposure: - Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost. - Is polyphagous with no shortage of suitable hosts present in NZ. Recorded hosts from over 77 plant families (MPI, 2014), including plants will be common in home gardens (melons, potato and pumpkin). Therefore likely to come in contact with a suitable host. - Females produce eggs continuously over several weeks until their deaths (MPI, 2014), which could continue once the cut flowers have been disposed of [14 day life span once flower is cut from plant]. Therefore mobile crawlers are likely to be produced as long as the host remains in good condition. - Crawlers are the only mobile stage for females. Males can move in all life stages (MPI, 2014). Due to their specialised biology, exposure is dependent on the delicate crawler (first instar only for females, males are mobile for all life stages) leaving the host and successfully finding a suitable host. - Crawlers are susceptible to extremes of temperatures, desiccation, rain and predation (MPI, 2014). Establishment and spread:	

					- Reproduction is sexual, with no evidence of parthenogenesis (MPI, 2014). Females are only mobile during the crawler (first instar stage), so a male would need to locate the female in order for reproduction [assuming both sexes enter and are exposed to a suitable host]. - Preference for humid environments (MPI, 2014), likely to be able to establish in at least some parts of New Zealand, or in sheltered habitats, or in greenhouses. - Detected in New Zealand in 2004 however distribution was limited to heated glasshouses and indoor plants (MPI, 2014). Confirmed eradicated in 2015 (MPI, 2014).	
			And has the potential to cause negative economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*C. aonidum* is capable of causing low level economic and environmental impacts if it established in New Zealand.	- Increased control costs, market access may be affected. - *C. aonidum* is especially difficult to control with insecticides because it may occur on a wide range of weedy hosts including conifers and grasses (MPI, 2014). - As for all armoured scale insects, management is difficult due to the protection afforded by the waxy caps covering the delicate insect body (MPI, 2014). - Economic and environmental impacts of *C. aonidum* is considered 'low' (MPI, 2014).	
		Chrysomphalus dictyospermi (Morgan, 1889)	Has the potential to be a quarantine pest on this pathway.	*Chrysomphalus dictyospermi* is associated with the pathway.	- *C. dictyospermi* is present in Taiwan (USDA, 2012). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (USDA, 2012).	**Is considered a quarantine pest on this pathway.** **Measures are justified (Basic Measures)**

			And has the potential to establish and spread if it entered NZ.	*C. dictyospermi has* the potential to enter New Zealand and being exposed to suitable hosts.	Entry:
					- Usually prefers leaves of plants (MPI, 2014).
					- Adults are very small (MPI, 2014) but could be visually detectable during production and harvest.
					    - Adult *C. dictyspermi* are protected by a scale (1.5 – 2.5mm) cover which is greyish or reddish-brown (MPI, 2014).
					- Is capable of surviving transit conditions to New Zealand [has been intercepted on arrival (alive) on cut flowers in New Zealand] [QuanCargo, 2017].
					Exposure:
					- Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost.
					- Is polyphagous with no shortage of suitable hosts in New Zealand. Recorded hosts from over 73 plant families (MPI, 2014), including plants commonly found in New Zealand home gardens (citrus, but also woody trees, shrubs and monocotyledons such as irises). Therefore likely to come in contact with a suitable host.
					- Both obligate bisexual and parthenogenetic forms (MPI, 2014). Females produce eggs continuously over several weeks until their deaths, which could continue once the cut flowers have been disposed of [14 day life span once flower is cut from plant].
					    - Females can produce up to 200 eggs over one or several months (MPI, 2014). Eggs may hatch within one to 24 hours with crawlers developing for 10-15 days (MPI, 2014).
					Therefore crawlers are likely to be produced as long as the host remains in good condition.	

					- Due to specialised biology, exposure is dependent on the delicate crawler (first instar only for females, males are mobile for all life stages) leaving the host and successfully finding a suitable host. Crawlers are susceptible to extremes of temperatures, desiccation, rain and predation (MPI, 2014). Establishment and spread: - Widespread in tropical and subtropical regions and occurs in greenhouses in temperate areas (MPI, 2014). - The likelihood of *C. dictyospermi* establishing in New Zealand is considered to be low (MPI, 2014). Introduction of parthenogenetic females is assumed to increase the likelihood of establishment (MPI, 2014). - *C. dictyospermi* may be able to establish outdoors in warmer Northern parts of New Zealand (MPI, 2014), or in greenhouses.	
			And has the potential to cause negative economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*C. dictyospermi* is capable of causing low level economic and environmental impacts if it established in New Zealand.	- As for all armoured scale insects, management is difficult due to the protection afforded by the waxy caps covering the delicate insect body (MPI, 2014). - There are 48 known chalcidoid natural enemies of *C. dictyospermi*, 8 of which are present in New Zealand (MPI, 2014). Therefore the parasitoids may provide some level of population control were *C. dictyospermi* to establish (MPI, 2014). - Economic and environmental impacts of *C. aonidum* is considered 'low' and independent of the pathway (MPI, 2014).	
		Diaspis bromeliae (Kerner, 1778)	Has the potential to be a quarantine pest on this pathway.	*Diaspis bromeliae* is associated with the pathway.	- *D. bromeliae* is present in Taiwan (USDA, 2012). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (USDA, 2012).	**Does not fulfil the criteria of being a quarantine pest on this pathway.**
			And has the potential to establish and spread if it entered NZ.	*D. bromeliae has* the potential to enter New Zealand	Entry: - Adults are small, however could be visually detectable during production and harvest. - Adult *D. bromeliae* are covered with a scale (>1 mm) which is greyish white (Petty *et al*., 2002; Waterhouse and Sands, 2001). - Scales from family Diaspididae are capable of surviving transit conditions (intercepted on fresh produce) to New Zealand [QuanCargo, 2017]. Exposure: - Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost. - Is quite polyphagous (Watson, 2005). Hosts are recorded as pineapple, *Aechmea*, *Ananas*, *Billbergia*, *Bromelia*, *Cattleya*, *Chevalieria, Guzmania, Neoregelia, Nidularium* and *Tillandsia* species (Miller and Davidson, 2005; Petty *et al.,* 2002). Therefore host availability may be limited in New Zealand home gardens. - Egg production could continue once the cut flowers have been disposed of [14 day life span once flower is cut from plant], with eggs hatching after 7 days (Petty *et al*., 2002; Waterhouse and Sands, 2001). Crawlers may be produced as long as the host remains in good condition.	

					- Due to specialised biology, exposure is dependent on the delicate crawler leaving the host and successfully finding a suitable host. Crawlers are susceptible to extremes of temperatures, desiccation, rain and predation (MPI, 2014). - Males (small, orange coloured) are winged and capable of dispersing. Establishment and spread: - Crawler dispersal is slow, but can also occur through wind currents (Waterhouse and Sands, 2001). - Tropical species: if it were to establish in New Zealand it would be severely limited by climate (MPI, 2017a). May be capable of establishing in glasshouses or other protected environments (MPI, 2017a).	
			***D. bromeliae* may be able to enter, and be exposed to a limited number of suitable hosts, but it would not establish and spread in New Zealand. Therefore this organism is not considered a quarantine pest on this pathway.**			
		Ischnaspis longirostris (Signoret, 1882)	Has the potential to be a quarantine pest on this pathway.	*Ischnaspis longirostris* is associated with the pathway.	- *I. longirostris* is present in Taiwan (USDA, 2012). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (USDA, 2012).	**Is considered a quarantine pest on this pathway.** **Measures are justified (Basic Measures)**

			And has the potential to establish and spread if it entered NZ.	*I. longirostris* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry:
					- Adults are small, however could be visually detectable during production and harvest.
					  - Adult *I. longirostris* are covered with a scale (<3 mm) cover which is blackish-brown (MPI, 2007).
					- Is capable of surviving transit conditions (intercepted on Bel leaves (MPI, 2016c) to New Zealand (QuanCargo, 2017).
					Exposure:
					- Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost.
					- Wide host range including *Citrus* spp., *Ficus* spp., *Aloe* spp., *Prunus* spp., as well as known to infest plants from the genera *Dracaena*, *Cordyline*, *Piper*, *Eugenia*, *Litsea*, *Euphorbia* and *Cyperus* (MPI,2007) which are present in NZ. Therefore likely to come in contact with a suitable host.
					- Egg production could continue once the cut flowers have been disposed of [14 day life span once flower is cut from plant], with eggs hatching after 7 days (Petty *et al*., 2002; Waterhouse and Sands, 2001).
					  - Females produce 20-30 eggs each, with eggs laid under the scale (MPI, 2007; MPI, 2017a).
					Therefore crawlers are likely to be produced as long as the host remains in good condition.
					- Crawlers hatching soon after the egg has been laid, with crawlers settling to feed in 24 hours (MPI, 2007). Only the first instar is capable of moving, however air currents could also transport the sessile life stages further (MPI, 2007; MPI, 2008).
					Establishment and spread:
					- Is parthenogenetic with no males of the species recorded (MPI, 2007; MPI, 2008), meaning a population could be founded from one individual.
					- Found in tropical areas, however reported from temperate boreal regions (MPI, 2007). Found in glasshouses in cooler regions (MPI, 2007).	

			And has the potential to cause negative economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*I. longirostris* is capable of causing low level economic and environmental impacts if it established in New Zealand.	- Only minor damage recorded for *I. longirostris*. Not usually the primary agent of mortality or plant health decline (MPI, 2007). - Economic consequence of establishment in New Zealand is likely to be low (MPI, 2007).	
		Pseudaulacaspis pentagona (Targioni Tozzetti, 1886)	Has the potential to be a quarantine pest on this pathway.	*Pseudaulacaspis pentagona* is associated with the pathway.	- *P. pentagona* is present in Taiwan (BA, 2010). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Orchidacea* (BA, 2010). No known association with the *Oncidium* flower (MPI, 2017a), however may be associated with the stem.	**Does not fulfil the criteria of being a quarantine pest on this pathway.**
			And has the potential to establish and spread if it entered NZ.	*P. pentagona* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry: - Adults are small, however could be visually detectable during production and harvest. - Adult *P. pentagona* are covered with a scale (1.5 – 3 mm) cover which is pale in colour (MPI, 2014). - Is capable of surviving transit conditions to New Zealand (intercepted on fresh produce) (QuanCargo, 2017). Has not been intercepted on cut flowers upon arrival in New Zealand (QuanCargo, 2017), and internationally not intercepted on cut flowers and foliage (EPPO, 2017). Exposure: - Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost. - Is polyphagous with no shortage of suitable hosts. Recorded hosts from over 78 plant families (MPI, 2014), including plants that are common in NZ home gardens (capsicum, cherries, *Citrus* species, kiwifruit, and *Prunus* species). Therefore likely to come in contact with a suitable host. - Females produce eggs continuously over several weeks until their deaths (MPI, 2014), which could continue once the cut flowers have been disposed of [14 day life span once flower is cut from plant]. Therefore crawlers are likely to be produces as long as the host remains in good condition. - Due to specialised biology, exposure is dependent on the delicate crawler (first instar only for females, males are mobile for all life stages) leaving the host and successfully finding a suitable host. Crawlers are susceptible to extremes of temperatures, desiccation, rain and predation (MPI, 2014). Establishment and spread: - A mated female or immatures of both sexes would be necessary to establish a reproductive population (MPI, 2014). - Males (flying) locate females via pheromones for sexual reproduction, with female's oviposition around 16 days after maturation (MPI, 2014). - Species overwinter as mated females in cold climates. Eggs may also overwinter in warmer climates (MPI, 2014).	

					- May be able to establish in at least some parts of New Zealand, or in sheltered habitats or in greenhouses. Is known to occur in temperate regions (MPI, 2014).	
			And has the potential to cause negative economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*P. pentagona is* capable of causing moderate level economic and environmental impacts if it established in New Zealand.	- Capable of killing some hosts, or feeding activities on hosts causes early leaf drop (MPI, 2014). - May cause increased control costs or interfering with IPM, however effective control systems are available. - *P. pentagona* is already present in many important markets, however market access could be affected if it established in NZ. - Economic consequences of establishment in New Zealand are considered to be moderate (MPI, 2014).	
			- **An additional phytosanitary measures cannot be applied against a pest if it is not considered to be a quarantine pest on this pathway [unconfirmed host association]. Measures for the management of other quarantine pests should also manage these species. Can be re-assessed when new information is available.**			
		Armoured scales from the family Diaspididae for the fresh produce import pathway were assessed in the Generic Pest Risk Assessment: *Armoured scale insects (Hempiptera: Coccoidea: Diaspididae) on the fresh produce pathway* (MPI 2014). Armoured scales were assessed together as they have the same limiting factor for establishment (limited dispersal ability). Entry and exposure likelihoods are different with fresh produce compared with cut flowers, namely the proportion of the product wasted (e.g. generally only skins/cores of fresh produce would be disposed, whereas the entire cut flower stem). Where there is limited information on scale species identified as a potential hazard, these species have been assessed together. It is assumed that if an organism was causing an economic impact, specific information would be available. An extra level of measure cannot be placed against an organism unless the risk is justified – lack of knowledge on a pest does not justify a measure.				
		Pinnaspis buxi (Bouché, 1851) *Parlatoria pseudaspidiotus* (Lindinger, 1905) *Lepidosaphes chinensis* (Chamberlin, 1925) *Parlatoria proteus* (Curtis, 1843)	Have the potential to be a quarantine pest on this pathway.	Are associated with the pathway.	- Species are present in Taiwan (BA, 2010; BAPHIQ, 2013; MPI, 2010; Stocks, 2014; USDA, 2012). - Are not recorded in New Zealand (NZOR, 2016). - Are known to be associated with Orchidaceae (BA, 2010; BAPHIQ, 2013; MPI, 2010; Stocks, 2014). - *P.* buxi, P. *proteus* are associated with *Oncidium* (USDA, 2012).	**Does not fulfil the criteria of being a quarantine pest on this pathway.**
			And has the potential to establish and spread if it entered NZ.	Has the potential to enter New Zealand and being exposed to suitable hosts.	Entry: - Adults from the family Diasipidae are small, however could be visually detectable during production and harvest. - Are likely capable of surviving transit conditions to New Zealand [scales from the family Diasipidae have been intercepted on arrival (alive) on cut flowers in New Zealand]. Exposure: - Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost. - Most armoured scales can complete their entire life cycle without leaving the host plant. - First crawlers are mobile and can actively transfer to the new host plant. Males are often winged. Crawlers can be blown by wind currents to new host material.	

					Establishment and spread: - Most species of armoured scale are polyphagous with preferred hosts likely to be common in New Zealand home gardens. - Armoured scales reproduce by sexual reproduction, with cut flowers likely to have both sexes (if required) present. - Species in the Diaspididae family have a wide environmental tolerance (tropical and temperate). Therefore it is likely that species of the family will be able to survive in the warmer regions of New Zealand, or in protected environments such as glasshouses.	
			And has the potential to cause negative economic consequences which are sufficient to justify phytosanitary measures on this pathway.	Is assumed to be capable of causing low level economic and environmental impacts if it established in New Zealand.	- Armoured scales are often polyphagous and damage host plants, occasionally causing plant death. With limited information on some species it is not known what hosts could be affected, or whether native plant species would be susceptible hosts. Note: There has been no impact reported on native plants from exotic diaspidids that have been established in New Zealand. - As with other armoured scales, there may be an increased cost of pest control or changes to current IPM.	
			An additional phytosanitary measures cannot be applied against a pest if there is not sufficient evidence to support the organism being a quarantine pest. Measures for the management of other armoured scales should also manage these species. Can be re-assessed when new information is available.			
	Coccoidea: Pseudococcidae	*Dysmicoccus brevipes* Cockerell, 1893	Has the potential to be a quarantine pest on this pathway.	*Dysmicoccus brevipes* is associated with the pathway.	- *D. brevipes* is present in Taiwan (USDA, 2012). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with Orchidaceae (Johnson, 2009), however no evidence to suggest an association with *Oncidium*.	**Does not fulfil the criteria of being a quarantine pest on this pathway.**
			An additional phytosanitary measures cannot be applied against a pest if it is not considered to be a quarantine pest on this pathway [unconfirmed host association]. Measures for the management of other quarantine pests should also manage these species. Can be re-assessed when new information is available.			
		Ferrisia virgata (Cockerell, 1893)	Has the potential to be a quarantine pest on this pathway.	*Ferrisia virgata* is associated with the pathway.	- *F. virgata* is present in Taiwan (DA, 2013). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (USDA, 2012).	**Is considered a quarantine pest on this pathway.**
			And has the potential to establish and spread if it entered NZ.	*F. virgata* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry: - Adults are very small, however adults (and the associated black sooty mould (MPI, 2007)) could be visually detectable during production and harvest. *F. virgata* tend to reside in cryptic locations, increasing the likelihood that they may be missed during visual inspection (MPI, 2017a). - Adult females are oval, 2 - 4.5 mm in length, covered with a conspicuous whitish mealy/wax with two dark dorsal stripes seen through the waxy coating (MPI, 2008; MPI, 2017a). - Eggs are laid individually on a pad made of whitish filaments (MPI, 2007; MPI, 2017a) so therefore could be missed during production and inspection. - Mealy bugs are attached to their host's very firmly, meaning they may be missed during post-harvest processing and inspection (including tapping of stems) (MPI, 2014).	**Measures are justified (Basic Measures)**

					- Is capable of surviving transit conditions to New Zealand (has been intercepted on arrival (alive) on cut flowers and foliage in New Zealand (QuanCargo, 2017)). Exposure: - Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost. - Is polyphagous with no shortage of suitable hosts. Recorded hosts from 68 plant families, including plants will be common in home gardens (beans, grapes and avocado) (MPI, 2007). Therefore is likely to be exposed to a suitable host. - Mealybug nymphs and adult females are able to move (unlike diasoidids and most coccids), however dispersal is mostly at the crawler stage so it is very likely that mealybugs are similar to diaspidids in regards to dispersal (MPI, 2014). Establishment and spread: - Is biparental, so both sexes would be required to found a population (MPI, 2008). - Climate may be a limiting factor for the establishment of *F. virgata* establishing in many parts of New Zealand as it is largely found in tropical and subtropical climates, but also in temperate regions (MPI, 2007; MPI, 2008). A summer population could establish and survive the winter in protected environments such as greenhouses (MPI, 2007). - Adult females are capable of overwintering (soil, branches, and leaves) in unsuitable conditions (MPI, 2007).	

			And has the potential to cause economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*F. virgata* is capable of causing low level economic and environmental impacts if it established in New Zealand.	- Sooty mould, as a result of *F. virgata* honeydew secretion, and wax deposits reduce the plants photosynthesis ability. This results in lower plant vigour and yield, and significant productions losses (MPI, 2007).
					- Can vector plant borne viruses (MPI, 2008) [*Note*: **not known** to vector viruses of concern associated with *Oncidium*].
					- *F. virgata* is known to vector other pathogens [stated below], Note: *F. virgata* has been shown to be a species complex (MPI, 2017a), therefore it is unknown whether the species present in New Zealand vector the below pathogens.
					  - *F. virgata* has an association with badnavirus and black pepper (*Piper nigrum* L.) (Bhat *et al*., 2003).
					  - *F. virgata* has an association with Cocoa swollen shoot disease (Bigger, 1981).
					  - *F. virgata* is recorded as carrying *Candidatus* Liberibacter asiaticus' (Las), the primary causal agent of huanglongbing (HLB), however Las populations transmitted by *F. virgata* did not cause disease in host plants (Pitino *et al*., 2014).
					  - There is one report of *F. virgata* transmitting Citrus tristeza virus after feeding on a CTV-infected plant (Herron *et al*., 2006).
					- The likelihood of *F. virgata* causing unwanted economic and environmental consequences is moderate to low (MPI, 2007).	

		Planococcus minor (Maskell, 1897)	Has the potential to be a quarantine pest on this pathway.	*Planococcus minor* is associated with the pathway.	- *P. minor* is present in Taiwan (MPI, 2010). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (USDA, 2012). USDA (2012) found very little evidence of *P. minor* with *Oncidium*: just a single interception on a cut flower shipment.	**Is considered a quarantine pest on this pathway.**

			And has the potential to establish and spread if it entered NZ.	*P. minor* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry:
					- Adults are very small, however adults could be visually detectable during production and harvest. Mealybugs tend to reside in cryptic locations, increasing the likelihood that they may be missed during visual inspection (Mani and Shivaraju, 2016).
					- *P. minor* has been recorded on *Phalaenopsis* nursery stock, with *P. minor* feeding primarily on foliage, but also known to feed on other plant parts such as corms and fruit (MPI, 2010).
					- Adults are very small, however adults (and the associated black sooty mould (MPI, 2007)) could be visually detectable during production and harvest. Young crawlers are minute and could be missed during inspection if hidden in flower crevices (MPI, 2010).
					  - Adult females are oval pinkish-white and 1- 3 mm long (MPI, 2010).
					- Eggs are produced in clusters so would be visually obvious during production and inspection (MPI, 2010).
					  - One female can lay on average 100 - 200 eggs per cluster (MPI, 2010).
					- Is capable of surviving transit conditions to New Zealand (has been intercepted on arrival (alive) on cut flowers in New Zealand (QuanCargo, 2017)).
					Exposure:
					- Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost.
					- First crawlers are mobile (MPI, 2010) and can actively transfer to the new host plant.
					- *P. minor* is polyphagous with a wide range of hosts that are grown in home gardens, including Orchidaceae, *Brassica* sp., capsicum, citrus, rose and potato (MPI, 2008; MPI, 2010). Therefore is likely to be exposed to a suitable host.
					- *P. minor* is a host of *Corynocarpus* sp., *Schefflera* sp., *Solanum* sp., *Sophora* sp., and Orchidaceae, all of which are represented by New Zealand's indigenous species (MPI, 2010).
					Establishment and spread:
					- *P. minor* reproduces sexually with the use of pheromones, and it is also likely reproduction occurs via parthenogenesis (MPI, 2010). There are multiple generations per year (MPI, 2010) which means that they have potential to form a population rapidly.
					- Mealybug nymphs are able to move, with passive dispersal occurring with air currents (MPI, 2010).
					- Greenhouse conditions are likely to enable a population to establish, however the climate may be a limiting factor in some outdoor regions. A population could establish in the subtropical climate in the northern regions of New Zealand, and potentially in the temperate regions also (MPI, 2010).
						Measures are justified (Basic Measures)

			And has the potential to cause economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*P. minor* is capable of causing low level economic and environmental impacts if it established in New Zealand.	- Sooty mould, as a result of *P. minor* honeydew secretion, and wax deposits reduce plant photosynthetic ability. This results in lower plant vigour and yield, and significant productions losses (MPI, 2010). - Additional/change in existing pest control activities and cost (MPI, 2010). - The likelihood of *P. minor* causing unwanted economic and environmental consequences is moderate to low (MPI, 2007; MPI, 2010).	

	Coccoidea: Coccidae	*Ceroplastes stellifer* Westwood, 1871 Synonym: *Vinsonia stellifera*	Has the potential to be a quarantine pest on this pathway.	*Ceroplastes stellifer* is associated with the pathway.	- *C. stellifer* is present in Taiwan (Jun, 2014). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with Orchidaceae (Malumphy, 2014). Intercepted in the USA on *Oncidium* from multiple countries (idtools, 2017)	**Does not fulfil the criteria of being a quarantine pest on this pathway.**
			And has the potential to establish and spread if it entered NZ.	*C. stellifer* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry: - Adults are very small, however adults could be visually detectable during production and harvest. Mealybugs tend to reside in conspicuous numbers on leaves (Jun *et al*., 2014). - Round body, with six to seven radiating arms (idtools, 2017). Females are pink to purplish-red, darkening as they become older (idtools, 2017), eggs are laid under the female in a cavity. Exposure: - Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost. - Limited information is available on this species regarding host information and plant association.	
			An additional phytosanitary measures cannot be applied against a pest if there is not sufficient evidence to support the organism being a quarantine pest. Measures for the management of other armoured scales should also manage these species. Can be re-assessed when new information is available.			
Hymenoptera	*Cardiocondyla emeryi* Forel, 1881		Has the potential to be a quarantine pest on this pathway.	*Cardiocondyla emeryi* is a non-plant pest.	- Intercepted on *Oncidium* nursery stock from Taiwan (USDA, 2012).	**Does not fulfil the criteria of being a quarantine pest on this pathway.**
			Hitchhiker pest – will be managed by sea container hygiene and management of other regulated pests.			
Lepidoptera	*Amsacta lactinea* (Cramer, 1777)		Has the potential to be a quarantine pest on this pathway.	*Amsacta lactinea* is associated with the pathway.	- *A. lactinea* is present in Taiwan (BAPHIQ, 2013). - Is not recorded in New Zealand (BAPHIQ, 2013). - Are known to be associated with *Oncidium* (USDA, 2012).	**Does not fulfil the criteria of being a quarantine pest on this pathway.**

			And does not have the potential to establish and spread if it entered NZ.	*A. lactinea* is unlikely to enter New Zealand.	Entry:
					- *A. lactinea* has been recorded on the leaf and flower of *Oncidium* (USDA, 2012).
					- *A. lactinea* is a large arctiid moth, with all life stages visually obvious.
					  - Caterpillars are 48 to 52 mm in length, black and covered with reddish-brown hairs (MPI, 2017a).
					  - Males have a wing expanse of around 5 cm (MPI, 2017a).
					- Not all life stages are associated with the cut flower.
					  - Pupation occurs in the soil (MPI, 2017a), with *Oncidium* spp. cut flowers required to be free of soil.
					  - Eggs are laid in batches of 250-500 on the leaves (MPI, 2017a), with *Oncidium* spp. cut flowers required to be free of leaves/foliage
					Exposure:
					- Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into New Zealand home gardens and compost.	

				- Have a wide range of hosts, including species from Facaceae, Orchidaceae, Poaceae, and Rosaceae (USDA, 2012) representatives of which are present in NZ. - USDA (2012) stated that there is little information available on the dispersal potential for *A. lactinea*, with a recent literature search not providing any further information. The USDA (2012) used known dispersal information of similar species *Amsacta moorei* for the basis of their risk estimation. For *A. moorei*, the USDA (2012) state that females lay 500-1900 eggs during their lifetime, with several generations per year. Both adult sexes are capable flyers. Establishment and spread: - Is distributed over subtropical and tropical countries (MPI, 2017a; USDA, 2012). Therefore it is likely that the range would be restricted to the warmer northern parts of New Zealand.	
		***A. lactinea* is unlikely to enter New Zealand on the *Oncidium* spp. cut flower pathway due to the morphology (size) of the species making them visually obvious during inspection. Therefore this organism is not considered a quarantine pest on this pathway.**			
	Orgyia postica (Walker, 1855)	Has the potential to be a quarantine pest on this pathway.	*Orgyia postica* is associated with the pathway.	- *O. postica* is present in Taiwan (MPI, 2010). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with Orchidaceae (BA, 2010; MPI, 2009a). No evidence found of an association with *Oncidium*.	**Does not fulfil the criteria of being a quarantine pest on this pathway.**

		And does not have the potential to establish and spread if it entered NZ.	*O. postica* is unlikely to enter New Zealand.	Entry:
				- *O. postica* have been recorded on leaves and stems of *Phalaenopsis* species (BA, 2010), and *O. postica* are recorded as feeding on leaves and new shoots (MPI, 2009a).
				- Larvae, pupae, adults and egg masses will be visually obvious during pre-export phytosanitary inspection (BA, 2010).
				   - Eggs range from 0.88-1.28 mm with the eggs deposited in a mass of 300-501 eggs (BA, 2010; Cheng *et al.*, 2001). Eggs hatch 5-6 days later (MPI, 2009; Sanchez and Laigo, 1968).
				   - Pupation occurs in a cocoon spun on leaves or the stem (BA, 2010; MPI, 2009a).
				   - Mature larvae grow up to 30-40mm in length, female adults are wingless and remain on the cocoon where eggs are laid. Emerging adults have a wingspan of 21-30cm.
				   - *Oncidium* spp. cut flowers do not have foliage present.
				Exposure:
				- Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost.
				- Females are unable to fly (MPI, 2010) so the *Oncidium* spp. cut flower would need to be in close proximity to other suitable hosts.
				- *O. postica* have a wide range of hosts that are grown in home gardens, including Orchidaceae, *Pinus*, *Rosa* sp., and *Vitis* sp. (MPI, 2009a; MPI, 2010).
				Establishment and spread:
				- The climate in most of New Zealand is unlikely to be suitable for the establishment of *O. positica* as optimum temperature for egg hatch is 25°C, and is 25-30°C for larval development (BA, 2010; Cheng *et al.*, 2001), however larvae can still develop between 10-15°C suggesting that some populations may establish in temperate regions (Cheng *et al.,* 2001; MPI, 2010).	

		***O. postica* is unlikely to enter New Zealand on the *Oncidium* spp. cut flower pathway due to the morphology (size) of the species making them obvious during visual inspection. Therefore this organism is not considered a quarantine pest on this pathway.**			
	Spodoptera exigua (Hübner, 1808)	Has the potential to be a quarantine pest on this pathway.	*Spodoptera exigua* is associated with the pathway.	- *S. exigua* is present in Taiwan (BA, 2010). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with Oncidium (Gilligan and Passoa, 2014).	**Does not fulfil the criteria of being a quarantine pest on this pathway.**

		And does not have the potential to establish and spread if it entered NZ.	*S. exigua* is unlikely to enter New Zealand.	Entry:
				- *S. exigua* are recorded as being present on Orchidaceae (MPI, 2010).
				- Egg clusters, larvae and larval damage would be visually obvious and expected to be detected during the harvest and packing processes.
				  - Eggs and larvae (1.2-11mm long and pale green to yellow in colour) are associated with stems, flowers and leaves of plant hosts (MPI, 2011). Pupation occurs in the soil.
				  - Adults have a wingspan of up to 30mm so would be detected during production and packhouse inspection.
				  - Eggs are laid in clusters of 50 to 150 eggs on leaves, with the egg mass having a fuzzy or cottony appearance (MPI, 2011). *Oncidium* spp. cut flowers are not exported with leaves, and the egg masses would be visual during production.
				  - Early instar larvae skeletonise the leaves, larger instar larvae create holes in leaves and fully grown larvae devour foliage completely (MPI, 2011). Effects would be visually obvious during production.
				- *Spodoptera litura* have been intercepted on *Oncidium* cut flowers at the border in New Zealand, indicating that some species are capable of surviving transit conditions [QuanCargo, 2017].
				Exposure:
				- Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into New Zealand home gardens and compost. Therefore it is possible that pupae will easily come in contact with soil for pupation.
				- Adult male and female moths are capable of dispersing long distances to find suitable hosts (MPI, 2011).
				- Wide range of hosts that are likely to be found in a New Zealand home garden including *Allium*, *Beta vulgaris*, *Brassica* spp., *Solanum* spp., and *Poaceae* (MPI, 2011).
				Establishment and spread:
				- Produces pheromones to locate the other sex, with females having a high fecundity (MPI, 2011).
				- Spring and summer conditions would be suitable for the establishment of a population in the North Island and some parts of the South Island, however would be limited by the winter conditions (MPI, 2011). Populations could persist in protected environments such as glasshouses.	

		***S. exigua* is unlikely to enter New Zealand on the *Oncidium* spp. cut flower pathway due to the morphology (size) of the species making them obvious during visual inspection. Therefore this organism is not considered a quarantine pest on this pathway.**			

Orthoptera	*Atractomorpha psittacina* (Haan, 1842)	Has the potential to be a quarantine pest on this pathway.	*Atractomorpha psittacina* is associated with the pathway.	- *A. psittacina* is present in Taiwan (BAPHIQ, 2013). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (BAPHIQ, 2013). USDA (2012) state that *A. psittacina* is a large, active, winged insect that may feed on the plants, but is highly unlikely to be associated with nursery plants during handling and shipping. It is presumed to be equally applicable for cut flowers.	**Does not fulfil the criteria of being a quarantine pest on this pathway.**
		And does not have the potential to establish and spread if it entered NZ.	*A. psittacina* is unlikely to enter New Zealand.	Entry: - Likely to be visually obvious during production and pre-export inspection. - Adults are recorded as being around 23-36mm in length (MPI, 2017a; Tan, 2010). Exposure: - Known hosts include mungbeans, urdbeans, sweet potato, cabbage, rice, groundnut/peanut. Coconut palms and wheat (MPI, 2017a). - All life stages of the insect (with exception of the eggs) are relatively or highly mobile. Adults are winged, but all life stages have enlarged hind legs for jumping (MPI, 2017a). Establishment and spread: - The known distribution of *A. psittacina* internationally suggested that this species may have a restricted distribution in New Zealand to warmer regions or protected environments (MPI, 2017a).	
		A. psittacina **is unlikely to enter New Zealand on the** ***Oncidium*** **spp. cut flower pathway due to obvious size and association with the commodity. Therefore this organism is not considered a quarantine pest on this pathway.**			
Thysanoptera	*Chaetanaphothrips orchidii* (Moulton, 1907)	Has the potential to be a quarantine pest on this pathway.	*Chaetanaphothrips orchidii* is associated with the pathway.	- *C. orchidii* is present in Taiwan (MPI, 2010). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with Orchidaceae (MPI, 2010), unknown whether associated with *Oncidium*.	**Does not fulfil the criteria of being a quarantine pest on this pathway.**

		And has the potential to establish and spread if it entered NZ.	*C. orchidii* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry:
				- All life stages are very small and it is possible they may not be detected during the pre-export processes, especially if infestations are low.
				  - Adult Thrips are 1 mm (Hara *et al.,* 2002).
				  - Eggs (80-100) are deposited into a bud or sheath. Early stage nymphs are whitish without wings, with late stage nymphs yellow/orange (Hara *et al*., 2002).
				- Presence of Thrips infestation is obvious by response of the plant.
				  - Damage in *Anthurium* (preferred host) appears as white streaks or scarring at the front and back of the spathe, deformed spathes and bronzing of injured tissue (Hara et al., 2002). Severe infestations cause damaged and deformed foliage with bronze streaking (Hara et al., 2002).
				- Has been intercepted on cut flowers (DAWR, 2016), indicating that some species are capable of surviving transit conditions.
				Exposure:
				- Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into New Zealand home gardens and compost. Pupation occurs in the soil (Hara *et al*., 2002), so it possible that the *Oncidium* spp. cut flowers will be disposed of within close vicinity to soil.	

				- Is polyphagous with a wide range of hosts, some of which are likely to be found in a home garden. Have a preference for *Anthurium*, however hosts include dendrobium, orchid, begonia, bird-of-paradise, bougainvillea, chrysanthemum, wandering jew, parsley, citrus, sweet potato and corn (Hara *et al*., 2002). - Nymphs are capable of crawling to suitable host material. Establishment and spread: - Adults are capable of flying, with no male thrips observed (Hara et al., 2002). - Has been recorded in a range of climates, and in protected environments such as greenhouses (Hara *et al.,* 2002). Widespread in tropical and subtropical countries – North, Central and South America, Africa, Europe, Asia and Australasia (DAWR, 2016).	
		And has the potential to cause economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*C. orchidii* is capable of causing low level economic and environmental impacts if it established in New Zealand.	- Plant growth may be reduced, reduce quality of product. - Establishment of *C. orchidii* will likely affect the New Zealand horticultural crops, with reduced flower quality, yield and increased cost of pest control. - Considered a quarantine pest in Australia, however not known to transmit tospoviruses (DAWR, 2016).	
		An additional measure is not justified unless certain of host association. When new information is available, the level of measure required for this pest can be reassessed. Management of other Thrips species is likely to also manage this species.			
	Dichromothrips corbetti (Priesner, 1936)	Has the potential to be a quarantine pest on this pathway.	*Dichromothrips corbetti* is associated with the pathway.	- *D. corbetti* is present in Taiwan (MPI, 2010). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with Orchidaceae (MPI, 2010), unknown whether associated with *Oncidium*.	**Does not fulfil the criteria of being a quarantine pest on this pathway.**
		And has the potential to establish and spread if it entered NZ.	*D. corbetti* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry: - Thrips are very small and it is possible they may not be detected during the pre-export processes, especially if infestations are low. - Been intercepted on cut flowers, including orchids (DAWR, 2016), indicating that some species are capable of surviving transit conditions. Exposure: - Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost. - Have a limited host range (cultivated orchids) (OzThrips, 2017). Establishment and spread: - Adults are winged and capable of dispersal (OzThrips, 2017). - Present across Asia (India, Indonesia, Malaysia, Philippines, Singapore, Taiwan and Thailand), North America (Florida and Hawaii), Puerto Rico, Europe (Belgium, Hungary, Netherlands) and Oceania (Australia (Northern Territory and Queensland), Fiji, French Polynesia and Samoa) (CABI, 2017), suggesting a more tropical distribution or in protected environments such as glasshouses.	

		And has the potential to cause economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*D. corbetti* is capable of causing low level economic and environmental impacts if it established in New Zealand.	- Establishment of *D. corbetti* will likely affect the New Zealand horticultural crops, with reduced flower quality, yield and increased cost of pest control.	
		An additional phytosanitary measure cannot be applied against a pest if it is not considered to be a quarantine pest on this pathway [unconfirmed host association]. Measures for the management of other quarantine pests should also manage these species. Can be re-assessed when new information is available.			
	Megalurothrips usitatus Bagnall 1913	Has the potential to be a quarantine pest on this pathway.	*Megalurothrips usitatus* is associated with the pathway.	- *M. usitatus* is present in Taiwan (DAWR, 2016). - Is not recorded in New Zealand (NZOR, 2017). - Intercepted on *Oncidium* cut flowers on arrival in Australia (DAWR, 2016).	**Does not fulfil the criteria of being a quarantine pest on this pathway.**
		And has the potential to establish and spread if it entered NZ.	*M. usitatus* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry: - All life stages are very small and it is possible they may not be detected during the pre-export inspection, especially if infestations are low. - Symptoms include petal malformation and scarring in leguminous hosts (Tang, 2015). - Been intercepted on *Oncidium* cut flowers from Taiwan (DAWR, 2016), indicating that some species are capable of surviving transit conditions. Exposure: - Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost. - Hosts include leguminous Fabaceae, including beans, peas, groundnuts, soyabeans and adzuki neans (Chang, 1988; Chang, 1995). Prefer to live and feed on flowers (pollen), though when preferred host material is known to feed on younge leaves and pods of leguminous plants (Chang, 1995; Tang *et al*., 2015). Establishment and spread: - Sexual and parthenogenesis reproduction, with parthenogenesis enabling a population to be sustained at low densities (Tang *et al*., 2015).	
		An additional phytosanitary measures cannot be applied against a pest if there is not sufficient evidence to support the organism being a quarantine pest. Measures for the management of other regulated pests should also manage these species. Can be re-assessed when new information is available.			
	Scirtothrips dorsalis Hood, 1919	Has the potential to be a quarantine pest on this pathway.	*Scirtothrips dorsalis* is associated with the pathway.	- *Scirtothrips dorsalis is* present in Taiwan (USDA, 2012). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (USDA, 2012).	**Is considered a quarantine pest on this pathway.** **Measures are justified (Targeted Measures)**
		And has the potential to establish and spread if it entered NZ.	*S. dorsalis* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry: - All life stages are very small and it is possible they may not be detected during the pre-export inspection, especially if infestations are low. - *S. dorsalis* is very small. Larvae are creamy white, with the first instar larvae, second instar larvae and pupae ranging between 0.37-0.39, 0.68-0.71 and 0.78-0.80mm (respectively)	

				(Kumar *et al*., 2013). Adults are less 1.5mm in length, winged and pale yellow in colour with dark brown setea (Kumar *et al.,* 2013). - Eggs are laid into the plant tissue (Kumar *et al.,* 2013) and may not be visually obvious. - The appearance of distorted, scarred, discoloured plant tissue indicates the presence of S. dorsalis (Kumar et al., 2013). - Been intercepted on *Oncidium* cut flowers (DAWR, 2016), indicating that some species are capable of surviving transit conditions. Exposure: - Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost. - All life stages are mobile, with suitable hosts common in New Zealand home gardens. Reported to feed on 225 plant taxa from 72 families (Kumar *et al*., 2013). Hosts include beans, citrus, corn, eggplants, grapes, kiwi, poplar, rose, strawberry and tomato (Kumar *et al.,* 2013). - Eggs hatch after 5-8 days (Kumar *et al*., 2013), meaning that eggs present on cut flowers may hatch once arrived in New Zealand and/ or stems have been disposed of. Establishment and spread: - Sexual and arrhenotoky parthenogenesis reproduction (USDA, 2012) therefore several individuals from both sexes, or a mated female would be needed to establish a population (MPI, 2013). - Adults are winged and capable of long distance dispersal (USDA, 2012). - Tropical species (Kumar *et al*., 2013), however reported from countries that share the same climatic similarity with parts of New Zealand (MPI, 2013). May be able to establish in protected microclimates such as glasshouses.	
		And has the potential to cause negative economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*S. dorsalis* is capable of causing low level economic and environmental impacts if it established in New Zealand.	- Reported as a serious economic pest in America (Kumar *et al*., 2013). Known vector capability, potential vector for viruses already present in New Zealand. - Establishment of *S. dorsalis* will likely affect the New Zealand horticultural crops, with reduced flower quality, yield and increased cost of pest control. - *S. dorsalis* is likely to have low economic (though significant to individual growers), environmental and socio-cultural consequences in New Zealand (MPI, 2013; MPI, 2016b).	
	Thrips hawaiiensis (Morgan, 1913)	Has the potential to be a quarantine pest on this pathway.	*Thrips hawaiiensis* is associated with the pathway.	- *T. hawaiiensis is* present in Taiwan (BAPHIQ, 2013) - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (BAPHIQ, 2013).	**Is considered a quarantine pest on this pathway.** **Measures are justified (Targeted Measures)**
		And has the potential to establish and spread if it entered NZ.	*T. hawaiiensis* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry: - All life stages are very small and it is possible they may not be detected during the pre-export processes, especially if infestations are low. - Eggs are laid inside plant tissues such as the anthers of open flowers (MPI, 2010). - *T. hawaiiensis* puncture the flowers, introducing spot lesions, scarring, necrosis or malformations. Symptoms on *Phalaenopsis* orchids include markings on flowers, abnormally shaped leaves and brown markings on leaves (MPI, 2010).	

				- Been intercepted on cut flowers and foliage (DAWR, 2016), indicating that some species are capable of surviving transit conditions. Exposure: - *T. hawaiiensis* is able to survive and reproduce without leaving the host plant when the plant is in flower (MPI, 2010). - Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost. - Eggs and pupae would be exposed to soil or leaf litter. Second star larvae move into the soil or leaf litter to pupate. Adults emerge around five days later and are winged (MPI, 2010). - *T. hawaiiensis* has been recorded on 141 plant species, with a preference for Fabaceae and Convolvulaceae. Affected crops include *Citrus* sp., apple, pear and some vegetables (MPI, 2010). Establishment and spread: - Can reproduce sexually and asexually (MPI, 2010), therefore a single individual may found a population and rapidly spread in regions that are climatically suitable. - May survive in the warmer northern regions of New Zealand. Optimal temperature and humidity for pupal development was found to be 28°C and 90%RH. (MPI, 2010), however will develop successfully over a temperature range of 15-25°C.	
		And has the potential to cause negative economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*T. hawaiiensis* is capable of causing low level economic and environmental impacts if it established in New Zealand.	- Assessed to have a high economic consequence if where to establish (MPI, 2008). - Establishment of *T. hawaiiensis* will likely affect the New Zealand orchid industry, with reduced flower quality, yield and increased cost of pest control.	
	Thrips palmi (Karny, 1925)	Has the potential to be a quarantine pest on this pathway.	*Thrips palmi* is associated with the pathway.	- *T. palmi is* present in Taiwan (MPI, 2010). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (USDA, 2012).	**Is considered a quarantine pest on this pathway.** **Measures are justified (Targeted Measures)**

		And has the potential to establish and spread if it entered NZ.	*T. palmi* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry:
				- All life stages are very small and it is possible they may not be detected during the pre-export processes, especially if infestations are low.
				    - Adult *T. palmi* are small (0.8-1.00mm in length) with black setae and fringed wings (MPI, 2008). Larvae resemble adults but are wingless (MPI, 2008).
				    - Eggs are inserted into the plant tissue (MPI, 2008) and therefore may not be visible during inspection.
				    - The appearance of distorted, scarred, discoloured plant tissue indicates the presence of *T. palmi*.
				- Have been intercepted on *Oncidium* cut flowers (MPI, 2016c), indicating that some species are capable of surviving transit conditions.
				Exposure:
				- Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost.	

				- Eggs and pupae would be exposed to soil or leaf litter. Pupation occurs in leaf litter or soil, and adults fly to leaves and flowers of host plants (MPI, 2008). - *T. palmi* is polyphagous and has hosts from several plant families (USDA, 2012). Hosts will be common in New Zealand home gardens, including *Citrus* spp., Solanaceae, Cucurbtaceae, Poaceae and *Allium cepa*. Establishment and spread: - Adults are winged and capable of dispersal long distance with wind currents (USDA, 2012). - Reproduce sexually and parthenogenetically (MPI, 2008). Therefore a single individual may found a population and rapidly spread in regions that are climatically suitable. - Are likely to survive and develop all year in the warmer northern regions of New Zealand (Auckland and Kerikeri) (MPI, 2008). Populations could establish in protected environments such as greenhouses.	
		And has the potential to cause negative economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*T. palmi* is capable of causing low level economic and environmental impacts if it established in New Zealand.	- Assessed to have a high economic consequence if where to establish (MPI, 2008). - Serious pest of cucurbits and eggplants (USDA, 2012). Infestation results in stunted plant growth, premature bud and fruit loss. - Known vector capability, potential vector for viruses already present in New Zealand. - Establishment of *T. palmi* will likely affect the New Zealand horticultural crops, with reduced flower quality, yield and increased cost of pest control.	
Mollusca	*Petalochlamys vesta* (Pfeiffer, 1866)	Has the potential to be a quarantine pest on this pathway.	*Petalochlamys vesta* is associated with the pathway.	- *P. vesta is* present in Taiwan (BAPHIQ, 2013). - Not present in New Zealand (MPI, 2017b). - Are known to be associated with *Oncidium* (USDA, 2012).	**Does not fulfil the criteria of being a quarantine pest on this pathway.**
		Not enough information is available on this pest to support entry, exposure, establishment and spread of this pest.		Entry: - *P. vesta* is recorded as being 8.5 x 16 mm in size (Hwang, 2014). Exposure, establishment and spread: - The USDA (2012) states: “We found no reports about agricultural losses caused by *Petalochlamys vesta*, but this species could be as destructive as *Pomacea canaliculata* because of polyphagia and the huge population sizes”. **Note: Limited information available for this species.**	
		An additional phytosanitary measures cannot be applied against a pest if there is not sufficient evidence to support the organism being a quarantine pest. Measures for the management of other regulated pests should also manage these species. Can be re-assessed when new information is available.			
	Achatina fulica (Férussac, 1821)	Has the potential to be a quarantine pest on this pathway.	*Achatina fulica* is associated with the pathway.	- *A. fulica is* present in Taiwan (BAPHIQ, 2013). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (BAPHIQ, 2013).	**Does not fulfil the criteria of being a quarantine pest on this pathway.**
		And does not have the potential to establish and spread if it entered NZ.	*A. fulica* is unlikely to enter New Zealand.	Entry: - Is associated with *Oncidium* flowers and stems. Young snails are most predacious on living vegetation (USDA, 2012) (most likely to be associated with *Oncidium*), therefore will be visually obvious during production and packhouse processing. - Very small and older individuals prefer detritus and decaying vegetation (USDA, 2012).	

				Exposure: - Broad range of hosts, associated with more than 200 species from 40 families, including species commonly found in the home garden: Brassicaceae, Cucurbitaceae, Fabaceae, Liliaceae, Rutaceae and Solanaceae (USDA, 2102). - Remains active at a temperature range of 9-29°C, however light, temperature, moisture and food availability are important factor in snail activity (USDA, 2012). Establishment and spread: - Limited natural dispersal, but passive dispersal by human activity can increase the rate of dispersal. - May not be capable of establishing in temperate environments (USDA, 2012), however could potentially establish in the warmer subtropical areas of the northern North Island. Undergo aestivation with the advent of adverse conditions (Rahman and Raut, 2010), therefore may aestivate until exposed to suitable conditions. - Large adults can aestivate for 10 months, whereas hatchling snails are restricted to two months due to desiccation (USDA, 2012).	
		A. fulica **is unlikely to enter New Zealand on the** ***Oncidium*** **spp. cut flower pathway due to the morphology (size) of the species. Therefore this organism is not considered a quarantine pest on this pathway.**			
	Parmarion martensi Simroth, 1893	Has the potential to be a quarantine pest on this pathway.	*Parmarion martensi* is associated with the pathway.	- *P. martensi is* present in Taiwan (BAPHIQ, 2013). - Not present in New Zealand (MPI, 2017c). - Are known to be associated with *Oncidium* (USDA, 2012).	**Does not fulfil the criteria of being a quarantine pest on this pathway.**

		And does not have the potential to establish and spread if it entered NZ.	*P. martensi* is unlikely to enter New Zealand.	Entry:
				- All life stages are sizeable and would be visually obvious during production or inspection.
				  - *P. martensi* are up to 50 mm in length, with a brown body (idtools, 2017). Neonates are <5 mm in length (Hollingsworth et al., 2007).
				  - Produces large numbers of egg masses with 10-30 eggs laid in each clutch (Hollingsworth et al., 2007).
				- Has been transported long distances when infested nursery stock is moved (Leathers, 2016).
				Exposure:
				- Is polyphagous and has living and decaying hosts (Leathers, 2016). Hosts include lettuce, fennel, sweet potato, passionfruit, lemon grass and *Heliconia* sp (idtools, 2017). Also been recorded feeding on fallen fruits of avocado, guava and citrus (idtools, 2017).
				- Very active, capable of climbing (Brodie and Barker, 2012).
				Establishment and spread:
				- Needs a suitable level of moisture for establishment (Leathers, 2016). Readily aestivates (Brodie and Barker, 2012) until conditions are suitable.
				- Hermaphrodite – two individuals would be required to create offspring and establish a population (Brodie and Barker, 2012).	

		And has the potential to cause negative human health consequences	*P. martensi* is capable of causing low level	- Transmission and vector of rat lungworm disease, caused by *Angiostrongylus cantonensis* (Hollingsworth *et al*., 2007). [Human health concern]	

		which are sufficient to justify phytosanitary measures on this pathway.	impacts if it established in New Zealand.		
		***A. fulica* is unlikely to enter New Zealand on the *Oncidium* spp. cut flower pathway due to the morphology (size) of the species. Therefore this organism is not considered a quarantine pest on this pathway.**			
	Bradybaena similaris (Rang, 1831)	Has the potential to be a quarantine pest on this pathway.	*Bradybaena similaris* is associated with the pathway.	- *B. similaris is* present in Taiwan (BAPHIQ, 2013). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (BAPHIQ, 2013).	**Does not fulfil the criteria of being a quarantine pest on this pathway.**

		And does not have the potential to establish and spread if it entered NZ.	*B. similaris* is unlikely to enter New Zealand.	Entry:
				- Snails are large and will be visually obvious during production and packhouse processing.
				  - Adult snails are 11-18mm in length (MPI, 2010).
				  - Eggs are laid in clutches of 20-30, each egg about 2mm long and laid in the soil (MPI, 2010).
				Exposure:
				- Polyphagous and feeds on a number of commercial and ornamental trees and grape vines, as well as citrus and common vegetables (MPI, 2010).
				- Can survive desiccation and lack of food for an average of 122 days (MPI, 2010).
				  - Aestivates over dry periods with the shell aperture sealed by the epiphragm (MPI, 2010). Therefore capable of surviving until exposed to suitable climatic conditions.
				Establishment and spread:
				- Longevity is about 12 months, with snails hatching in late summer/autumn and over-wintering before reaching sexual maturity. However a snail would need to survive to sexual maturity, and being hermaphroditic, two individuals would need to locate each other for cross fertilisation to occur.
				- Limited mobility (MPI, 2010).
				- Tropical and subtropical distribution. Could survive in the warmer northern regions of the North Island, or in glasshouses (MPI, 2010).	

		And has the potential to cause economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*B. similaris* is capable of causing low level economic and environmental impacts if it established in New Zealand.	- Feeding reduces the visual quality of the host plant, and reduces plant vigour (MPI, 2010). - Could affect citrus and grape industries in regions that have a suitable climate. - Snails carry parasites that could affect New Zealand's native snail fauna, or compete for habitat (MPI, 2010).	
		***B. similaris* is unlikely to enter New Zealand on the *Oncidium* spp. cut flower pathway due to the morphology (size) of the species being visually obvious during pre-export inspection. Therefore this organism is not considered a quarantine pest on this pathway.**			
	Austropeplea ollula (Gould, 1859)	Has the potential to be a quarantine pest on this pathway.	*Austropeplea ollula* is associated with the pathway.	- *A. ollula is* present in Taiwan (BAPHIQ, 2013). - Not present in New Zealand (MPI, 2017c). - Are known to be associated with *Oncidium* (BAPHIQ, 2013).	**Does not fulfil the criteria of being a**

		And does not have the potential to establish and spread if it entered NZ.	*A. ollula* is unlikely to enter New Zealand.	Entry: - Aquatic (freshwater) snail, associated with freshwater and soil and drainage canals (Makiya and Ishiguro, 1982). Capable of overwintering (in rice paddies) (Makiya and Ishiguro, 1982). - Shell length 1.70-7.95mm (Makiya and Ishiguro, 1982). Egg masses found on the soil (Makiya and Ishiguro, 1982). - Hosts include rice and *Oncidium* (Makiya and Ishiguro, 1982; USDA, 2012) - Intermediate host of liver fluke (*Fasciola hepatica*) (Makiya and Ishiguro, 1982) [human health concern]. ***Limited information available for this species.***	**quarantine pest on this pathway.**
		***A. ollula* is unlikely to enter New Zealand on the *Oncidium* spp. cut flower pathway due to lack of host association (water/soil rather than associated with the stem). Therefore this organism is not considered a quarantine pest on this pathway.**			
	Meghimatium pictum (Stoliczka, 1873)	Has the potential to be a quarantine pest on this pathway.	*Meghimatium pictum* is associated with the pathway.	- *M. pictum is* present in Taiwan (BAPHIQ, 2013). - Not present in New Zealand (MPI, 2017c). - Are known to be associated with the leaf, stem and roots of *Oncidium* (USDA, 2012).	**Does not fulfil the criteria of being a quarantine pest on this pathway.**

		And does not have the potential to establish and spread if it entered NZ.	*M. pictum* is unlikely to enter New Zealand.	Entry:
				- Slugs are large and will be visually obvious during production and packhouse processing.
				  - Specimens are numerous and close to each other. Eggs are laid in masses (dozens of individual eggs) with adults found close to egg masses (Gomes et al., 2011).
				  - Slugs are yellowish-beige with two dark brown to black mantel stripes (Gomes et al., 2011). Slugs grow up to 6cm in length (1.5cm wide).
				Exposure:
				- Has a wide host range, with individuals generally found in wasteland pheriphal areas under objects such as logs, rocks, or garbage (Gomes *et al*., 2011). In forests the slugs are found on the woody stem in resting, or inside hollowed trunks (Gomes *et al*., 2011).
				- Hermaphrodites (capable of self-fertilisation) with a high reproductive rate.
				- *M. pictum* are recorded from areas with high humidity (Gomes *et al*., 2011).
				- Limited locomotion capability (USDA, 2012).
				Establishment and spread:
				- Present in China, Taiwan, Malaysia, India, Brazil and Argentina (Baronio *et al*. 2014). Unknown whether could establish in New Zealand.	

		***M. pictum* is unlikely to enter New Zealand on the *Oncidium* spp. cut flower pathway due to the morphology (size) of the species being visually obvious during pre-export inspection. Therefore this organism is not considered a quarantine pest on this pathway.**			
	Meghimatium bilineatum (Benson, 1842)	Has the potential to be a quarantine pest on this pathway.	*Meghimatium bilineatum* is associated with the pathway.	- *M. bilineata* is present in Taiwan (BAPHIQ, 2013). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (BAPHIQ, 2013	**Does not fulfil the criteria of being a**

	Synonym: *Incilaria bilineata*	**And** does not have the potential to establish and spread if it entered NZ.	*M. bilineata* is unlikely to enter New Zealand.	Entry: - Is associated with a wide variety of living and decaying plant material (MPI, 2017a), however USDA (2012) reports *M. bilineata* from flowers, leaves, stems and roots. - Slugs are large (40- 90 mm in length) and therefore will be visually obvious during production and packhouse processing (MPI, 2017a). - Eggs are white and stringed together with mucus (MPI, 2017a). Three to four batched are laid with an average of 932 eggs laid total for lab reared slugs (MPI, 2017a) Exposure: - Polyphagous (MPI, 2017a), so unlikely to be limited with hosts. - Capable of moving to a new host but are dependent on the environment being relatively moist or humid to be able to move far (MPI, 2017a). Establishment and spread: - Species is likely to be able to establish in at least some parts of New Zealand (MPI, 2017a).	**quarantine pest on this pathway.**
		***M. bilineata* is unlikely to enter New Zealand on the *Oncidium* spp. cut flower pathway due to the morphology (size) of the species being visually obvious during pre-export inspection. Therefore this organism is not considered a quarantine pest on this pathway.**			
	Laevicaulis alte (Férussac, 1822) Synonym: *Vaginulus alte*	Has the potential to be a quarantine pest on this pathway.	*Laevicaulis alte* is associated with the pathway.	- *L. alte is* present in Taiwan (BAPHIQ, 2013). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (USDA, 2012).	**Does not fulfil the criteria of being a quarantine pest on this pathway.**

		And does not have the potential to establish and spread if it entered NZ.	*L. alte* is unlikely to enter New Zealand.	Entry:
				- Slugs are large and will be visually obvious during production and packhouse processing.
				  - Slugs are large (70-80mm in length), dark grey with a pale brown line spans the length of the dorsum (idtools, 2017). When the slug is irritated it produces a sticky white mucus (Das and Parida, 2015).
				  - Juveniles are around 0.5cm but can grow to 4cm in length in 7 months.
				  - Eggs (6-8 mm in size) are laid in the soil (Das and Parida, 2015; idtools, 2017).
				Exposure:
				- Is polyphageous (Kumari and Thakur, 2005), host plants including lettuce, spinach, coriander, bean, cabbage (Das and Parida, 2015). Ornamental plants are also affected including marigold, verbena, dahlia, cosmos, narcissus and lily (Das and Parida, 2015). Therefore it is likely that *L. alte* would be exposed to a suitable host.
				- Are protandric hermaphrodites (Das and Parida, 2015), however two individuals would need to find each for mating to occur and to found a population.
				Establishment and spread:
				- Tropical and subtropical species, surviving in humid conditions (Kumari and Thakur, 2005). Barker (1979) stated that the species is unlikely to acclimatise in New Zealand except in protected environments such as greenhouses.	

		And has the potential to cause negative human health consequences which are sufficient to	*L. alte* is capable of causing low level economic and environmental impacts if	- Is an intermediate host for *Angiostongylus cantonensis*, the rat lungworm (most common cause of eosinophilic meningoencephalitis in humans) (Kim *et al*., 2014).	

		justify phytosanitary measures on this pathway.	it established in New Zealand.		
		***L. alte* is unlikely to enter New Zealand on the *Oncidium* spp. cut flower pathway due to the morphology (size) of the species being visually obvious during pre-export inspection. Therefore this organism is not considered a quarantine pest on this pathway.**			
Nematoda	*Aphelenchoides besseyi* Christie, 1942	Has the potential to be a quarantine pest on this pathway.	*Aphelenchoides besseyi* is associated with the pathway.	- *A. besseyi is* present in Taiwan (MPI, 2010). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with Orchidaceae [**no confirmed association with *Oncidium***] (MPI, 2010). Orchids are not a major host and prevalence with orchids in Taiwan unknown.	**Does not fulfil the criteria of being a quarantine pest on this pathway.**
		And does not have the potential to establish and spread if it entered NZ.	*A. besseyi* is unlikely to enter New Zealand due to unconfirmed host association.	Entry: - Endoparasite on leaves of *Dendrobium* (Orchidaceae) (MPI, 2010). Nematodes are very small and symptoms on the host plant are the only indication of presence. - Ectoparasite on leaves, stems, buds and other parts of host plants (MPI, 2010). - Symptoms include discolouration, necrosis and/or distortion of leaves and dwarfing of plant (MPI, 2010). - Low level infestations may not be detected through production and packhouse processing. - *Aphelenchoides* spp. have been intercepted on imported fresh produce, there is no record of *Aphelenchoides* spp intercepted on cut flowers arriving in New Zealand [QuanCargo, 2017]. Exposure: - Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost. - *A. besseyi* has a wide range of hosts, including strawberry as a major host, which could be in close vicinity to disposed of cut flowers. *A. besseyi* can also survive in the soil until a suitable host is in the vicinity (MPI, 2010). - *A. besseyi* moves readily through water films or moist conditions over plant tissues. This can be to material in direct contact with the infected cut flower stem, or through soil or other contaminated debris to a more suitable host (MPI, 2010). - Watering (irrigation) or rain can facilitate dispersal to new hosts. Establishment and spread: - *A. besseyi* reproduce both asexually and sexually, with both male and female mobile in suitable conditions (MPI, 2010). - *A. besseyi* would be able to establish populations in suitable, sheltered environments such as greenhouses, or in the warmer northern regions of New Zealand [40% of New Zealand's commercial strawberry crop is grown in Auckland].	
		An additional phytosanitary measures cannot be applied against a pest if there is not sufficient evidence to support the organism being a quarantine pest [unconfirmed host status]. Measures for the management of other regulated pests should also manage these species. Can be re-assessed when new information is available.			
Bacteria	*Burkholderia gladioli* (Severini 1913) *pv. gladioli*	Has the potential to be a quarantine pest on this pathway.	*Burkholderia gladioli pv. gladioli* is associated with the pathway.	- *Burkholderia gladioli pv. gladioli is* present in Taiwan (BAPHIQ, 2013). - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (BAPHIQ, 2013).	**Does not fulfil the criteria of being a**

		And does not have the potential to establish and spread if it entered NZ.	*B. gladioli pv. gladioli* is unlikely to enter New Zealand.	Entry:
				- If infection occurs in the stem, the symptoms of the disease (dark green to brownish water-soaked lesions) will be prevalent (MPI, 2017c).
				  - The disease causes visible lesions (to the naked eye) on both sides of the plantlet, psuedobulb and spike that are brown in colour, however low level infection may not be detected prior to shipment (Keith, 2005).
				  - There are no known reports of *B. gladioli pv. gladioli* intercepted from asymptomatic stems (MPI, 2017c).
				Exposure:
				- Hosts include Orchidaceae, rice, onion (*Allium cepa*), gladiolus and iris species (Compant *et al*., 2008).
				- No known vectors for *B. gladioli pv. gladioli*,however insects might contribute to the onset of bacterial disease (e.g. damage from snails or other insect-caused wounds) (MPI, 2017c).
				- Other factors that can contribute to the onset of *B. gladioli pv. gladioli* include contaminated water, media and contact between plants (MPI, 2017c).
				Establishment and spread:
				- Establishment is New Zealand is likely in warmer, humid regions of New Zealand (MPI, 2017c).
					quarantine pest on this pathway.

		And has the potential to cause economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*B. gladioli pv. gladioli* is capable of causing low level economic and environmental impacts if it established in New Zealand.	- Can cause serious losses in orchid production (Moon *et al*., 2016). - Establishment of *Burkholderia gladioli pv. gladioli* will likely affect the New Zealand orchid industry, with reduced plant health, yield and increased cost of pest control.	
		It is unlikely that *B. gladioli pv. gladioli* could enter and establish in New Zealand from the *Oncidium* cut flower import pathway. Therefore this organism is not considered a quarantine pest on this pathway.			
	Pectobacterium cypripedii (Hori 1911) Brenner *et al.* 1973 emend. Hauben *et al.* 1999	Has the potential to be a quarantine pest on this pathway.	*Pectobacterium cypripedii* is associated with the pathway.	- *P. cypripedii is* present in Taiwan (USDA, 2012). - Is not recorded in New Zealand (NZFungi2 2016; NZOR, 2016). - Are known to be associated with *Oncidium* (USDA, 2012).	**Does not fulfil the criteria of being a quarantine pest on this pathway.**
		And has the potential to establish and spread if it entered NZ.	*P. cypripedii* is unlikley to enter New Zealand and be exposed to suitable hosts.	Entry: - Infection would be obvious during *Oncidium* production. - The disease causes visible lesions (to the naked eye) on both sides of the leaf that are brown in colour. Unchecked the disease may spread down the stem to reach the growing point and kill the plant (MPI, 2010). *Oncidium* spp. cut flowers are required to be free of leaf material. Exposure: - Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost. - *Oncidium* spp. cut flowers do not have foliage, with the disease being spread by water splashes between leaves. It is not known whether *P. cypripedii* is transmitted by insect vectors (MPI, 2010). Establishment and spread:	

<table>
<tr><td></td><td></td><td></td><td></td><td>- The disease is primarily a tropical bacterium, with optimal temperatures for growth being 27-31°C (MPI, 2010). Survival and establishment may occur in protected, ideal environments such as glasshouses.</td><td></td></tr>
<tr><td></td><td></td><td colspan="3">It is unlikely that P. cypripedii could enter and establish in New Zealand from the Oncidium cut flower import pathway. Therefore this organism is not considered a quarantine pest on this pathway.</td><td></td></tr>
<tr><td rowspan="3">Chromista</td><td rowspan="3">Phytophthora palmivora
(E.J. Butler) E.J. Butler</td><td>Has the potential to be a quarantine pest on this pathway.</td><td>Phytophthora palmivora is associated with the pathway.</td><td>- P. palmivora is present in Taiwan (BAPHIQ, 2013).
- Is not recorded in New Zealand (NZOR, 2016).
- Are known to be associated with Oncidium roots, stems and bulbs (BAPHIQ, 2013).</td><td rowspan="3">Is considered a quarantine pest on this pathway.

Measures are justified (Basic Measures)</td></tr>
<tr><td>And has the potential to establish and spread if it entered NZ.</td><td>P. palmivora has the potential to enter New Zealand and being exposed to suitable hosts.</td><td>Entry:
- Symptoms are likely to be visible, but low levels may not be detected prior to shipment.
- The disease causes visible lesions (to the naked eye) on the roots of basal portions of the orchid psuedobulb. Lesions can grow to cover the entire psuedobulb and leaf of the orchid (MPI, 2010).
Exposure:
- Whole Oncidium spp. cut stems are disposed of, with some likely to be disposed of into home compost, with a wide range of hosts that are likely to be in home gardens. Soil would also act as a reservoir for the pathogen [low populations can persist in the soil (MPI, 2010)].
- Infects more than 130 species of economic, ornamental, shade and hedge plants (MPI, 2010). Therefore likely to be exposed to suitable hosts.
Establishment and spread:
- Spores are dispersed via water or air; zoospores are released in water and dispersed. Sporangia can be dispersed at least 0.5m by rain splash (MPI, 2010).
- The northern North Island has environmental conditions most suited for the establishment of P. palmivora (warm and humid) (MPI, 2010).The minimum temperature for growth is 11°C, however sporangia can form between 10-22°C. These sporangia could then develop when there are more optimal temperatures.</td></tr>
<tr><td>And has the potential to cause economic consequences which are sufficient to justify phytosanitary measures on this pathway.</td><td>P. palmivora is capable of causing low level economic and environmental impacts if it established in New Zealand.</td><td>- P. palmivora has a wide range of hosts including economically important species such a tomato, avocado, macadamia and potato.
- The level of damage will be restricted by the level of disease expression in suboptimal temperatures.</td></tr>
<tr><td rowspan="2">Fungi</td><td rowspan="2">Phomopsis orchidophila
E.K. Cash & A.M.J. Watson, 1955</td><td>Has the potential to be a quarantine pest on this pathway.</td><td>Phomopsis orchidophila is associated with the pathway.</td><td>- P. orchidophila is present in Taiwan (MPI, 2010).
- Is not recorded in New Zealand (MPI, 2010).
- Are known to be associated with Oncidium (MPI, 2010).</td><td rowspan="2">Does not fulfil the criteria of being a quarantine pest on this pathway.</td></tr>
<tr><td>And does not have the potential to establish and spread if it entered NZ.</td><td>P. orchidophila has the potential to enter New Zealand and being exposed to suitable hosts.</td><td>Entry:
- P. orchidophila produces leaf spots on stems on leaves of several genera in the Orchidaceae family. Spots can be easily be detected by trained inspectors, but latent infections may not be detected (MPI, 2010).
Exposure:</td></tr>
</table>

				- Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost. Suitable hosts would need to be within a vicinity for spores to be transferred via passive or active dispersal. - *P. orchidophila* has a host range limited to Orchidaceae (MPI, 2010), which may limit host availability. - Spores can be transferred by rain splash, or carried to new hosts when they contact insects, humans and other animals moving amongst plants (MPI, 2010). Establishment and spread: - *P. orchidophila* reproduces asexually (MPI, 2010). Asexual reproduction increases the likelihood of establishment in suitable climatic conditions. - Potential establishment of this pathogen would be limited to the warmer, northern regions of New Zealand or protected environments.	
		It is unlikely that *P. orchidophila* could enter and establish in New Zealand from the *Oncidium* cut flower import pathway. Therefore this organism is not considered a quarantine pest on this pathway.			
	Colletotrichum orchidearum Allesch. 1902	Has the potential to be a quarantine pest on this pathway.	*Colletotrichum orchidearum* is associated with the pathway.	- *C. orchidearum is* present in Taiwan (MPI, 2010) - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Oncidium* (MPI, 2017c).	**Does not fulfil the criteria of being a quarantine pest on this pathway.**
		And has the potential to establish and spread if it entered NZ.	*C. orchidearum* has the potential to enter New Zealand and being exposed to suitable hosts.	Entry: - *C. orchidearum* produces brown to black spots on leaves of *Oncidium*, however has been intercepted on flowers and stalks of *Cattleya* sp. (MPI, 2017c). Spots can be easily be detected by trained inspectors, but latent infections may not be detected. - *C. orchidearum* has been isolated from live and dead flowers and stems, indicating that they may also have a saprotrophic lifecycle (MPI, 2017c). - Various species of *Colletotrichum* have been isolated from healthy plant tissue. Species of the *Colletotrichum* genus are known to be endophytes and opportunistic pathogens, however there is no record of *C. orchidearum* occuring endophytically on *Oncidium* spp. Exposure: - Whole *Oncidium* spp. cut stems are disposed of, with some likely to be disposed of into home gardens and compost. - *C. orchidearum* is a host of orchids (*Cattleya, Oncidium, Cymbidium, Eria, a*nd *Physosiphon*), and burdock (MPI, 2017c). Tomato and apple is recorded as a host from artificial inoculation by wound drop (MPI, 2017c). Establishment and spread: - Spores under ideal conditions can be spread via wind and water-splash, and can survive in soil by growing saprobically on dead plant fragments (MPI, 2017c).There are no known insect vectors (MPI, 2017c). - Climate may be a limiting factor for the establishment of this species, however it may be able to establish in the warmer northern areas of New Zealand or protected environments (MPI, 2017c)	

		And has the potential to cause negative economic consequences which are sufficient to justify phytosanitary measures on this pathway.	*C. orchidearum* is capable of causing low level economic and environmental impacts if it established in New Zealand.	- New Zealand's native orchid species could be prone to the effects of this fungi, as well as the commercial orchid industry. - There would be a potential economic impact on the New Zealand apple and tomato industry. However it is unknown whether *C. orchidearum* would infect apple and tomato outside of inoculation experiments.	
	Coleosporium bletiae Dietel 1898	Has the potential to be a quarantine pest on this pathway.	*Coleosporium bletiae* is associated with the pathway.	- *C. bletiae is* present in Taiwan (BA, 2010; MPI, 2010) - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Orchidaceae* (BA, 2010). Note: No information of this pest being associated with *Oncidium.*	**Does not fulfil the criteria of being a quarantine pest on this pathway.**
		An additional phytosanitary measure cannot be applied against a pest if there is not sufficient evidence to support the organism being a quarantine pest [unconfirmed host status]. Measures for the management of other regulated pests should also manage these species. Can be re-assessed when new information is available.			
	Curvularia eragrostidis (Henn.)	Has the potential to be a quarantine pest on this pathway.	*Curvularia eragrostidis* is associated with the pathway.	- *C. eragrostidis* is present in Taiwan (BCRC, 2017) - Is not recorded in New Zealand (NZOR, 2016). - Are known to be associated with *Orchidaceae* (Daly *et al*., 2013). Note: No information of this pest being associated with *Oncidium.*	**Does not fulfil the criteria of being a quarantine pest on this pathway.**
		An additional phytosanitary measure cannot be applied against a pest if there is not sufficient evidence to support the organism being a quarantine pest [unconfirmed host status]. Measures for the management of other regulated pests should also manage these species. Can be re-assessed when new information is available.			

The following pests are not on the *Oncidium* cut flower pest list for the following reasons:

(1) The pests are non-regulated (n=46).

Scientific name	Classification
Tetranychus urticae	Acari: Tenuipalpidae
Alphitobius diaperinus	Coleoptera: Tenebrionidae
Cerataphis orchidearum	Hemiptera: Aphididae
Coccus hesperidum	Hemiptera: Coccidae
Saissetia coffeae	Hemiptera: Coccidae
Aspidiotus nerii	Hemiptera: Diaspididae
Diaspis boisduvali	Hemiptera: Diaspididae
Hemiberlesia lataniae	Hemiptera: Diaspididae
Lindingaspis rossi	Hemiptera: Diaspididae
Pseudococcus viburni	Hemiptera: Pseudococcidae
Spodoptera litura	Lepidoptera: Noctuidae
Frankliniella intonsa	Thysanoptera: Thripidae
Hecamede granifera	Thysanoptera: Thripidae
Microcephalothrips abdominalis	Thysanoptera: Thripidae
Deroceras laeve	Stylommatophora: Agriolimacidae
Limacus flavus	Stylommatophora: Limacidae
Zonitoides arboreus	Stylommatophora: Zonitidae
Helicotylenchus pseudorobustus	Tylenchida : Hoplolaimidae
Pseudomonas tolaasii	Gammaproteobacteria: Pseudomonadaceae
Acidovorax avenae subsp. *cattleyae*	Betaproteobacteria, Comamonadaceae
Dickeya chrysanthemi	Gammaproteobacteria, Enterobacteriaceae
Dickeya zeae	Gammaproteobacteria, Enterobacteriaceae
Erwinia carotovora subsp. *carotovora*	Gammaproteobacteria, Enterobacteriaceae
Phytophthora cactorum	Oomycota: Peronosporaceae
Pythium ultimum	Oomycota: Peronosporaceae
Pestalotiopsis palmarum	Ascomycota: Botryosphaeriales
Phyllosticta capitalensis	Ascomycota: Capnodiales
Cladosporium cladosporioides	Ascomycota: Capnodiales
Cladosporium oxysporum	Ascomycota: Capnodiales
Pseudocercospora odontoglossi	Ascomycota: Capnodiales
Septoria selenophomoides	Ascomycota: Capnodiales
Botrytis cinerea	Ascomycota: Helotiales
Fusarium proliferatum	Ascomycota: Hypocreales
Nectria haematococca	Ascomycota: Hypocreales
Colletotrichum boninense	Ascomycota: Incertae sedis
Colletotrichum crassipes	Ascomycota: Incertae sedis
Nigrospora oryzae	Ascomycota: Incertae sedis
Bipolaris maydis	Ascomycota: Pleosporales
Curvularia lunata	Ascomycota: Pleosporales
Athelia rolfsii	Basidiomycota: Atheliales
Thanatephorus cucumeris	Basidiomycota: Cantharellales
Carnation mottle virus	Alphacarmovirus
Cucumber mosaic virus	Cucumovirus
Cymbidium mosaic virus	Potexvirus
Impatiens necrotic spot virus	Tospovirus
Odontoglossum ringspot virus	Tobamovirus
Tomato Spotted Wilt Virus	Tospovirus

(2) Regulatory status unconfirmed, present in Taiwan but not/insufficient evidence to suggest an association with *Oncidium* [or Orchidaceae unless specified] (n=6)

Scientific name	Classification	not/insufficient evidence to suggest an association with *Oncidium* [or Orchidaceae]	Present in Taiwan
Gonocephalum depressum	Coleoptera: Tenebrionidae	*	Insectoid, 2017
Lilioceris formosana	Coleoptera: Chrysomelidae	DA, 2013; *	DA, 2013
Sangariola punctatostriata	Coleoptera: Chrysomelidae	DA, 2013; *	DA, 2013
Kaniska canace	Lepidoptera: Nymphalidae	DA, 2013; *	DA, 2013
Lasiodiplodia theobromae	Ascomycota: Botryosphaeriales	Farr and Rossman 2010; Lopes *et al*., 2009 [1]	BA, 2010
Sphaerulina phalaenopsidis	Ascomycota: Capnodiales	Farr and Rossman, 2010; BA, 2010 [2]; USDA, 2003 [2; *]	BA, 2010; MPI, 2010
Cylindrosporium phalaenopsidis	Ascomycota: Helotiales	Farr and Rossman, 2010; USDA, 2003 [2]; BA, 2010 [3]	BA, 2010; MPI, 2010
Phalaenopsis chlorotic spot virus		BA, 2010 [2]; Chen and Chen, 2017 [2]	MPI, 2010

* No supporting information found (2017).

[1] Only record of being associated with one orchid species [*Catasetum fimbriatum* (Morren) Lindley, ephiphytic Brazilian orchid).

[2] Only recorded from *Phalaenopsis* spp.

[3] Recorded from *Phalaenopsis* spp. and *Cymbidium sinensis.*

(3) Regulatory status unconfirmed, not/unconfirmed presence in Taiwan and not/insufficient evidence to suggest an association with *Oncidium* or Orchidaceae (n=8)

Scientific name	Classification	not/insufficient evidence to suggest an association with *Oncidium* [or Orchidaceae]	Not/unconfirmed presence in Taiwan
Xenotarsonemus belemnitoides	Acari: Tarsonemidae	USDA, 2012	MPI, 2010; USDA, 2012; *
Xenotarsonemus rivalis	Acari: Tarsonemidae	USDA, 2012	MPI, 2010; USDA, 2012; *
Xenotarsonemus sensus	Acari: Tarsonemidae	USDA, 2012	MPI, 2010; USDA, 2012, *
Xenotarsonemus ulignosus	Acari: Tarsonemidae	USDA, 2012	MPI, 2010; USDA, 2012, *
Xenotarsonemus wani	Acari: Tarsonemidae	USDA, 2012	MPI, 2010; USDA, 2012; Insectoid, 2017**
Xenotarsonemus xiufui	Acari: Tarsonemidae	USDA, 2012	MPI, 2010; USDA, 2012, *
Calanthe mild mosaic virus	Potyvirus	*	MPI, 2010, *
Dendrobium vein necrosis virus	.	*	MPI, 2010, *

* No supporting information found (2017).

**Evidence to suggest presence.

(4) Regulatory status unconfirmed, not/unconfirmed presence in Taiwan and are associated with *Oncidium* or Orchidaceae (n=30)

Scientific name	Classification	Associated with *Oncidium* or Orchidaceae	Not/unconfirmed presence in Taiwan
Camarosporium orchidicola	Ascomycota: Botryosphaeriales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Phyllosticta laeliae	Ascomycota: Botryosphaeriales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Phyllosticta nigromaculans	Ascomycota: Botryosphaeriales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Pseudocercospora angraeci	Ascomycota: Capnodiales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Linospora subtropicalis	Ascomycota: Diaporthales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Valsella pedicellata	Ascomycota: Diaporthales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Gloeosporium affine (Colletotrichum gloeosporioides)	Ascomycota: Helotiales	Yes [Farr and Rossman 2010]	Wang *et al*., 2008 Present in New Zealand

Gloeosporium oncidii	Ascomycota: Helotiales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Gloeosporium cinctum	Ascomycota: Helotiales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Colletotrichum arxii	Ascomycota: Incertae sedis	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Colletotrichum oncidii	Ascomycota: Incertae sedis	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Muyocopron corrientinum	Ascomycota: Incertae sedis	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Pseudophragmotrichum cubense	Ascomycota: Incertae sedis	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Septonema intercalare	Ascomycota: Incertae sedis	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Septonema intercalare var. *longisporum*	Ascomycota: Incertae sedis	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Micropeltis bakeri	Ascomycota: Microthyriales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Muyocopron corrientinum	Ascomycota: Incertae sedis	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Negeta chlorocrota	Lepidoptera: Nolidae	Yes [PHA, 2016]	MPI, 2010; *
Ophiodothella orchidearum	Ascomycota: Phyllachorales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; MPI, 2010; *
Coniothyrium hariotianum	Ascomycota: Pleosporales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Stagonospora microspora	Ascomycota: Pleosporales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Anthostomella keissleri	Ascomycota: Xylariales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; MPI, 2010; *
Physalospora camptospora	Ascomycota: Xylariales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Paranthostomella microspore	Ascomycota: Xylariales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Puccinia oncidii	Basidiomycota: Pucciniales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Sphenospora saphena	Basidiomycota: Pucciniales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Uredo epidendri	Basidiomycota: Pucciniales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Orchid fleck virus	Unclassified bipartite, negative-sense RNA plant virus	Yes [Peng *et al*., 2013]	Not recorded [Peng *et al*., 2013]

* No supporting information found (2017).

(5) The pests are regulated, are not associated with *Oncidium* or Orchidaceae and not/unconfirmed presence in Taiwan (n=3)

Scientific name	Classification	Are not associated with *Oncidium* or Orchidaceae	Not/unconfirmed presence in Taiwan
Volutella albidopila	Ascomycota: Hypocreales	Farr and Rossman 2010; *	MPI, 2010; *
Botryosphaeria vanilla	Ascomycota: Botryosphaeriales	Yes [Farr and Rossman 2010]	Farr and Rossman, 2010; *
Gonocephalum depressum	Coleoptera: Tenebrionidae	*	Insectoid, 2017**

* No supporting information found (2017).
** Evidence to suggest presence, but not confirmed

(6) The pests are regulated, not present in Taiwan and associated with *Oncidium* or Orchidaceae (n=20)

Scientific name	Classification	Are associated with *Oncidium* or Orchidaceae	Not present in Taiwan
Brevipalpus californicus	Acari: Tenuipalpidae	Childers *et al.,* 2003	MPI, 2010; *
Cladosporium orchidearum	Ascomycota: Capnodiales	Farr and Rossman 2010	Farr and Rossman 2010; *
Botryodiplodia oncidii	Ascomycota: Diaporthales	Farr and Rossman 2010	Farr and Rossman 2010; MPI, 2010; *
Fusarium oxysporum f. sp. *cattleyae*	Ascomycota: Hypocreales	Farr and Rossman 2010	Farr and Rossman 2010; MPI, 2010; *
Volutella citrinella	Ascomycota: Hypocreales	Farr and Rossman 2010	Farr and Rossman 2010; MPI, 2010
Curvularia aeria	Ascomycota: Pleosporales	Farr and Rossman 2010	Farr and Rossman 2010; *
Physalospora orchidearum	Ascomycota: Xylariales	Farr and Rossman 2010]	Farr and Rossman 2010; *
Marasmiellus inoderma	Basidiomycota: Agaricales	Farr and Rossman 2010	Farr and Rossman 2010; *
Desmosorus oncidii	Basidiomycota: Pucciniales	Farr and Rossman 2010	Farr and Rossman 2010; *
Sphenospora kevorkianii	Basidiomycota: Pucciniales	Farr and Rossman 2010	Farr and Rossman 2010; *

Diaxenes phalaenopsis	Coleoptera: Cerambycidae	CABI 2016; Swezey 1945	MPI, 2010; *
Diaxenes taylori	Coleoptera: Cerambycidae	Swezey 1945	MPI, 2010; *
Gonophora xanthomelaena	Coleoptera: Chrysomelidae	CABI 2016	MPI, 2010; *
Acythopeus aterrimus (Orchidophilus aterrimus)	Coleoptera: Curculionidae	Swezey 1945	MPI, 2010; Preena, 2008; *
Orchidophilus gilvonotatus (Orchidophilus eburifer)	Coleoptera: Curculionidae	Swezey 1945	MPI, 2010; Preena, 2008; *
Orchidophilus peregrinator	Coleoptera: Curculionidae	Swezey 1945	MPI, 2010; Preena, 2008; *
Tadius erirhinoides	Coleoptera: Curculionidae	Swezey, 1945	Morimoto, 1994[1]; *
Aleurodicus dugesii	Hemiptera: Aleyrodidae	CABI, 2016	*
Pinnaspis strachani	Hemiptera: Diaspididae	CABI. 2016	MPI, 2010; *
Nipaecoccus nipae	Hemiptera: Pseudococcidae	CABI 2016	CABI, 2016; *
Chliaria othona	Lepidoptera: Lycaenidae	Yes [CABI 2016, Orchidaceae]	Insectoid, 2017**
Trichoplusia ni	Lepidoptera: Noctuidae	CABI, 2016	*
Frankliniella schultzei	Thysanoptera: Thripidae	CABI 2016	MPI, 2010; *
Colletotrichum fructicola	Ascomycota: Incertae sedis	Farr and Rossman, 2010	Farr and Rossman 2010; MPI, 2010; *

* No supporting information found (2017).
** Evidence to suggest presence, but not confirmed
[1] Only source of reference as being present in Taiwan.

(7) The pests are present in Taiwan, but not/insufficient evidence to suggest an association with *Oncidium* or Orchidaceae (n=15)

Scientific name	Classification	Are not/insufficient evidence of an association with *Oncidium* or Orchidaceae	Are present in Taiwan
Harmonia axyridis	Coleoptera: Coccinellidae	DA, 2013; *	DA, 2013
Chromatomyia horticola	Diptera: Agromyzidae	DA, 2013; *	DA, 2013
Liriomyza huidobrensis	Diptera: Agromyzidae	DA, 2013; *	DA, 2013
Liriomyza trifolii	Diptera: Agromyzidae	DA, 2013; *	DA, 2013
Pseudococcus comstocki	Hemiptera: Pseudococcidae	DA, 2013; idtools. 2017**	DA, 2013
Euproctis taiwana	Lepidoptera: Lymantriidae	DA, 2013; *	DA, 2013
Agrotis segetum	Lepidoptera: Noctuidae	DA, 2013; *	DA, 2013
Xylena formosa	Lepidoptera: Noctuidae	DA, 2013; *	DA, 2013
Oxya intricata	Orthoptera: Acrididae	DA, 2013; *	DA, 2013
Haplothrips chinensis	Thysanoptera: Phlaeothripidae	DA, 2013; *	DA, 2013
Fusarium oxysporum f. sp. *lilii*	Ascomycota: Hypocreales	Farr and Rossman 2010; *	DA, 2013
Curvularia affinis	Ascomycota: Pleosporales	*	Wu and Dow, 1993
Coleosporium bletiae	Basidiomycota: Pucciniales	Farr and Rossman 2010; *	BA, 2010; MPI, 2010
Capsicum chlorosis virus	.	*	MPI, 2010
Choanephora cucurbitarum	Zygomycota: Mucorales	Farr and Rossman 2010; *	CABI, 2008

* No supporting information found (2017).
** Evidence to suggest presence, but not confirmed

(8) The pests are regulated at genus level. Note: species from within the genus have been assessed separately where information of an association with *Oncidium* or Orchidaceae is available. (n=26)

Scientific name	Classification
Neotarsonemoides sp.	Acari: Tarsonemidae
Brevipalpus sp.	Acari: Tenuipalpidae
Tydeus sp.	Acari: Tydeidae
Spodoptera sp.	Lepidoptera: Noctuidae
Pseudomonas sp.	Gammaproteobacteria, Pseudomonadaceae
Phytophthora sp.	Oomycota: Peronosporaceae
Pestalotiopsis sp.	Ascomycota: Amphisphaeriales

Fusicoccum sp.	Ascomycota: Botryosphaeriales
Macrophoma sp.	Ascomycota: Botryosphaeriales
Cercospora sp.	Ascomycota: Capnodiales
Mycosphaerella sp.	Ascomycota: Capnodiales
Phomopsis sp.	Ascomycota: Diaporthales
Selenophoma sp.	Ascomycota: Dothideales
Fusarium sp.	Ascomycota: Hypocreales
Colletotrichum sp.	Ascomycota: Incertae sedis
Glomerella sp.	Ascomycota: Incertae sedis
Pseudorobillarda sp.	Ascomycota: Incertae sedis
Alternaria sp.	Ascomycota: Pleosporales
Ascochyta sp.	Ascomycota: Pleosporales
Coniothyrium sp.	Ascomycota: Pleosporales
Didymosphaeria sp.	Ascomycota: Pleosporales
Leptosphaeria sp.	Ascomycota: Pleosporales
Microsphaeropsis sp.	Ascomycota: Pleosporales
Phaeosphaeria sp.	Ascomycota: Pleosporales
Phoma sp.	Ascomycota: Pleosporales
Stagonospora sp.	Ascomycota: Pleosporales

(9) The pests are regulated, present in Taiwan and New Zealand, associated with *Oncidium* or Orchidaceae.

Scientific name	Classification	Associated with Oncidium or Orchidaceae	Are present in Taiwan and New Zealand
Fusarium oxysporum [strains not in New Zealand]	Ascomycota: Hypocreales	BAPHIQ, 2013	BAPHIQ, 2013
Bipolaris oryzae	Ascomycota: Pleosporales	BAPHIQ, 2013	BAPHIQ, 2013
Colletotrichum gloeosporioides [strains not in New Zealand]	Ascomycota: Incertae sedis	BAPHIQ, 2013	BAPHIQ, 2013

(10) The pests are regulated due to their vector status and are present in Taiwan, but are not known to vector viruses/fungi associated with *Oncidium* (n=3).

Scientific name	Classification	Notes
Myzus persicae	Hemiptera: Aphididae	Present in New Zealand and Taiwan**, and associated with *Oncidium*. Are not known to vector viruses associated with *Oncidium*, however are known to vector other viruses present in Taiwan but not known to New Zealand [CABI, 2017].
Aphis gossypii	Hemiptera: Aphididae	Present in New Zealand and Taiwan**, and associated with *Oncidium*. Are not known to vector viruses associated with *Oncidium*, however are known to vector other viruses present in Taiwan but not known to New Zealand [CABI, 2017].
Frankliniella intonsa	Thysanoptera: Thripidae	Present in New Zealand and Taiwan**, and associated with *Oncidium*. Are not known to vector viruses associated with *Oncidium*, however are known to vector other viruses present in Taiwan but not known to New Zealand [CABI, 2017].
Pseudococcus longispinus	Hemiptera: Pseudococcidae	Present in New Zealand (NZFUNGI, 2016], present in Taiwan (BAPHIQ, 2013). Interception record on *Oncidium* in the USA (idtools, 2017). Known to vector *Grapevine leafroll-associated virus 3* (GLRaV-3) (Douglas and Kruger, 2008), however this is present in New Zealand (Pearson *et al*., 2006).
Mertila malayensis	Hemiptera: Miridae	Associated with Orchidacea (Swezey, 1945). No information found on vector.
** pests are still regulated as vectors even though present in New Zealand. Detection during production or post-harvest activities will require remedial action prior to the issuance of a phytosanitary certificate.		

Additional Vector analysis: Pests associated with pineapples from Taiwan and *Xylella fastidiosa*

The following pests [vectors] from other pathways were considered due to the small scale production observed in Taiwan, as well as the ongoing concern of *Xylella fastidiosa* internationally.

Organism	Notes	Level of measure
Dysmicoccus brevipes Pineapple mealy bug	Is highly polyphagous with hosts from more than 100 genera [CABI, 2017]. Hosts include Celery, capsicum, citrus, cucumber, pumpkin, apple and grasses [CABI, 2017]. Vectored viruses: Pineapple mealybug wilt-associated virus	Regulated, requiring Basic Measures on other pathways. Other mealybugs on *Oncidium* cut flowers require Targeted measures, which should also mitigate the risk associated with this species. Though not known to be associated with *Oncidium*, detection during production or post-harvest activities will require remedial action prior to the issuance of a phytosanitary certificate.
Pineapple mealybug wilt-associated virus Vectored by: *Dysmicoccus brevipes*	Host range appears to be restricted to pineapple. New Zealand does not have a pineapple industry (PVO, 2017).	Regulated. Though not known to be associated with *Oncidium*, detection during production or post-harvest activities will require remedial action prior to the issuance of a phytosanitary certificate.
Xylella fastidiosa	MPI has assessed *X. fastidiosa* and determined that the pathogen is unlikely to enter New Zealand on a cut flower stem. Rather, vectors present on a cut flower would be the most likely method of introduction on this pathway. Species *X. taiwanensis* sp. nov., causes pear leaf scorch disease (Su *et al*., 2016). *Oncidium* is not recorded as a host for *Xylella fastidiosa* (EFSA, 2015). Vectors of *X. fastidiosa* include Cecropoidea, Cicadoidea, Cicadellini (Redak, *et al*., 2004; Su *et al*., 2013), none of which have a known association with *Oncidium*.	All *Xylella* species not present in New Zealand are regulated. Vectors of *Xylella* are also regulated, and though not known to be associated with *Oncidium*, detection during production or post-harvest activities will require remedial action prior to the issuance of a phytosanitary certificate.