



Risk Management Proposal

Fresh Ginger (*Zingiber officinale* and *Z. zerumbet*) for Human Consumption

Ministry for Primary Industries Discussion Paper No: 2019/06

ISBN No: 978-1-99-000810-8 (online)

ISSN No: 2253-3907 (online)

Prepared by the Ministry for Primary Industries

30 August 2019

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Submissions

The Ministry for Primary Industries (MPI) invites comment from interested parties on the amended import health standard (IHS) for Fresh Ginger for Human Consumption 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 scientific 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 (to arrive by close of business on 29 September 2019). 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 29 September 2019).

Horticulture Imports
Plants and Pathways
Ministry for Primary Industries
PO Box 2526
Wellington 6140
New Zealand

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

Official Information Act 1982

Please note that your submission is public information. MPI policy is to provide a copy of all submissions received and the review of submission to all parties who lodge submissions.

Submissions may 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. Anyone preparing a submission may wish to inform MPI if there are 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.

1 Introduction

1.1 OBJECTIVE

1. MPI's objective is to ensure the known biosecurity risks associated with fresh ginger (*Zingiberi officinale* and/or *Z. zerumbet*) rhizomes from approved exporting countries are managed appropriately and are consistent with New Zealand's domestic legislation and international obligations.

1.2 PURPOSE

- 1) The purpose of this risk management proposal (RMP) is to:
 - a) consider the known biosecurity risks that may be associated with importing fresh ginger for human consumption from approved countries and a new country requesting market access,
 - b) identify how measures proposed in the draft IHS effectively manage the biosecurity risk, and
 - c) provide information to support consultation on the draft IHS.
- 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.

1.3 SCOPE OF THE RISK MANAGEMENT PROPOSAL

- 3) This RMP includes technical justification and describes the approach used to determine the proposed measures to manage the biosecurity risks associated with the import of fresh ginger from new and approved countries under the IHS for Fresh Ginger for Human Consumption. The RMP includes:
 - a) a summary of pests that are considered a biosecurity risk directly associated with *Z. officinale* and/or *Z. zerumbet* at the point of export; and
 - b) a description of pre-export phytosanitary measures and their effectiveness for managing regulated pests associated with fresh ginger at the point of export.
- 4) This RMP is divided into four parts:
 - a) Part 1 provides the introduction and background.
 - b) Part 2 provides the context of the framework within which the proposed draft IHS for Fresh Ginger for Human Consumption has been developed.
 - c) Part 3 outlines the approach used to determine the management of risks associated with imported fresh ginger for human consumption. This includes information on the types of measures which may effectively manage specific risks associated with importing fresh ginger rhizomes.
 - d) Part 4 considers the regulated pests associated with fresh ginger and the appropriate measures to effectively manage these risks.
- 5) The draft IHS for Fresh Ginger for Human Consumption contains the proposed measures which will manage pests associated with fresh ginger from China in addition to countries with existing access.
- 6) Biosecurity risk information in this risk management proposal is based on the MPI (2019) Import Risk Analysis: Ginger (*Zingiber officinale*, *Zingiber zerumbet*) fresh produce. Version 1. July 2019, unless specific references are included in the text.

1.4 BACKGROUND

- 7) Fresh ginger for human consumption is currently approved for import from eight countries (Table 1). However since 2014, ginger has only been imported from three approved countries. These were from:
 - a) Australia = 7 consignments (MPI QuanCargo, 2019).
 - b) Fiji = 565 consignments (MPI QuanCargo, 2019).
 - c) Thailand = 558 consignments (MPI QuanCargo, 2019).

Table 1: Approved countries for the import of ginger for consumption

Country	Species of ginger access
Australia	<i>Z. officinale</i>
Fiji	<i>Z. officinale</i>
Niue	<i>Z. zerumbet</i>
Papua New Guinea	<i>Z. officinale</i>
Samoa	<i>Z. officinale</i> and <i>Z. zerumbet</i>
Thailand	<i>Z. officinale</i>
Tonga	<i>Z. zerumbet</i>
Vanuatu	<i>Z. officinale</i>

- 8) A market request for ginger for human consumption from China initiated an analysis of biosecurity risks for this import pathway and triggered a review of pests and measures for currently approved countries. The review of the currently approved country:commodity ginger IHS's has also addressed changes of pest regulatory status and inconsistencies between the IHS's.

1.5 FORMAT OF DRAFT IHS

- 9) MPI has recently revised the format of IHSs for fresh fruits and vegetables. This new IHS format:
- standardises the current fresh fruit and vegetable IHSs (which was in a country:commodity format) to a commodity IHS for all approved countries,
 - removes non-regulated pests,
 - corrects administrative inaccuracies such as incorrect references to government to government agreements, and
 - clearly differentiates between import requirements and guidance and clarifies other ambiguities and definitions.
- 10) The new IHS format has been used to incorporate the market access request for China and existing currently approved ginger IHS's.

2 Context

2.1 DOMESTIC

- 11) 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.
- 12) MPI is the lead government agency for New Zealand's biosecurity system and is responsible for the effective management of risks associated with the importation of risk goods into New Zealand (Part 3, Biosecurity Act 1993).
- 13) MPI engages with interested parties and/or affected New Zealand stakeholders and the exporting country requesting market access during the development of an IHS.
- 14) MPI follows MPI policies and procedures for the development and consultation of an IHS.

2.2 INTERNATIONAL

- 15) 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.
- 16) 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.

2.3 NEW ZEALAND'S BIOSECURITY SYSTEM

- 17) New Zealand operates a biosecurity system for which the phytosanitary aspect (covering plant health) is a key part.
- 18) No biosecurity system is capable of reducing risk to zero. The objective of the IHS system is to reduce to an acceptable level the likelihood of entry and establishment of regulated organisms (including pests, diseases and weeds).
- 19) An organism is 'regulated' by MPI if it could cause unacceptable 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) it 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/or spread in New Zealand.
 - Entry and establishment is defined as 'introduction' by the International Plant Protection Convention (IPPC).
- 20) The New Zealand phytosanitary system focuses on ensuring that the most significant pests, for example economically important fruit flies, are unlikely to establish in New Zealand. The system also manages risk associated with all regulated pests.
- 21) 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).
- 22) 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.

2.4 STRENGTH OF MEASURES

- 23) Measures are required for regulated pests where the 'probability of introduction and spread' on a pathway is unacceptable (i.e. it is able to enter through the pathway, find a suitable host, **and** able to establish and (in most cases) spread in New Zealand).
- 24) The strength of the measure required should be no more than necessary to manage the risk the organism poses. When managing biosecurity risks on fresh fruit and vegetables, MPI has classified measures into three categories of increasing strength: *Basic Measures*, *Targeted Measures* and *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 a transient population is low.
- 26) The greater the consequence from 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 pests requiring *Targeted* and/or *MPI-Specified Measure*, an Export Plan will be negotiated with the exporting NPPO which will be 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.

2.5 IMPORTING FRESH PRODUCE

- 27) Fresh produce can only be imported into New Zealand where a commodity specific IHS is available and the NPPO has provided evidence to the satisfaction of a CTO that the exporting country has a phytosanitary certification system that complies with International Standard for Phytosanitary Measures (**ISPM 7**). *Phytosanitary certification system*. The phytosanitary certification system (including programmes and standards) must demonstrate the process used to provide export assurance. The export system is subject to audit by MPI.
- 28) In circumstances where regulated pests requiring *Targeted* or *MPI-Specified Measures* are associated with the commodity, MPI requires the exporting NPPO to negotiate an Export Plan with MPI. Exports to New Zealand under the IHS cannot occur until the Export Plan has been agreed by MPI and the exporting country.
- 29) MPI has an obligation to prepare and make available a list of regulated pests as per Article VII.2 (i) of the IPPC (1997) and New Zealand's list of regulated pests can be found in MPI's [Biosecurity Organisms Register for Imported Commodities](#) (BORIC). In addition, some commodity IHS's will have specific pests listed which require *Targeted* or *MPI-Specified Measures* for National Plant Protection Organisations (NPPOs) certifying commodities for export to New Zealand. If pests are detected during phytosanitary inspection which are not listed on the commodity specific pest list, then the exporting NPPO should refer to BORIC for their regulatory status. Where the pest is not listed in BORIC, the exporting NPPO must contact MPI (PlantImports@mpi.govt.nz) in order to make a determination on the regulatory status of the pest.

3 Risk Analysis Approach

This section outlines the approach used to determine the management of risks associated with imported fresh ginger for human consumption. This includes information on the types of measures which may effectively manage specific risks associated with importing fresh ginger rhizomes.

3.1 COMMODITY DESCRIPTION

- 30) The commodity description and standard production practices is significant in the risk analysis procedure in order to determine the baseline from which any outstanding risks are identified. These outstanding risks may require additional measures over and above *Basic Measures*.
- 31) This RMP applies to fresh ginger (*Zingiber officinale* and *Z. zerumbet*) rhizome for human consumption ('fresh ginger').
- 32) **Fresh ginger** commodity is defined as export quality fresh ginger rhizomes with skin. The ginger rhizome is typically branched, containing yellow flesh covered by a thin brown skin. The commodity does not include roots (with the exception that *Z. zerumbet* may have dry root hairs or fine roots attached), leaves, stems, or other plant parts. Products must be clean, free from soil, and washed.
- 33) **Export quality** is defined as:
 - a) intact, sound and clean;
 - b) free from:
 - rot, signs of shrivelling and dehydration;
 - any visible foreign matter;
 - damage caused by pests affecting the flesh; and
 - abnormal moisture.
 - c) able to withstand transportation and handling.
- 34) Commercially produced ginger is graded throughout production to remove:
 - a) rhizomes in an immature state;
 - b) damaged rhizomes, and plant material (such as the leaves) other than what is included in the commodity description;
 - c) rhizomes which are infested or infected with visually detectable pests; and/or
 - d) all plant material from species other than *Z. officinale* and *Z. zerumbet*.
- 35) 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 for Fresh Ginger for Human Consumption.
- 36) Dried, frozen and processed ginger products are excluded from the scope of this RMP. Such product may be imported under the [Stored Plant Products for Human Consumption IHS](#).

3.2 SOURCE INFORMATION

- 37) In the development of the RMP the following information was used to identify risk organisms and the appropriate measures to manage their entry and establishment in New Zealand:
 - a) BORIC. Biosecurity Organisms Register for Imported Commodities (MPI database).
<https://www.mpi.govt.nz/news-and-resources/resources/registers-and-lists/biosecurity-organisms-register-for-imported-commodities/>
 - b) IPPC. 1997. International Plant Protection Convention. Rome, IPPC, FAO.
 - c) Ginger pest and production information received from countries approved to export to New Zealand and China.
 - d) MPI (2019) Import Risk Analysis: Ginger (*Zingiber officinale*, *Zingiber zerumbet*) fresh produce. Version 1. July 2019
 - e) MPI. (2019). Ministry for Primary Industries Standard 152.02: Importation and Clearance of Fresh Fruit and Vegetables into New Zealand.
 - f) MPI. (2019). International pathway assessment report: Fresh ginger from China.

- g) MPI. (2006). Import Health Standard Commodity Sub-class: Fresh Fruit/Vegetables Ginger, (*Zingiber officinale*) from Papua New Guinea.
- h) MPI. (2006). Import Health Standard Commodity Sub-class: Fresh Fruit/Vegetables Ginger, (*Zingiber officinale*) from Thailand.
- i) MPI. (1998). Import Health Standard Commodity Sub-class: Fresh Fruit/Vegetables Ginger, *Zingiber officinale* from Vanuatu.
- j) QuanCargo. MPI internal database of imported commodity consignments.

3.3 DESCRIPTION OF IMPORT RISK ASSESSMENT

- 38) Biosecurity risk information in this RMP is based on the MPI (2019) Import Risk Analysis: Ginger (*Zingiber officinale*, *Zingiber zerumbet*) fresh produce. Version 1. July 2019, unless specific references are included in the text. A summary of risk organisms and justification for measures can be found in Part 4.

Note: This is not an exhaustive list of pests but is representative of the type of pests that are likely to be or, are known to be associated with the commodity at the point of export. This includes pest interception data.

- 39) The purpose of the risk analysis is to provide evidence for decisions about the strength of measures required.
- 40) The risk analysis process is described in the IRA, and considers:
- 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) likelihood of entry and establishment in New Zealand;
 - f) potential to cause unwanted consequences in New Zealand; and
 - g) the ability of *Basic Measures* to manage the risk to an acceptable level.
- 41) 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**).
- 42) The criteria for a pest or pathogen to require more than *Basic Measures* is based on the combination of the likelihood of the pests being removed or detected during standard commercial production and the risk if they were not.

3.4 DESCRIPTION OF MEASURES

- 43) 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 the risk of pests to New Zealand is managed to an appropriate level. 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 (*Basic Measures*) to reduce pest prevalence on a commodity;
 - b) application of an additional measure in the exporting country to reduce pest prevalence on a commodity (*Targeted* and/ or *MPI-Specified Measure* where required);
 - c) official pre-export phytosanitary inspection of homogeneous lot and certification to verify that pre-export measures have been undertaken and effective as required by MPI and that the consignment is considered 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 (e.g. treatment) as required.
- 44) Measures of different strengths (*Basic*, *Targeted*, or *MPI-Specified Measures*) are applied according to the level of the pest risk on the pathway to effectively mitigate the risk of pest introduction via a commodity.

Basic Measures

- 45) All consignments must comply with *Basic Measures* described in the IHS. *Basic Measures* will manage the biosecurity risk of pests and diseases entering and establishing in New Zealand unless MPI has determined that *Targeted* and/or *MPI-Specified Measures* are required.
- 46) *Basic Measures* include (but are not restricted to) the following required components:

Commercial production

- 47) All fresh fruit and vegetables 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.
- 48) Commercial production of fresh ginger includes:
- Recognised standard cultivation:
 - production site management such as plant health monitoring, appropriate use of agrichemicals, environmental controls, management of records.
 - crop hygiene practices such as in-field weed control.
 - Pest management:
 - pest monitoring.
 - management of pests and diseases including cultural, biological and chemical controls.
 - Harvest activities:
 - sorting of ginger to remove extraneous matter (such as plant material and soil) and non-export quality produce.
 - Packaging activities:
 - removal of debris (including soil) and visible pests from ginger rhizome.
 - packing ginger into clean packaging material.
 - maintaining product security following export certification to prevent pest re-infestation.
- 49) All fresh fruit and vegetables for export to New Zealand must be of export quality to minimise the likelihood of infested or infected ginger rhizomes entering the supply chain.
- 50) For many pests, *Basic Measures* are sufficient to reduce their prevalence in a consignment to a very low level and by doing so reduce to an acceptable level their likelihood of entry, establishment, and spread, and therefore prevent any unwanted impact they may have on New Zealand

Targeted Measures

- 51) *Targeted Measures* are measures which effectively reduce the likelihood of entry and establishment of regulated pests which are not sufficiently managed by *Basic Measures* alone. *Targeted Measures* are required in addition to *Basic Measures*.

MPI-Specified Measures

- 52) *MPI-Specified Measures* are measures which effectively reduce the likelihood of entry and establishment of certain very high risk regulated pests into New Zealand, such as economically important fruit flies. *MPI-Specified Measures* are required in addition to *Basic Measures* where a very high level of confidence is required.

3.5 CERTIFICATION AND VERIFICATION

Pre-export inspection and phytosanitary certification

- 53) Pre-export inspection of a homogeneous lot and phytosanitary certification by the exporting NPPO of all commercially produced fresh fruit and vegetables for export to New Zealand is required to provide assurances of freedom from visually detectable regulated pests. Assurance is also required if measures for

pests that are not visually detectable have been applied as described in the Export Plan. An Export Plan is only required for pests requiring *Targeted* or *MPI-Specified Measures*.

- 54) The phytosanitary certification process includes:
- a) verification that *Basic Measures* required by MPI have been met;
 - b) verification that *Targeted* or *MPI-Specified Measures* have been met, if applicable;
 - c) sampling and inspection to determine pest freedom;
 - The exporting NPPO will randomly sample and visually inspect a minimum of 600 randomly selected ginger rhizomes from each lot of 20,000 rhizomes or more to ensure a 95% confidence level that not more than 0.5% of the units in the lot are infested. 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.
 - Inspection will involve an examination of all external parts of the ginger rhizome 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.
 - Where any live regulated pest is found in the inspected lot, an appropriate measure (i.e. remedial action) must be applied (for example fumigation with an efficacious chemical) or the lot must be rejected for export to New Zealand.
 - d) any remedial action taken as agreed with MPI.

Verification on arrival in New Zealand

- 55) 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.
- 56) Consignments without phytosanitary certification, or accompanied by incorrect certification, may be held in a transitional facility until correct documentation is presented. Failure to present correct documentation may result in the consignment being re-shipped or destroyed.
- 57) MPI will normally sample and inspect consignments of fresh fruit and vegetables on-arrival to verify the absence of regulated pests. Where a pathway is historically 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.
- 58) When live regulated pests are detected on consignments on arrival in New Zealand, one of the following remedial risk management activities will be applied:
- a) Treatment of the consignment.
 - re-conditioning to remove infested or infected stems; or
 - application of an efficacious treatment to kill regulated pests.
 - b) Reshipment of the consignment.
 - c) Destruction of the consignment.

4 Pest Risk Analysis for Fresh Ginger

- 59) This section contains the regulated pests associated with the fresh ginger and the proposed measures to manage the biosecurity risk.
- 60) The pest risk assessment process:
- a) identifies pests and diseases found to be associated with fresh ginger in Australia, China, Fiji, Niue, Papua New Guinea, Samoa, Thailand, Tonga, and Vanuatu,
 - b) determines their presence (or absence) in New Zealand, and
 - c) considers if they might be associated with export quality fresh ginger at the point of export.
- 61) A summary of key conclusions from the pest risk assessment process is included where a pest has been identified as a potential regulated pest.

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 may be discounted from the pest list and the pest risk analysis process does not continue.

✗ = information on where the pest is not managed

✓ = information on where the pest is managed

? = uncertainty

- 62) For the technical justification for the addition and removal of pests, refer to the pages 16-24 and Appendix 1.
- 63) It is assumed that if an organism associated with fresh ginger (*Z. officinale* and *Z. zerumbet*) is of concern, then the evidence for this concern would be recorded internationally (such as interception data (where available), risk analysis, scientific studies, reports of significant economic impacts). Measures must be supported by technical justification. Where there is insufficient information, provisional measures may be recommended recognising the obligation to seek additional 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 in a country;
 - c) frequent interception on arrival in New Zealand; or
 - d) a new or changed risk on imported fresh ginger is reported (e.g. via MPI's Emerging Risks System).
- 64) If regulated organisms are intercepted on the pathway an on-arrival, remedial action will be required (e.g. fumigation) prior to clearance for entry into New Zealand. If no suitable or approved remedial measure is available, the consignment will be reshipped or destroyed. Any pests intercepted on the pathway may be retrospectively added to the pest list and/or will be considered as part of the next review of the IHS.
- 65) **ISPM 11.** *Pest risk analysis for quarantine pests* 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 of biosecurity concern that are present in the countries assessed but not in New Zealand would be considered as regulated as they still pose a potential risk to New Zealand.

4.1 SUMMARY OF RISK ASSOCIATED WITH THE IMPORTATION OF FRESH GINGER

- 66) Pests identified as potentially associated with fresh ginger rhizomes (including roots for *Z. zerumbet*) were assessed in MPI's import risk analysis of ginger (MPI, 2019). These include pest 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.

- 67) Assessment identified 345 potential organisms associated with fresh ginger rhizomes that present a potential risk on this import pathway because they:
- are present in a country that intends to export fresh ginger rhizomes to New Zealand;
 - are absent from New Zealand; and/or
 - are associated with fresh ginger rhizome of *Z. officinale* and/or fresh ginger rhizome [including roots] of *Z. zerumbet*.
- 68) Fifty-eight of the 345 organisms present a potential biosecurity risk on the fresh ginger from all approved countries and China (i.e. the organisms may be associated with the fresh ginger, capable of establishing and spreading in New Zealand, and causing harmful economic consequences). These are identified in Table 2 and measures explained on pages 16-24.
- The remaining 287 organisms are not considered to present a biosecurity risk on the pathway (unlikely to be associated with the product at point of export, or will not survive transit to New Zealand), and therefore do not require further assessment.

Table 2: Pests associated with fresh ginger

Pest	
Acari	
• <i>Cosmoglyphus oudemansi</i>	• <i>Schwiebea zingiberi</i>
• <i>Rhizoglyphus setosus</i>	• <i>Tyrophagus javensis</i>
• <i>Rhizoglyphus singularis</i>	• <i>Tyrophagus perniciosus</i>
• <i>Schwiebea similis</i>	
Bacteria	
• <i>Pantoea ananatis</i>	• <i>Xanthomonas zingiberi</i>
• <i>Ralstonia solanacearum</i> Race 4	• <i>Candidatus Phytoplasma asteris</i>
Coleoptera	
• <i>Adoretus sinicus</i>	• <i>Drasterius</i> sp.
• <i>Elytroteinus subtruncatus</i>	• <i>Haptoncus ocularis</i>
Diptera	
• <i>Calobata indica</i>	• <i>Merochlorops flavipes</i>
• <i>Elassogaster</i> sp. nr <i>linearis</i>	• <i>Mimegralla coeruleifrons</i>
• <i>Chalcidomyia atricornis</i>	• <i>Pnyxia scabiei</i>
Fungi	
• <i>Fusarium oxysporum</i> f. sp. <i>zingiberi</i>	• <i>Proxipyricularia zingiberis</i> (syn. <i>Pyricularia zingiberi</i>)
• <i>Mucor racemosus</i>	• <i>Rosellinia bunodes</i>
Hemiptera	
• <i>Aspidiella hartii</i>	• <i>Dysmicoccus brevipes</i>
• <i>Aspidiotus destructor</i>	• <i>Formicococcus polysperes</i>
Lepidoptera	
• <i>Conogethes punctiferalis</i>	• <i>Opogona regressa</i>
• <i>Piletocera xanthosoma</i>	• <i>Setomorpha rutella</i>
• <i>Maruca vitrata</i>	
Nematodes	
• <i>Caloosia longicaudata</i>	• <i>Hoplolaimus seinhorsti</i>
• <i>Criconemella onoensis</i>	• <i>Macroposthonia denoudeni</i>
• <i>Discocriconemella discolabia</i>	• <i>Meloidogyne enterolobii</i>
• <i>Helicotylenchus abunaamai</i>	• <i>Meloidogyne thailandica</i>
• <i>Helicotylenchus egyptiensis</i>	• <i>Mesocriconema onoense</i>
• <i>Helicotylenchus indicus</i>	• <i>Pratylenchus zaeae</i>
• <i>Helicotylenchus mucronatus</i>	• <i>Quinisulcius</i> sp.
• <i>Helicotylenchus multicinctus</i>	• <i>Radopholus similis</i>
• <i>Hemicriconemoides cocophillus</i>	• <i>Rotylenchulus reniformis</i>
• <i>Hoplolaimus indicus</i>	• <i>Xiphinema insigne</i>
	• <i>Xiphinema krugi</i>

Oomycetes	
• <i>Pythiogeton ramosum</i>	• <i>Pythium deliense</i>
• <i>Pythium aphanidermatum</i>	
Virus	
• Ginger chlorotic fleck virus	

4.2 DETERMINATION OF PHYTOSANITARY MEASURES INCLUDED IN THE DRAFT IHS

- 69) MPI requires measures to be applied to reduce the risk of entry and establishment of a pest on a pathway to an acceptable level. Attaining zero biosecurity risk is not possible in any system.
- 70) Each step in the biosecurity 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. Remedial actions will be taken on non-compliant consignments.
- 71) An assessment and determination of measures for pests associated with fresh ginger rhizomes can be found from pages 16-24.
- 72) The measures contained in the IHS are subject to regular review based on pathway compliance, pest interceptions, emerging risk assessment, and new information/ intelligence. MPI will monitor interceptions of all regulated pests (including hitchhikers) and the appropriateness/ effectiveness of phytosanitary measures during trade.

4.3 SUMMARY OF PROPOSED MEASURES FOR FRESH GINGER

- 73) MPI considers the risks associated with the importation of fresh ginger will be effectively managed by applying [Basic Measures](#).
- 74) *Basic Measures* are justified and sufficient to manage the pests listed below on the fresh ginger import pathway. Detailed pest information can be found in the ginger fresh produce IRA.
- a) The risk activities summarised below contribute to managing all the pest groups summarised below:
- Commercial production activities will reduce pest levels, visible damage or symptoms in ginger production sites to a low level.
 - Commercial production includes monitoring for plants displaying signs/symptoms of infestation/infection during production. Monitoring will identify obviously affected plants, resulting in pest controls being applied (see [Commercial Production](#)).
 - Harvest, grading and packing activities will reduce the likelihood of these pests being associated with fresh ginger at export to a very low level.
 - Many of the pests will be removed from the ginger rhizomes with the removal of soil (MPI, 2019).
 - Rhizomes with visible damage caused by pest infestation/infection will be removed during packhouse activities.
 - The IHS specifies export quality rhizomes (which includes grading to remove damaged rhizomes). Heavily infested/infected, damaged ginger will not be export quality and therefore will be removed during grading and packaging (see [Commercial Production](#)).
 - Pest infestation/infection is likely to be detected and managed during official pre-export inspection by the exporting NPPO (see [Pre-export inspection and phytosanitary certification](#)).
 - Detection of these pests will require remedial action (e.g. end point treatment, resorting etc.) prior to export certification.
- 75) The information about the pest groups below covers additional information about risk management for these pests.

76) The assessment structure used to determine whether a pest will be managed by *Basic Measures* may consider the following factors:

- Entry
- Exposure
- Establishment
- Spread
- Impact

The pest assessment concludes at the factor where the pest is considered to be managed. The following symbols indicate:

✗ = the information on where the pest is not managed.

✓ = the information on where the pest is managed.

? = uncertainty.

ACARI (MITES)

Conclusion: Basic Measures are Justified and Sufficient

The mites in Table 3 have been assessed and determined to be a biosecurity risk on the pathway because:

Pathway association

- These mites are associated with fresh ginger rhizome (MPI, 2019).
- These mites are not present in New Zealand (MPI, 2019).
- These mites are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).

Table 3: Mites assessed as a potential biosecurity risk

Family	Pest	
Acaridae	<i>Cosmoglyphus oudemansi</i> <i>Rhizoglyphus setosus</i> <i>Rhizoglyphus singularis</i> <i>Schwiebea similis</i>	<i>Schwiebea zingiberi</i> <i>Tyrophagus javensis</i> <i>Tyrophagus perniciosus</i>

Basic Measures are sufficient to manage the risk posed by the mites in Table 3 because:

Entry

- ✓ The mites are likely to be visible during commercial production, phytosanitary and/or border inspections.
 - Mites of all life stages have been detected at the border due to their colouring, movement and/or damage to the commodity (MPI, 2019).

BACTERIA

Conclusion: Basic Measures are Justified and Sufficient

The bacterium in Table 4 has been assessed and determined to be a biosecurity risk on the pathway because:

Pathway association

- This bacterium is associated with fresh ginger rhizome (MPI, 2019).
- This bacterium is not present in New Zealand (MPI, 2019).
- This bacterium is present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).

Table 4: Bacterium assessed as a potential biosecurity risk

Family	Pest
Xanthomonadaceae	<i>Xanthomonas zingiberi</i>

Basic Measures are sufficient to manage the risk posed by *X. zingiberi* because:

Entry

✗ *Xanthomonas zingiberi* is not reported to cause symptoms on ginger so is unlikely to be detected during phytosanitary and/or border inspections (MPI, 2019).

Establishment

✓ There is no information to support *X. zingiberi* establishing and spreading in New Zealand, however, it is unlikely to encounter a host plant (MPI, 2019).

Impact

- ✓ If *X. zingiberi* established and spread in New Zealand, it would have a very low impact on New Zealand (MPI, 2019).
 - *Xanthomonas zingiberi* is only known to occur in ginger rhizomes and is not known to affect other hosts (MPI, 2019).
 - The overall value of the Zingiberaceae family in New Zealand is very low (MPI, 2019).
 - There are several species of plants in the Zingiberaceae family grown as ornamentals and no species in the *Zingiber* genus are commercially grown for human consumption in New Zealand (MPI, 2019).

Conclusion: Basic Measures are Justified and Sufficient

The bacterium in Table 5 has been assessed and determined to be a biosecurity risk on the pathway because:

Pathway association

- This bacterium is associated with fresh ginger rhizome (MPI, 2019).
 - This bacterium can occur as an endophyte, epiphyte, pathogen and symbiont (MPI, 2019). The varied nature of the bacterium makes it difficult to predict how it will behave in different circumstances (MPI, 2019). For example, it is uncertain whether the *P. ananatis* found on ginger can cause impacts on any other plant species (MPI, 2019).
 - There are no reports of *P. ananatis* causing symptoms in ginger crops in countries that intend to export to New Zealand (MPI, 2019).
- This bacterium is not present in New Zealand (MPI, 2019).
- This bacterium is present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).

Table 5: Bacterium assessed as a potential biosecurity risk

Family	Pest
Enterobacteriaceae	<i>Pantoea ananatis</i>

Basic Measures are sufficient to manage the risk posed by *P. ananatis* because:

Entry

✓ The only report of *P. ananatis* causing symptoms in ginger crops is in India. *Pantoea ananatis* disease symptoms are likely to be detected by crop inspectors in ginger fields prior to export. Symptoms include foliar blighting and reduction in ginger rhizome yield (MPI, 2019). The crop monitors are likely to apply pest management strategies to infected crops.

? There is uncertainty regarding the circumstances in which *P. ananatis* is pathogenic and in its ability to be transferred to a suitable environment for establishment (MPI, 2019). Different strains of *P. ananatis* have been predicted in the literature, but none have been formally described (MPI, 2019).

✗ Symptoms caused by *P. ananatis* are unlikely to be detected during phytosanitary and/or border inspections (MPI, 2019).

Establishment

- ✓ *Pantoea ananatis* has been isolated from soil, water and plant matter, but there is no information to support spread by mechanical transmission (MPI, 2019)
 - Due to the small volume of waste produced and relatively high consumption, there are likely to be low inoculum levels of *P. ananatis* being discarded into the environment and a low likelihood of the infected inoculum being exposed to a suitable host (MPI, 2019).
- ✓ The known vectors (*Thrips tabaci* and *Frankliniella fusca*) of *P. ananatis* are unlikely to transmit this bacteria to host plants from discarded ginger (MPI, 2019).
 - *Thrips tabaci* is present in New Zealand but ginger is not a known host of *T. tabaci* (MPI, 2019).
 - *Frankliniella fusca* is absent from New Zealand and regulated on BORIC (MPI, 2019).
 - Thrips are unlikely to be associated with fresh ginger rhizomes (MPI, 2019).
- ✓ For this bacterium to establish in New Zealand, the ginger will need to be propagated which is unlikely to occur.
 - There is no record of any of the species of the *Zingiber* genus being naturalised in New Zealand (MPI, 2019). Infected discarded ginger rhizomes are unlikely to grow in New Zealand and therefore these bacteria are unlikely to be exposed to suitable hosts (MPI, 2019).
 - *Zingiber* plants require warm, tropical conditions with lots of water and nutrients to grow, therefore, it is unlikely that these plants could grow without intentional propagation (MPI, 2019).

Conclusion: Basic Measures is Sufficient

The bacterium in Table 6 has been assessed and determined to be a biosecurity risk on the pathway because:

Pathway association

- This bacterium is associated with fresh ginger rhizome (MPI, 2019).
 - *Candidatus Phytoplasma asteris* is associated with fresh ginger rhizomes with roots (MPI, 2019).
- This bacterium is not present in New Zealand (MPI, 2019).
- This bacterium is present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).

Table 6: Bacterium assessed as a potential biosecurity risk

Family	Pest
Acholeplasmataceae	<i>Candidatus Phytoplasma asteris</i>

Basic Measures are sufficient to manage the risk posed by *Candidatus Phytoplasma asteris* because:

Entry

- ✗ Symptoms caused by *Candidatus Phytoplasma asteris* are unlikely to be detected during phytosanitary and/or border inspections (MPI, 2019).

Establishment

- ✓ For this bacteria to establish in New Zealand, the ginger will need to be propagated which is unlikely to occur.
 - There is no record of any of the species of the *Zingiber* genus being naturalised in New Zealand (MPI, 2019). Infected discarded ginger rhizomes are unlikely to grow in New Zealand and therefore these bacteria are unlikely to be exposed to suitable hosts (MPI, 2019).
 - *Zingiber* plants require warm, tropical conditions with lots of water and nutrients to grow, therefore, it is unlikely that these plants could grow without intentional propagation (MPI, 2019).

Conclusion: Basic Measures are Justified and Sufficient

The bacterium in Table 7 has been assessed and determined to be a biosecurity risk on the pathway because:

Pathway association

- This bacterium is associated with fresh ginger rhizome (MPI, 2019).

- This bacterium is not present in New Zealand (MPI, 2019).
- This bacterium is present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).

Table 7: Bacterium assessed as a potential biosecurity risk

Family	Pest
Ralstoniaceae	<i>Ralstonia solanacearum</i> (Race 4)

Basic Measures are sufficient to manage the risk posed by *R. solanacearum* (Race 4) because:

Entry

- ✓ Symptoms caused by bacterial infections are likely to be visible during commercial production, phytosanitary and/or border inspections.
 - The symptoms of bacterial infection on rhizomes are generally darker than normal and have water-soaked areas with pockets of milky fluid (MPI, 2019).
- ✓ Diseased ginger rhizomes will be graded out during the processing stages (MPI, 2019).

COLEOPTERA (BEETLES)

Conclusion: Basic Measures are Justified and Sufficient

The Coleoptera in Table 8 has been assessed and determined to be a biosecurity risk on the pathway because:

Pathway association

- These insects are associated with fresh ginger rhizome (MPI, 2019).
- These insects are not present in New Zealand (MPI, 2019).
- These insects are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).

Table 8: Coleoptera assessed as a potential biosecurity risk

Family	Pest
Curculionidae	<i>Elytroteinus subtruncatus</i>
Elateridae	<i>Drasterius</i> sp.
Nitidulidae	<i>Haptoncus ocularis</i>
Scarabaeidae	<i>Adoretus sinicus</i> <i>Phyllophaga</i> spp.

Basic Measures are sufficient to manage the risk posed the Coleoptera in Table 8 because:

Entry

- ✓ These insects are likely to be visible during commercial production, phytosanitary and/or border inspections.
 - All life stages of the insects and/or the damage caused by these insects are likely to be detected on the rhizomes during inspection (MPI, 2019).

DIPTERA (FLIES)

Conclusion: Basic Measures are Justified and Sufficient

The Diptera in Table 9 have been assessed and determined to be a biosecurity risk on the pathway because:

Pathway association

- These insects are associated with fresh ginger rhizome (MPI, 2019).
- These insects are not present in New Zealand (MPI, 2019).
- These insects are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).

Table 9: Diptera assessed as a potential biosecurity risk

Family	Pest
Chloropidae	<i>Chalcidomyia atricornis</i> <i>Merochlorops flavipes</i>
Micropezidae	<i>Calobata indica</i> <i>Mimegralla coeruleifrons</i>
Platystomatidae	<i>Elassogaster</i> sp. nr <i>linearis</i>
Sciaridae	<i>Pnyxia scabiei</i>

Basic Measures are sufficient to manage the risk posed the Diptera in Table 9 because:

Entry

- ✓ These insects (adults and larvae) are unlikely to enter:
 - Damage caused by these insects will be graded out during processing (MPI, 2019).
 - These insects (adults and larvae) and associated damage are likely to be visible during commercial production, phytosanitary and/or border inspections (MPI, 2019).

FUNGI

Conclusion: Basic Measures are Justified and Sufficient

The fungi in Table 10 have been assessed and determined to be a biosecurity risk on the pathway because:

Pathway association

- The fungi are associated with fresh ginger rhizome (MPI, 2019).
- The fungi are not present in New Zealand (MPI, 2019).
- The fungi are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).

Table 10: Fungi assessed as a potential biosecurity risk

Family	Pest
Mucoraceae	<i>Mucor racemosus</i>
Nectriaceae	<i>Fusarium oxysporum</i> f. sp. <i>zingiberi</i>
Pyriculariaceae	<i>Proxipyricularia zingiberis</i> (syn. <i>Pyricularia zingiberi</i>)
Xylariaceae	<i>Rosellinia bunodes</i>

Basic Measures are sufficient to manage the risk posed the fungi in Table 10 because:

Entry

- ✓ Symptoms caused by a fungal infection are likely to be visible during commercial production, phytosanitary and/or border inspections.
 - *Mucor racemosus* causes rotting of ginger rhizomes in storage (MPI, 2019).
 - *Fusarium oxysporum* f. sp. *zingiberi* causes Fusarium yellows in ginger plants which cause the ginger rhizomes to become shrivelled (MPI, 2019).
 - *Proxipyricularia zingiberis* causes leaf spot/leaf blast and black scabs on rhizomes of on *Z. officinale* (MPI, 2019).
 - *Rosellinia bunodes* causes black rot in ginger which can be visually detected (MPI, 2019)

HEMIPTERA (TRUE BUGS)

Conclusion: Basic Measures are Justified and Sufficient

The Hemiptera in Table 11 have been assessed and determined be a biosecurity risk on the pathway because:

Pathway association

- These insects are associated with fresh ginger rhizome (MPI, 2019).
 - *Dysmicoccus brevipes* and *F. polysperes* are associated with fresh ginger rhizome with roots (MPI, 2019).
- These insects are not present in New Zealand (MPI, 2019).
- These insects are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).

Table 11: Diptera assessed as potential biosecurity risk

Family	Pest	
Diaspididae	<i>Aspidiotus destructor</i>	<i>Aspidiella hartii</i>
Pseudococcidae	<i>Dysmicoccus brevipes</i>	<i>Formicococcus polysperes</i>

Basic Measures are sufficient to manage the risk posed the Hemiptera in Table 11 because:

Entry

- ✓ These insects are likely to be visible during commercial production, phytosanitary and/or border inspections.
 - *Aspidiotus destructor* and *Aspidiella hartii* will be visible and therefore are likely to be detected during visual inspection (MPI, 2019).
 - Infestations by *D. brevipes* are visually detectable as the mealybugs produce a white wax which cover the adults (MPI, 2019).
 - *F. polysperes* is visible due to the obvious white mealybug colonies and symbiotically associated ant colonies (MPI, 2019).

LEPIDOPTERA (BUTTERFLIES & MOTHS)

Conclusion: Basic measures are Justified and Sufficient

The Lepidoptera in Table 12 have been assessed and determined be a biosecurity risk on the pathway because:

Pathway association

- These insects are associated with fresh ginger rhizome (MPI, 2019).
- These insects are not present in New Zealand (MPI, 2019).
- These insects are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).

Table 12: Lepidoptera assessed as a potential biosecurity risk

Family	Pest	
Crambidae	<i>Conogethes punctiferalis</i>	<i>Pileocera xanthosoma</i>
Pyralidae	<i>Maruca vitrata</i>	
Tineidae	<i>Opogona regressa</i>	<i>Setomorpha rutella</i>

Basic Measures are sufficient to manage the risk posed the Lepidoptera in Table 12 because:

Entry

- ✓ These insects (adults and larvae) are unlikely to enter:
 - Damage caused by these insects will be graded out during processing (MPI, 2019).
 - These insects (adults and larvae) and associated damage are likely to be visible and therefore managed/removed during commercial production, phytosanitary and/or border inspections (MPI, 2019).

- ✓ Infestation of *C. punctiferalis* in the field will be detected by crop monitors prior to harvesting.
 - This insect feeds on the leaves, shoots, and inside the stem of the ginger plant and therefore is unlikely to be associated with the rhizome (MPI, 2019).
 - In-field symptoms (e.g. terminal yellow shoots on the plant) reduce the likelihood of infested ginger rhizome from being imported due to infected plants dying. The symptoms are likely to be detected by crop inspectors during normal commercial production.

NEMATODES (ROUNDWORMS)

Conclusion: Basic measures are Justified and Sufficient

The nematode in Table 13 has been assessed and determined to be a biosecurity risk on the pathway because:

Pathway association

- This nematode is present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).
- This nematode is not present in New Zealand (MPI, 2019).
- This nematode is associated with fresh ginger rhizome with roots (MPI, 2019).
 - Ginger appears not to be a common host for *Pratylenchus zaei*. This nematode may only infrequently be associated with ginger roots/rhizomes, and if so, it is likely to be in low numbers. (MPI, 2019).

Table 13: Nematodes assessed as a potential biosecurity risk

Family	Pest
Pratylenchidae	<i>Pratylenchus zaei</i>

Basic Measures are sufficient to manage the risk posed by *P. zaei* because:

Entry

- ✗ If this nematode was associated with ginger rhizomes, post-harvest processing is unlikely to remove or kill the pest (MPI, 2019).
 - *Pratylenchus zaei* is a migratory endoparasite and can enter and feed on the roots (MPI, 2019).

Establishment

- ✓ There is a low potential for infected ginger rhizomes to be exposed to hosts and therefore establish in New Zealand as a result of the import of fresh ginger rhizomes (MPI, 2019).
 - Small amounts of ginger are usually purchased per customer with only small amounts of ginger likely to be discarded in compost as it is likely to be consumed, disposed of in the landfill or, kitchen disposal units which leads to the sewers (MPI, 2019)
 - There is a potential for businesses (e.g. supermarkets) to discard larger quantities of ginger, however, it is unlikely that infected ginger rhizomes would be actively exposed to a host plant in the environment (MPI, 2019).
 - The movement of soil/compost by humans, or the action of ground water, could disperse *P. zaei* to host plants in the environment (MPI, 2019).
 - This nematode is largely a tropical and subtropical pest and it is uncertain whether climatic conditions in New Zealand would enable this pest to thrive enough to become a significant pest (MPI, 2019).

Conclusion: Basic measures are Justified and Sufficient

The nematodes in Table 14 have been assessed and determined to be a biosecurity risk on the pathway because:

Pathway association

- These nematodes are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).
- These nematodes are not present in New Zealand (MPI, 2019).
- These nematodes are associated with fresh ginger rhizome with roots (MPI, 2019).
 - These nematodes are free-living organisms in soil and feed externally on plant roots (MPI, 2019).
 - *Meloidogyne enterolobii* and *Radopholus similis* is associated internally with ginger roots MPI, 2019).

Table 14: Nematodes assessed as a potential biosecurity risk

Family	Pest	
Criconeematidae	<i>Mesocriconema onoense</i> <i>Discocriconemella discolabia</i> <i>Criconeemella onoensis</i>	<i>Hemicriconemoides cocophillus</i> <i>Macroposthonia denoudenii</i> <i>Caloosia longicaudata</i>
Dolichodoridae	<i>Quinisulcius</i> sp.	
Longidoridae	<i>Xiphinema insigne</i>	<i>Xiphinema krugi</i>
Hoplolaimidae	<i>Helicotylenchus abunaamai</i> <i>Helicotylenchus egyptiensis</i> <i>Helicotylenchus indicus</i> <i>Helicotylenchus mucronatus</i>	<i>Helicotylenchus multicinctus</i> <i>Hoplolaimus indicus</i> <i>Hoplolaimus seinhorsti</i> <i>Rotylenchulus reniformis</i>
Heteroderidae	<i>Meloidogyne enterolobii</i>	<i>Meloidogyne thailandica</i>
Pratylenchidae	<i>Radopholus similis</i>	

Basic Measures are sufficient to manage the risk posed by the nematodes in Table 14 because:

Entry

- ✓ These pests are likely to be managed by the commodity description and *Basic Measures* (MPI, 2019).
 - The fresh ginger is required to be exported free from soil which will remove the nematodes from the ginger rhizome and roots (MPI, 2019)
 - Cleaning and grading of the rhizomes will remove adult and egg life stages of this pest (MPI, 2019).
- ✓ *Rotylenchulus reniformis*, *Radopholus similis*, and associated damage/infection is likely to be visible during commercial production, phytosanitary and/or border inspections (MPI, 2019).
- ✓ *Meloidogyne enterolobii* is not present in countries approved to export *Z. zerumbet* to New Zealand.
 - Roots on ginger are only approved to be exported on *Z. zerumbet*, not *Z. officinale*.

OOMYCETES (FUNGUS-LIKE MICROORGANISMS)

Conclusion: Basic Measures are Justified and Sufficient

The oomycetes in Table 15 have been assessed and determined to be a biosecurity risk on the pathway because:

Pathway association

- These oomycetes are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).
- These oomycetes are not present in New Zealand (MPI, 2019).
- These oomycetes are associated with fresh ginger rhizome (MPI, 2019).

Table 15: Oomycetes assessed as a potential biosecurity risk

Family	Pest	
Pythiaceae	<i>Pythium aphanidermatum</i>	<i>Pythium deliense</i>

Pythiogetonaceae	<i>Pythiogeton ramosum</i>
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Basic Measures are sufficient to manage the risk posed by the oomycetes in Table 15 because:

Entry

- ✓ Symptoms caused by oomycete infection are likely to be visible during commercial production, phytosanitary and/or border inspections.
 - *Pythium aphanidermatum* causes soft rot which is visually detectable due to the brown spots on the rhizomes (MPI, 2019).
 - *Pythium deliense* causes rot in rhizomes in the field and post-harvest (MPI, 2019).
 - *Pythiogeton ramosum* causes visible symptoms such as soft rot in ginger (MPI, 2019).

VIRUS

Conclusion: Basic Measures are Sufficient

The virus in Table 16 has been assessed and determined to be a biosecurity risk on the pathway because:

Pathway association

- The virus is present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).
- The virus is not present in New Zealand (MPI, 2019).
- The virus is associated with fresh ginger rhizome (MPI, 2019).

Table 16: Virus assessed as a potential biosecurity risk

Family	Pest
Sobemovirus	Ginger chlorotic fleck virus

Basic Measures are sufficient to manage the risk posed by Ginger chlorotic fleck virus because:

Establishment

- ✓ Discarded ginger would need to be propagated in order for the virus to be exposed to other hosts to establish and spread even though infections by this virus are unlikely to be detected during visible during phytosanitary and/or border inspections (MPI, 2019).
 - There is no record of any of the species of the *Zingiber* genus being naturalised in New Zealand (MPI, 2019). Infected discarded ginger rhizomes are unlikely to grow in New Zealand and therefore these bacteria are unlikely to be exposed to suitable hosts.
 - *Zingiber* plants require warm, tropical conditions with lots of water and nutrients to grow, therefore, it is unlikely that these plants could grow without intentional propagation (MPI, 2019).

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QuanCargo. MPI internal database of imported commodity consignments.

Appendix 1: Pest Risk Assessment summary

Appendix 1 lists the pests and diseases that were considered, however, were not deemed a biosecurity risk because they were either not associated with the commodity or the pest is not present in the exporting country.

ACARI (MITES)

Conclusion: Commodity is not a host

The mites in Table 17 have been assessed and determined to not be a biosecurity risk on the pathway because:

- These mites are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).
- These mites are not present in New Zealand (MPI, 2019).
- These mites are not associated with fresh ginger rhizome (MPI, 2019).

Table 17: Mites assessed as a potential biosecurity risk

Family	Pest
Ascidae	<i>Lasioseius subterraneus</i>
Tenuipalpidae	<i>Raoiella indica</i>
Tetranychidae	<i>Tetranychus kanzawai</i> <i>Tetranychus okawanus</i>

BACTERIA

Conclusion: Commodity is not a host

The bacterium in Table 18 has been assessed and determined to not be a biosecurity risk on the pathway because:

- This bacterium is present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).
- This bacterium is not present in New Zealand (MPI, 2019).
- This bacterium is not associated with fresh ginger rhizome (MPI, 2019).

Table 18: Bacterium assessed as a potential biosecurity risk

Family	Pest
Xanthomonadaceae	<i>Xanthomonas campestris</i> pv. <i>zingibericola</i>

COLEOPTERA (BEETLES)

Conclusion: Commodity is not a host

The Coleoptera in Table 19 have been assessed and determined to not be a biosecurity risk on the pathway because:

- These insects are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).
- These insects are not present in New Zealand (MPI, 2019).
- These insects are not associated with fresh ginger rhizome (MPI, 2019).

Table 19: Coleoptera assessed as a potential biosecurity risk

Family	Pest
Anthicidae	<i>Anthicus</i> sp. <i>Abacetis</i> sp.
Chrysomelidae	<i>Chaeridiona mayuri</i>
Erotylidae	<i>Dacne</i> sp.
Latridiidae	<i>Corticaria</i> sp.
Mycetophagidae	<i>Litargus</i> sp.
Ptiliidae	<i>Acrotrichis flavipennis</i>
Scarabaeidae	<i>Adoretus versutus</i> <i>Protaetia</i> sp.
Staphylinidae	<i>Carpelimus</i> sp. <i>Scaphisoma distans</i> <i>Phloeonomus</i> sp. <i>Tachinus</i> sp.

Conclusion: Pest not in Export Countries

The Coleoptera in Table 20 have been assessed and determined to not be a biosecurity risk on the pathway because:

- These insects are not present in any countries intending to export ginger to New Zealand (MPI, 2019).

Table 20: Coleoptera assessed as a potential biosecurity risk

Family	Pest
Curculionidae	<i>Caulophilus oryzae</i>
Scarabaeidae	<i>Brahmina coriacea</i>

DIPTERA (FLIES)

Conclusion: Commodity is not a host

The Diptera in Table 21 have been assessed and determined to not be a biosecurity risk on the pathway because:

- These flies are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).
- These flies are not present in New Zealand (MPI, 2019).
- These flies are not associated with fresh ginger rhizome (MPI, 2019).

Table 21: Diptera assessed as a potential biosecurity risk

Family	Pest
Drosophilidae	<i>Dettopsomyia nigrovittata</i>
Limoniidae	<i>Limonia strigivena</i>
Muscidae	<i>Atherigona orientalis</i>
Phoridae	<i>Megaselia albiclavata</i>
Syrphidae	<i>Eumerus albifrons</i> <i>Eumerus figurans</i> <i>Eumerus pulcherrimus</i>

FUNGI

Conclusion: Commodity is not a host

The fungi in Table 22 have been assessed and determined to not be a biosecurity risk on the pathway because:

- The fungi is present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).
- The fungi is not present in New Zealand (MPI, 2019).
- The fungi is not associated with fresh ginger rhizome (MPI, 2019).

Table 22: Fungi assessed as a potential biosecurity risk

Family	Pest
Botryosphaeriaceae	<i>Phyllosticta zingiberis</i>
Physalacriaceae	<i>Armillaria mellea</i> (anamorph <i>Rhizomorpha subcorticalis</i>)

Conclusion: Pest is not in Export Country

The fungus in Table 23 has been assessed and determined to not be a biosecurity risk on the pathway because:

- This fungus has not present in any countries intending to export ginger to New Zealand (MPI, 2019).

Table 23: Fungus assessed as potential biosecurity risk

Family	Pest
Aspergillaceae	<i>Aspergillus parvisclerotigenus</i>

HEMIPTERA (TRUE BUGS)

Conclusion: Commodity is not a host

The Diptera in Table 24 have been assessed and determined to not be a biosecurity risk on the pathway because:

- These insects are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).
- These insects are not present in New Zealand (MPI, 2019).
- These insects are not associated with fresh ginger rhizome (MPI, 2019).

Table 24: Diptera assessed as a potential biosecurity risk

Family	Pest
Aleyrodidae	<i>Aleurocanthus woglumi</i> <i>Aleurodicus dispersus</i> <i>Aleurodicus dugesii</i>
Aphididae	<i>Pentalonia nigronervosa</i>
Diaspididae	<i>Aspidiella sacchari</i> <i>Ceroplastes rubens</i> <i>Aulacaspis tubercularis</i> <i>Chrysomphalus dictyospermi</i> <i>Hemiberlesia palmae</i> <i>Pinnaspis strachani</i> <i>Pseudaonidia trilobitiformis</i> <i>Selenaspidus articulatus</i>
Pseudococcidae	<i>Ferrisia virgata</i> <i>Nipaecoccus nipae</i> <i>Planococcus minor</i> <i>Pseudococcus jackbeardsleyi</i>
Miridae	<i>Cyrtorhinus lividipennis</i>
Monophlebidae	<i>Icerya seychellarum</i>
Tingidae	<i>Stephanitis typica</i>

HYMENOPTERA (ANTS)

Conclusion: Commodity is not a host

The ants in Table 25 have been assessed and determined to not be a biosecurity risk on the pathway because:

- These ants are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).
- These ants are not present in New Zealand (MPI, 2019).
- These ants are not associated with fresh ginger rhizome (MPI, 2019).
 - These ants are associated with ginger as hitch hikers and do not feed on the fresh ginger rhizomes (MPI, 2019). These pests would not be present on the fresh ginger rhizome if the fresh ginger complies with the commodity description.

Table 25: Ants assessed as a potential biosecurity risk

Family	Pest
Formicidae	<i>Camponotus chloroticus</i> <i>Monomorium minutum</i> <i>Nylanderia vaga</i> <i>Odontomachus haematodus</i> <i>Paratrechina longicornis</i> <i>Paratrechina vaga</i> <i>Pheidole fervens</i> <i>Tapinoma melanocephalum</i> <i>Technomyrmex albipes</i> <i>Tetramorium simillimum</i> <i>Tetramorium tonganum</i>

LEPIDOPTERA (BUTTERFLIES & MOTHS)

Conclusion: Commodity not a host

The Lepidoptera in Table 26 have been assessed and determined to not be a biosecurity risk on the pathway because:

- These insects are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).
- These insects are not present in New Zealand (MPI, 2019).

- These insects are not associated with fresh ginger rhizome (MPI, 2019).

Table 26: Lepidoptera assessed as a potential biosecurity risk

Family	Pest
Crambidae	<i>Ostrinia furnacalis</i> <i>Ostrinia nubilalis</i>
Hesperiidae	<i>Udaspes folus</i>
Noctuidae	<i>Spodoptera exigua</i> <i>Spodoptera frugiperda</i>

MOLLUSCS

Conclusion: Commodity not a host

The molluscs in Table 27 have been assessed and determined to not be a biosecurity risk on the pathway because:

- These molluscs are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).
- These molluscs are not present in New Zealand (MPI, 2019).
- These molluscs are not associated with fresh ginger rhizome (MPI, 2019).
 - There are single interceptions of some species but without other evidence this is not sufficient evidence to consider a species associated with a commodity.

Table 27: Molluscs assessed as a potential biosecurity risk

Family	Pest
Veronicellidae	<i>Arion</i> sp. <i>Veronicella leydigii</i> <i>Achatina fulica</i>

NEMATODES (ROUNDWORMS)

Conclusion: Commodity is not a host

The nematodes in Table 28 have been assessed and determined to not be a biosecurity risk on the pathway because:

- These nematodes are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).
- These nematodes are not present in New Zealand (MPI, 2019).
- These nematodes are not associated with fresh ginger rhizome (MPI, 2019).

Table 28: Nematodes assessed as a potential biosecurity risk

Family	Pest
Aphelenchoididae	<i>Aphelenchoides</i> sp.
Anguinidae	<i>Ditylenchus</i> sp.
Pratylenchidae	<i>Pratylenchus brachyurus</i>

PSOCOPTERA

Conclusion: Commodity is not a host

The Psocoptera in Table 29 have been assessed and determined to not be a biosecurity risk on the pathway because:

- These Psocoptera are present in one or more of the countries intending to export ginger to New Zealand (MPI, 2019).
- These Psocoptera are not present in New Zealand (MPI, 2019).
- These Psocoptera are not associated with fresh ginger rhizome (MPI, 2019).

Table 29: Psocoptera assessed as a potential biosecurity risk

Family	Pest
Psoquillidae	<i>Psoquilla marginepunctata</i>

Appendix 2

PESTS/ COUNTRY ASSOCIATION WITH THE GINGER PATHWAY

Table 30 shows the countries which each pest is found or is absent.

Key

	Present
	Absent

Table 30: A table of pests assessed which are associated with fresh ginger rhizomes from countries approved for export to New Zealand

Pests	Australia	China	Fiji	Niue	Papua New Guinea	Samoa	Thailand	Tonga	Vanuatu
<i>Aspidiella hartii</i>									
<i>Aspidiotus destructor</i>									
<i>Caloosia longicaudata</i>									
<i>Conogethes punctiferalis</i>									
<i>Criconemella onoensis</i> (syn. <i>Mesocriconema onoense</i>)									
<i>Discocriconemella discolabia</i>									
<i>Dysmicoccus brevipes</i>									
<i>Elytroteinus subtruncatus</i> (syn. <i>E. geophilus</i>)									
<i>Ferrisia virgata</i>									
<i>Formicococcus polysperes</i>									
<i>Fusarium oxysporum</i> f. sp. <i>zingiberi</i>									
<i>Helicotylenchus abunaamai</i>									
<i>Helicotylenchus egyptiensis</i>									
<i>Helicotylenchus indicus</i>									
<i>Helicotylenchus mucronatus</i>									
<i>Helicotylenchus multicinctus</i>									
<i>Hemicriconemoides cocophillus</i>									
<i>Hoplolaimus indicus</i>									
<i>Hoplolaimus seinhorsti</i>									

Pests	Australia	China	Fiji	Niue	Papua New Guinea	Samoa	Thailand	Tonga	Vanuatu
<i>Macroposthonia denoudeni</i>									
<i>Maruca vitrata</i>									
<i>Mimegralla coeruleifrons</i>									
<i>Mucor racemosus</i>									
<i>Opogona regressa</i>									
<i>Pantoea ananatis</i>									
<i>Pratylenchus zeae</i>									
<i>Proxipyricalaria zingiberis</i> (syn. <i>Pyricularia zingiberi</i>)									
<i>Pythiogeton ramosum</i>									
<i>Pythium aphanidermatum</i>									
<i>Pythium deliense</i>									
<i>Radopholus similis</i>									
<i>Ralstonia solanacearum</i> Race 4									
<i>Rosellinia bunodes</i>									
<i>Rotylenchulus reniformis</i>									
<i>Xanthomonas zingiberi</i>									
<i>Xiphinema insigne</i>									
<i>Xiphinema krugi</i>									