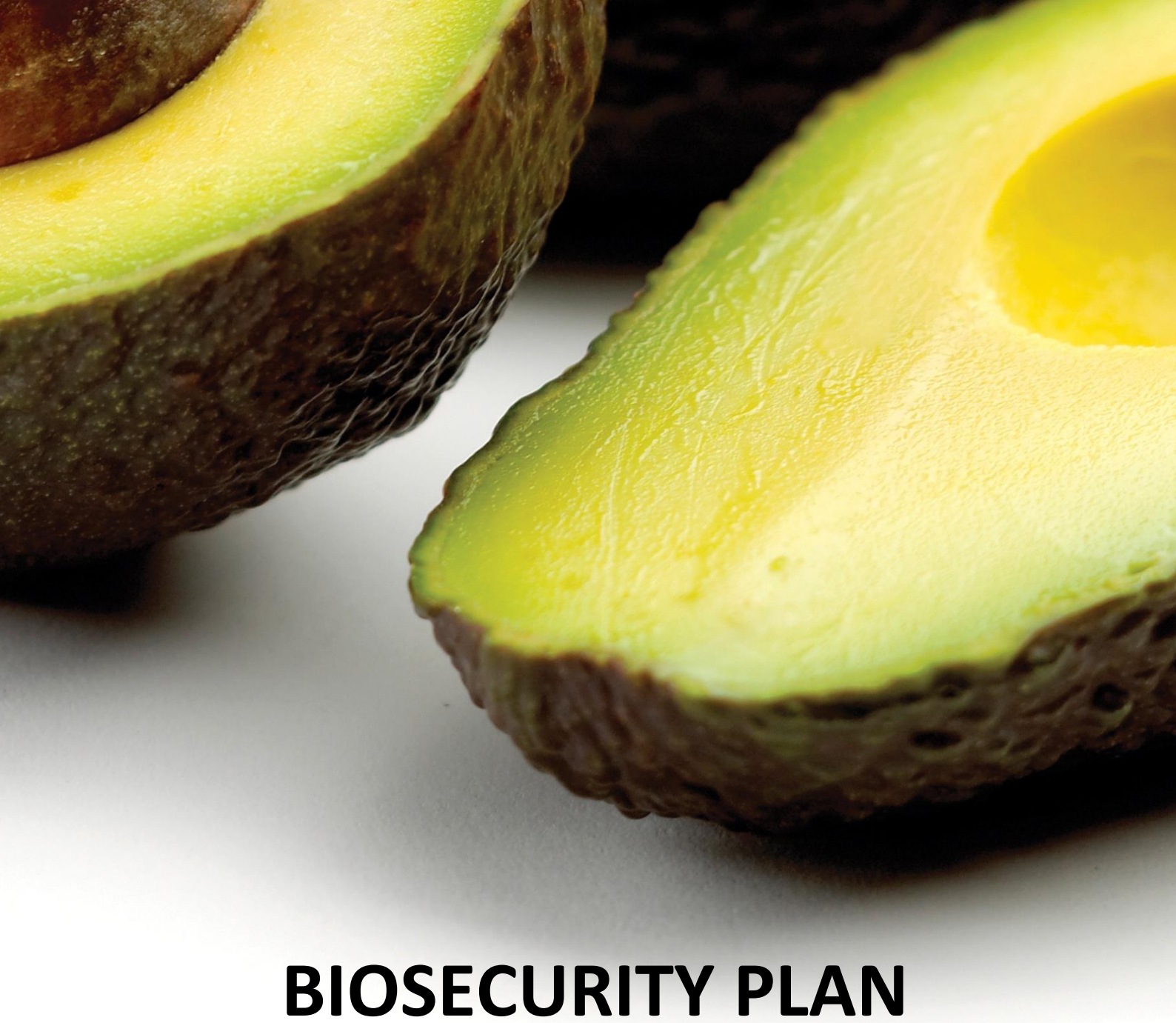

BIOSECURITY PLAN FOR THE NEW ZEALAND AVOCADO INDUSTRY

2021

New Zealand Avocado

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An electronic copy of this plan is available from the web site listed above.

Disclaimer

The scientific and technical content of this document is current at the date published and all efforts have been made to obtain relevant and published information. New information will be included as it becomes available. The material contained in this publication is produced for general information only.

Endorsement and review

The Biosecurity Plan for the New Zealand Avocado Industry has been endorsed by the avocado industry (via the AGA Executive).

Acknowledgements

The development of the Biosecurity Plan for the New Zealand Avocado Industry was coordinated by NZ Avocado and developed through a partnership approach using government and industry resources and expertise. The following organisations and agencies were involved in the development of the plan. A list of contributors are listed in the industry biosecurity group section (page 8).

Glossary and Acronyms

PEST

The definition of a pest as adopted by the International Plant Protection Convention (IPPC) is any species, strain or biotype of plant, animal, or pathogenic agent, injurious to plants or plant products. Therefore, the term '**pest'** used throughout this document covers all insects, mites, snails, nematodes, disease causing pathogens and weeds that impact avocado production or trade.

AAL
Avocados Australia Limited
AIL
Avocado Industry Ltd.
CIMS
Coordinated Incident Management System
EMS
Export Marketing Strategy
FDN
First Detector Network
GIA
Government Industry Agreement for Biosecurity Readiness and Response
HHS
High Health Scheme
HIAL
Horticulture Innovation Australia
IHS
Import Health Standard
IPPC
International Plant Protection Convention
MAO
MPI Approved Organisations
MPI
Ministry for Primary Industries
NBCN
National Biosecurity Capability Network
NBRS
National Biosecurity Response System
NZAGA
New Zealand Avocado Growers' Association Inc.
NZANA
New Zealand Avocado Nursery Association
OA
Operational Agreement
OAP
Official Assurance Programme
PGP
Primary Growth Partnership
PFR
Plant & Food Research
PHEL
Plant Health & Environment Laboratory
SPS
Sanitary and Phytosanitary agreement
WTO
World Trade Organisation

INTRODUCTION

Executive summary

To secure the future of the New Zealand avocado industry biosecurity measures must be established to reduce the threat posed by exotic pests and to be able to respond effectively to pest incursions. The New Zealand avocado industry faces a number of biosecurity threats which have the potential to cause considerable financial loss across the industry. Loss may come in the form of trade disruption, reduced productivity, decreased pack outs, loss of quality or increased production costs.

The avocado industry biosecurity plan provides a framework to coordinate biosecurity activities and investment and provides a mechanism for industry, government and stakeholders to better prepare for, and respond to, incursions of pests that could have significant impacts on the industry. This biosecurity plan aims to assist industry and government representatives identify, evaluate and mitigate biosecurity risks and focus on future biosecurity challenges.

This biosecurity plan was developed in consultation with a select group of entomologists, pathologists, plant health and biosecurity experts including representatives from NZAGA, MPI, Plant & Food Research and experts across the horticulture sector. The Plan describes the current biosecurity environment in New Zealand including the relationships and arrangements between government and industry being strengthened and formalised through the Government Industry Agreement for Biosecurity readiness and response (GIA).

A key outcome of the plan was the identification and prioritisation of more than 150 exotic avocado invertebrate pests and over 30 pathogens. A limited number of organisms were selected as the industry's Priority Pests based on their potential for entry, establishment, spread and economic impact. These Priority Pests will be a focus for future readiness activities including increased surveillance, diagnostic capability, grower awareness, contingency planning and GIA Operational Agreements.

This plan is principally designed for decision makers and its development allowed for an end-to end gap analysis of national biosecurity activities already in place across the biosecurity continuum (off-shore, at the border and post-border). This includes details of relevant pest monitoring programmes, contingency plans, awareness material and diagnostic protocols. Although it is not always possible to prepare for specific new threats until they arise, this plan helps the New Zealand avocado industry develop a global awareness of pests that are impacting avocado production across the globe to better manage potential pathways of entry and be able to respond more effectively.

This is as an evolving document aimed at providing an ongoing stocktake of available resources and biosecurity activities to ensure NZAGA's investment in biosecurity is targeted, well managed and clearly communicated to industry.

Industry Biosecurity

New Zealand Avocado Growers' Association Inc. (NZAGA)

The objective of the NZAGA is to provide a governing body to protect the interests of and handle the affairs of avocado growers within New Zealand. The association provides services to growers in the form of research and development, market access, promotion of avocados, quality management, crop estimation services, information to growers and governance of the association. The association handles all affairs to maintain a democracy for avocado growers.

The NZ Avocado Industry Ltd (NZAIL), is a 100% owned subsidiary of NZAGA and deals with any contractual arrangements necessary for the management of the industry.

Biosecurity planning

Biosecurity is a set of measures put in place at the national, regional or orchard level to protect against the introduction, spread and establishment of new pests and to effectively deal with them should they arrive. Biosecurity planning provides a mechanism for the avocado industry, the Ministry for Primary Industries (MPI) and other relevant stakeholders to actively determine the pests of highest importance, identify risk pathways, and put in place mitigation measures along the biosecurity continuum (pre-border ⇔ border ⇔ post border).

The industry has an aim of better understanding exotic pest organisms, supporting efforts both offshore and at the border to prevent their entry and improve industry's overall readiness to respond to any unwelcome pest threats. Through this planning process, the industry will be better placed to maintain international trade, negotiate access to new overseas markets, and reduce the social and economic costs of pest incursions on both growers and the wider community.

Key contacts

Role in Industry Biosecurity	Name, role and organisation	Email	Phone
Deed Governance Group Response Governance	Jen Scoular Chief Executive Officer New Zealand Avocado	**jen.scoular@nzavocado.co.nz**	021 741 014 07 571 5772
Biosecurity Preparedness & Technical Market Access	Brad Siebert Biosecurity Manager New Zealand Avocado	**Brad.Siebert@nzavocado.co.nz**	021 804 847 07 571 5773
Capability deployment Post-harvest liaison	Glenys Parton Industry Systems Manager New Zealand Avocado	**glenys.parton@nzavocado.co.nz**	0274 99 70 81 07 571 5774
Communications	Jodi Senior Communication Manager New Zealand Avocado	**melissa.conrad@nzavocado.co.nz**	07 571 6147
Welfare	TBC		
Research and external technical resources	Philippa Stevens General Manager, Bio-protection Plant & Food Research	**philippa.stevens@plantandfood.co.nz**	021 226 8233 09 925 7233

Biosecurity group

An Avocado Biosecurity Group will be formed to review the avocado biosecurity plan and other related documents. This specialist group will involve entomologists, pathologists, plant health and biosecurity experts including core representatives from NZAGA, MPI and Plant & Food Research.

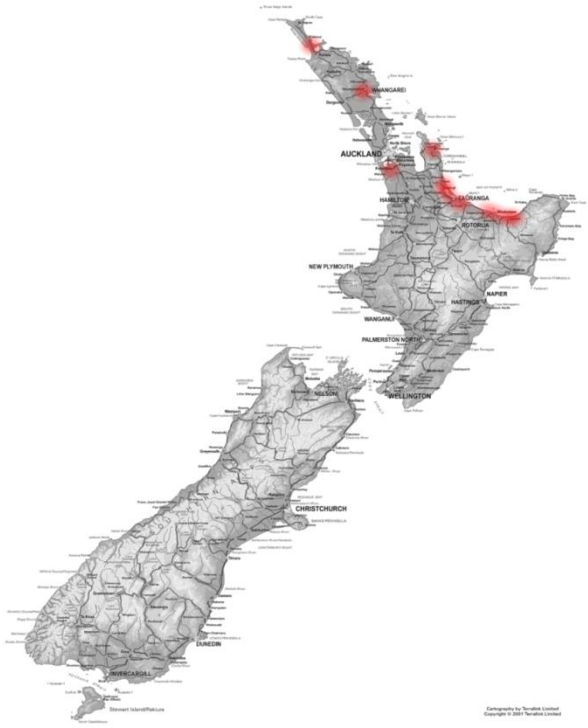
Members of the biosecurity group:

Name	Organisation	Name	Organisation
Bob Fullerton*	Plant & Food Research	Disna Gunawardana*	MPI
Philippa Stevens*	Plant & Food Research	Brad Chandler*	MPI
David Teulon*	Plant & Food Research/B3	Rob Taylor*	MPI
Max Suckling	Plant & Food Research	Karen Armstrong*	Lincoln University
Lisa Jamieson	Plant & Food Research	Matt Dyck*	Kiwifruit Vine Health
Kerry Everett	Plant & Food Research	Brad Siebert*	NZ Avocado

* Attended initial biosecurity plan meeting

Summary of the NZ avocado industry

Avocados are the third-largest fresh fruit export from New Zealand. The industry comprises over 1800 avocado orchards across 4000 hectares. Avocado production is concentrated to three major growing regions (Far North, Mid North and the Bay of Plenty). Small pockets of production can also be found throughout the east coast of NZ, Auckland and Coromandel/Waikato.



Commercial avocado nurseries

- **Members of the Avocado Nursery Association (ANA)**

Nursery name	Location	Contact details
Riversun Nursery Limited	4 Banks street, **Gisborne**	Geoff Thorpe **geoff@riversun.co.nz** 027 498 3207 | 06 867 1120
Lynwood Avocado Nursery Ltd	701 State Highway 14, RD 9, **Whangarei**	Stephen Wade **stephen@lynwood.co.nz** 027 4346664 | 09 4346664
Opihi Nurseries Ltd	9 Waikaraka Drive West, **Te Puna**	Mitsuo Nagae **opihi_nurseries@xtra.co.nz** 07 552 5533
Taruheru Nursery	531 Nelson Road, **Gisborne**	Giuseppe Martelli **taruherunursery@gmail.com** 027 6121976
Trevelyan's nursery	214 No1 Road, **Te Puke**	Daniel Birnie **daniel@trevelyan.co.nz** 07 573 0085

The Post-harvest sector

Post-harvest facility	Operating as	Address	Region
Aongatete Avocados Ltd	Export Packhouse, Storage	81 Walker Road East,Katikati	Bay of Plenty
Apata Group Ltd - Mends Lane	Export Packhouse, Storage	15 Mends Lane, Te Puke	Bay of Plenty
Apata Group Ltd - Turntable Road	Export Packhouse, Storage	Turn Table Hill Rd, Katikati	Bay of Plenty
DMS Progrowers Ltd	Export Packhouse, Storage	22 Te Puna Rd, Te Puna	Bay of Plenty
Citipac Ltd	Local Packhouse, Storage	21 Alach Street, Tauranga	Bay of Plenty
Eastpack (Glenbervie)	Export Packhouse, Storage	Cnr Ngunguru & Maruata Rds	Whangarei
Eastpack (Marshall Rd)	Export Packhouse, Storage	28 Marshall Road, Katikati	Bay of Plenty
Far North Packers	Export Packhouse, Storage	Far North Rd, Awanui	Kaitaia
Golden Mile Fruitpacker Ltd	Export Packhouse, Storage	77 Austin Rd, Maunu	Whangarei
Grove Avocado Oil	Processor	1 Armstrong Road, Te Puna	Bay of Plenty
Just Avocados Ltd	Export Packhouse, Storage	Woodland Rd, Tauranga	Bay of Plenty
Kauri Pak/NZ Kiwifruit Ltd	Export Packhouse, Storage	364 Kauri Point Road, Katikati	Bay of Plenty
Kiwi Produce Ltd	Export Packhouse, Storage	418 Old Coach Road, Paengaroa	Bay of Plenty
LD Packers Ltd	Export Packhouse, Storage	15 Conifer Lane, Kerikeri	Kerikeri
Natural Touch Ltd	Export Packhouse, Storage	406 Apotu Road, Kamo	Whangarei
Olivado	Processor	41 Sandys Road. Kerikeri	Kerikeri
Pole 2 pole fresh	Local Packhouse, Storage sites	84 Waimea Drive, Te Puke 153 Pahoia Road, Whakamarama 61 Work Road, Aongatete	Bay of Plenty
Seeka (Katikati)	Export Packhouse, Storage	Cnr Main Rd & Wharawhara Rd, Katikati	Bay of Plenty
Seeka (Keripack)	Export Packhouse, Storage	532 Kapiro Road, Kerikeri	Kerikeri
Trevelyan Pack & Cool Ltd	Export Packhouse, Storage	310 No 1 Road, Te Puke	Bay of Plenty
Turners and Growers/Kerifresh	Export Packhouse, Storage	Waipapa Road, Kerikeri	Kerikeri
Village press	Processor	52 Kirkwood Road, Hastings	Hastings

The New Zealand Biosecurity System

The New Zealand biosecurity system provides the basis for New Zealand's official assurances to its trading partners about the safety and phytosanitary status of exported commodities, and helps protect against biosecurity incursions. The Ministry for Primary Industries (MPI) is the lead agency for the New Zealand biosecurity system. The system consists of overlapping layers of activities that manage risk at different points along the biosecurity continuum (pre-border ⇔ border ⇔ post border).

Layers of the national biosecurity system

1. International plant and animal health standards	Developing international standards and rules under the World Trade Organisation Sanitary and Phytosanitary Agreements
2. Trade agreements and bilateral arrangements	Negotiation of agreements and processes for future biosecurity cooperation and trade
3. Risk assessment and import health standards	Identification of risk, and specification of requirements, for people and goods coming into New Zealand
4. Border interventions	Educating and auditing to encourage compliance, inspecting to verify compliance and taking action to manage non-compliance
5. Surveillance	General and targeted programmes to detect harmful pests and diseases
6. Readiness and response	Regular testing of the biosecurity system's capability to respond, responding to detected harmful pests and diseases
7. Pest and disease management	National, regional & industry actions to manage established pests and diseases

Biosecurity 2025

The Biosecurity 2025 Direction Statement helps to shape the long-term context of biosecurity in New Zealand. It includes five strategic directions.

A biosecurity team of 4.7 million – A collective effort across the country – every New Zealander becomes a biosecurity risk manager and every business manages their own biosecurity risk.

A toolbox for tomorrow – Harnessing science and technology to transform the way we do biosecurity.

Smart, free-flowing information – Tapping into the wealth of data available, building intelligence, and using powerful data analysis to underpin risk management.

Effective leadership and governance – System-wide leadership and inclusive governance to support all system participants in their roles.

Tomorrow's skills and assets – A capable and sustainable workforce and world-class infrastructure provides the foundation for an effective system.

Biosecurity implementation

The Avocado Biosecurity Plan provides a framework for the implementation and investment into biosecurity related activities. Currently a range of biosecurity practices are undertaken at a national level by MPI and other horticulture sectors, at a regional level by local councils and throughout the supply chain by industry stakeholders. The GIA partnership will continue to allow for increased collaboration between industry groups and governments to increase biosecurity preparedness.

The below list of biosecurity action items were developed by the avocado biosecurity group to help identify and prioritise activities aimed at enhancing biosecurity across the industry.

Biosecurity action items

Action item	Details	Responsibility
Collaborate with other sectors	Formalise connections with other horticulture sectors on biosecurity preparedness and response planning	NZAGA
Development of an industry biosecurity group	Researchers and relevant experts hold a workshop to develop biosecurity action items and identify industry threat lists.	NZAGA
Identification of all avocado growing properties	Develop an accurate database of all avocado growing properties for use in pest monitoring or control programs and trace back investigations.	NZAGA
Training in responsibilities under GIA	Industry response training and Deed responsibilities should an incursion occur.	GIA secretariat / MPI
Develop NBCN relationship	Response training for industry representative's throughout the supply chain	NZAGA
Development of on-orchard biosecurity training packages	Grower, contractor and service provider training through the provision of an on-orchard biosecurity manual and fact sheets on high priority pests (AvoGreen medium?)	NZAGA
Prioritise biosecurity research objectives	Establish a mechanism or forum to document key research areas/objectives that will help inform national/cross industry research priorities (National Science Challenge, B3, P&FR, SFF, GIA O/agreements)	NZAGA
Agrichemical gap analysis for priority pests	Identification of chemical control requirements for avocado high priority pest threats and their availability (registration status/requirements) in New Zealand. Is there a mechanism to establish pre-emptive approval systems with ACVM for chemicals not readily available in NZ or approved for Avocados/specific pest groups?	NZAGA / ACVM
Provide biosecurity awareness to industry	Investigate the best mechanism to distribute information to growers and where possible use existing communication methods (i.e. AvoScene) to provide exotic pest material to industry to promote general surveillance of the industry's priority pests.	NZAGA
Document the relevant experts for the industry pests	Identify through Plant & Food Research and other research providers the relevant technical contact for each priority pest.	NZAGA
Document and develop the diagnostic capability for industry pests	Identify through Plant & Food Research and other research providers the required diagnostic requirements for each priority pest. Look at ways to enhance the capability and capacity of national diagnostic services.	NZAGA
Develop an Operational Agreement for priority activities	Agree with MPI and other industry groups any Operational Agreements to document pre-agreed industry readiness or incursion response (cost-shared) activities	NZAGA
Develop a process to enhance urban biosecurity awareness	Look into cross industry opportunities to provide the public in urban environments a better understanding of biosecurity threats to primary production and the importance of early reporting.	NZAGA
Neglected orchards	Identify neglected orchards that could pose a risk of exacerbating pest establishment or spread within a region	NZAGA

The Government Industry Agreement for Biosecurity (GIA)

GIA represents a partnership-based approach to managing exotic pests and creates a joint working relationship between industry and government to improve biosecurity outcomes. The GIA provides the framework for a transparent, consistent and equitable biosecurity partnership between the Ministry for Primary Industries (MPI) and industry. This partnership approach is formalised in a Deed which outlines the principles for this partnership which commits both industry and MPI to joint decision-making and cost-sharing for GIA readiness and response activities. The GIA Deed describes the rights, legal obligations, roles, responsibilities and commitments of each Signatory and sets out governance arrangements for decision-making, resourcing and operations.

- A copy of the GIA Deed is available on the GIA website **www.gia.org.nz**

GIA Governance

GIA Executive Committee (GEC)

Made up of 3-5 GIA signatory members to provide day-to-day governance of GIA activities and oversee the operation of the GIA Secretariat.

Deed Governance Group (DGG)

A Governance Group made up of all Signatories that is the highest decision making body of GIA and is the guardian of the GIA Deed. DGG is ultimately responsible for the implementation of the GIA Deed.

Sector-Based Councils (SBC)

Helps to coordinate common sector interests, primarily activities and investments agreed in related operational agreements. Examples include the Fruit Fly and BMSB Councils.

Plant Biosecurity Council

Brings representatives from horticultural and arable industries and the Ministry for Primary Industries together to work together on biosecurity issues and opportunities affecting New Zealand's plant industries.

The GIA Secretariat

The GIA Secretariat facilitates implementation of the partnership described in the GIA Deed. It acts in the interests of all Deed Signatories and has a range of responsibilities. These include facilitating the negotiation and drafting of Operational Agreements between Deed Signatories, advising the Deed Governance Group in its responsibilities and developing policies and procedures as described in the Deed.

The GIA Secretariat is accountable to the Deed Governance Group for the effective and efficient performance of its responsibilities.

Operational Agreements

Operational Agreements (OA) describe the management of specific cost-shared biosecurity activities. Operational Agreements are more practical documents that sit under the Deed and allow industry to prescribe the readiness and response activities to be undertaken for specific pests or biosecurity activities and detail how the activities will be managed and funded.

Along with the government (MPI), an OA may involve more than one industry group particularly where multiple crops are affected by a particular pest or group of pests such as fruit flies. All biosecurity activities agreed through GIA Operational Agreements are listed in the Industry risk management section

Minimum commitments under GIA

All Deed signatories are required to meet a set of Minimum Commitments listed in the GIA Deed (listed below). Minimum Commitments are drawn from the capacity and capability that signatories can contribute to the biosecurity system and are not eligible for cost sharing. Any specific cost sharable commitments of MPI and industries will be detailed in Operational Agreements.

Clause 3.2 of the GIA Deed:

Commitments

Minimum industry Signatory commitments to this Deed and its implementation include:

A. Being aware of the industry biosecurity risk profile and taking measures to manage the biosecurity risks that industry is best placed to manage.
B. Communicating with industry membership, including Maori, on biosecurity in general to elicit better biosecurity outcomes.
C. Working with MPI to integrate industry into response delivery programmes and processes.
D. Raising awareness of response arrangements described in the MPI response procedures and policies.
E. Promoting early reporting of unwanted organisms to MPI.
F. Securing appropriately skilled and committed people to engage in readiness and response activities, including technical and operational experts.
G. Raising awareness within their membership, of the GIA and the commitments that have been made through this Deed and any Operational Agreement(s).

Minimum commitments for all Signatories to achieve Deed outcomes include:

A. Maintaining access to technical biosecurity capacity and capability.
B. Maintaining or improving the capacity to recognise and rapidly report the detection of any unwanted organism.
C. Promoting awareness and use of mechanisms to report changes in New Zealand's biosecurity status.
D. Establishing and maintaining mechanisms to communicate between Signatories and with relevant stakeholders.
E. Securing and maintaining sufficient resources to meet their commitments for the administration of this Deed including annual meetings, consultation and decision-making.
F. Establishing or accessing the necessary capacity and capability to engage in processes to implement this Deed, and any Operational Agreements developed.

Minimum MPI commitments to this Deed and its implementation include:

A. Maintaining a core competency to deliver effective response and readiness activities, including diagnostic and investigation capability, and to negotiate market access.
B. Rapidly notifying potentially affected Signatories when a suspected unwanted organism is detected in New Zealand.
C. Urgently establishing preliminary response arrangements consistent with Deed requirements and any Operational Agreements that may be in place, including initiating decision-making, cost sharing and impact/risk analysis processes.
D. Managing trade and market access issues arising from the detection of the unwanted organism, and meeting international reporting obligations.
E. Representing the interests of non-Signatories and other stakeholders, including Maori.
F. Facilitating access for industry Signatories to Crown loans, as a last resort, to fund response commitments under this Deed.

Meeting the Minimum Commitments of GIA

Each readiness and response minimum commitment requires an associated performance measure. Although work continues between GIA signatories to develop agreed performance measures, below are steps the avocado industry is making towards meeting the industry Minimum Commitments.

Industry commitments	NZAGA Implementation / progress
A. Being aware of the industry biosecurity risk profile and taking measures to manage the biosecurity risks that industry is best placed to manage.	**1.** Avocado biosecurity workshop held with MPI, P&FR and industry representatives in 2012. **2.** Industry biosecurity plan developed identifying and prioritising exotic biosecurity threats. **3.** Orchard biosecurity fact sheets and associated awareness material being developed for growers and industry service providers
B. Communicating with industry membership, including Maori, on biosecurity in general to elicit better biosecurity outcomes.	**1.** Regular biosecurity article in industry magazine (AvoScene) **2.** E-Newsletter (AvoConnect) able to rapidly communicate biosecurity information/alerts to all registered growers. **3.** Industry (PGP) Working Groups provide conduit to communicate messages to grower community
C. Working with MPI to integrate industry into response delivery programmes and processes.	**1.** NZ Avocado now a member of the NBCN **2.** Looking to develop AvoGreen network into a response resource. **3.** Internal biosecurity communication checklist developed

	4. Industry has signed Fruit Fly OA
D. Raising awareness of response arrangements described in the MPI response procedures and policies.	**1.** Industry contingency plans developed that reference and direct industry personnel to MPI's National Biosecurity Response System **2.** NZ Avocado staff yet to be formally trained through the MPI response process.
E. Promoting early reporting of unwanted organisms to MPI.	**1.** Fact sheets and awareness material promoting the Exotic pest hot line developed **2.** AvoGreen network providing dedicated training in reporting and pest awareness to monitoring teams.
F. Securing appropriately skilled and committed people to engage in readiness and response activities, including technical and operational experts.	**1.** Biosecurity and contingency plans being developed document relevant experts and resources available. **2.** GIS maps of avocado growing properties maintained **3.** Biosecurity Manager (1/2 FTE)
G. Raising awareness within their membership, of the GIA and the commitments that have been made through this Deed and any Operational Agreement(s).	**1.** Industry magazine has had GIA awareness articles since 2010. **2.** Successful GIA Postal Ballot of growers completed in March 2015. **3.** Biosecurity plan details GIA commitments and OAs.

GIA and the avocado industry

The New Zealand Avocado Growers' Association (NZAGA) is a signatory to the GIA having signed the Deed in 2015. This followed a series of GIA roadshows and grower referendum held via postal vote during March 2015. This ballot was to determine the level of support for the industry becoming a signatory to the GIA and secondly whether growers supported a compulsory Biosecurity Act levy. Voting results weighted in accordance with production volumes showed 87% of respondents voted in favour of NZAGA becoming a signatory to the GIA Deed and the establishment of a Levy.

Industry biosecurity funding

Funding readiness work

The industry funds its share of any biosecurity Readiness activities (for example, pest surveillance costs as part of an Operational Agreement) and any Minimum Commitments (for example, NZAGA staff taking part in annual GIA Forums) from the industry commodity levy.

Funding responses

The Biosecurity Levy

In March 2019 the avocado Biosecurity Response Levy Order came into force as the agreed mechanism to fund significant industry response costs. The default levy rate will be set at zero with the levy only

being activated as a result of the industry having to re-pay its agreed share of response costs under the Government Industry Agreement.

The maximum rate the Biosecurity Act levy is 0.25% of the sale price for avocados sold on the local market; and 5 cents per tray equivalent on export avocados. The mechanism for collecting and paying the levy is the same process as the industry's commodity levy. The NZAGA Executive will be responsible for activating the Biosecurity Levy and setting an appropriate rate of levy (up to the agreed maximum).

Previous use of the levy

A fruit fly response during 2019 lead to the avocado industry needing to pay its share of response costs. On the 21st June 2019, the NZAGA Executive set the levy rate at half the maximum at 0.125% for New Zealand market avocados; and 2.5 cents per tray equivalent for export avocados. Levy collection began on 7th September 2019 and ended on 30th April 2020 reverting back to a default rate of zero.
The industry does not have to commit to any cost shared activities for joint readiness work until it signs an Operational Agreement.

Biosecurity Decision making under GIA

The NZAGA Executive (a representative grower group and the elected industry group accountable to members) has been given the mandate to make national biosecurity decisions on behalf on the industry during joint decision-making and cost sharing.
NZAGA will have the ability to delegate these accountabilities to NZAIL.

INDUSTRY BIOSECURITY THREATS

Threat identification

This section identifies the exotic pest threats to the avocado industry. The identification of the industry's pests will assist in the implementation of relevant grower awareness campaigns, targeted surveillance and training programs, ensuring diagnostic capability and the development of GIA Operational Agreements.

Identifying industry biosecurity threats

Risk assessment is a process to evaluate and prioritise the risk that a pest organism will be transported and introduced, establish, increase in abundance, spread and cause production, quality or trade impacts. Information on biosecurity threats to the avocado industry came from a combination of:

- existing industry knowledge
- published literature
- overseas research
- specialist and expert judgment (relevant specialists from government, universities, research organisations and industry).

A structured prioritisation risk assessment process was purposefully not used, instead identification of biosecurity threats and their potential risk to the industry will continue to come from a combination of peer-reviewed publications, industry research and expert opinion from NZ and offshore researchers including government and avocado industry representatives from Australia, South Africa and USA.

MPI Emerging Risks System

The MPI Emerging Risks System (ERS) is run by the Biosecurity Science and Risk Assessment team at MPI who proactively identify and manage information relating to potential or emerging biosecurity risks. The ERS relies on international/regional online alerts as well as alerts from individuals within MPI or other Government departments, and from the science and industry communities. This provides an oversight of any changes to the distribution, hosts or virulence of exotic organisms. The ERS provides a centralised service to communicate emerging risks to stakeholders and a mechanism where industry can feedback intelligence/updates on invasive threats that may need more specialised risk assessment. An ERS Stakeholder Report is provided to stakeholders each quarter.

Which pests the GIA Deed covers

Joint decision-making and cost-sharing for readiness and response activities only covers organisms that are:

1. *Not known to be present in New Zealand;*
2. *Present but not established, and could potentially be eradicated or contained; or*
3. *Present and having different effects, there are new hosts, or there are new control methods that raise the potential of eradicating or containing them.*
4. *Not already the subject of an existing pest management plan.*

Priority Exotic Pests of Avocado

The below table provides a list of exotic pests identified as posing the most significant threat to the New Zealand avocado industry.

Common name	Life form	Scientific name	Notes
Invertebrates			
Economically important Fruit flies	Fly		
Melon fly		*Bactrocera cucurbitae*	
Oriental fruit fly		*Bactrocera dorsalis*	
Queensland fruit fly		*Bactrocera tryoni*	
Mediterranean fruit fly		*Ceratitis capitata*	
Persea mite	Mite	*Oligonychus perseae*	(Mexico, Costa Rica, Spain, California), is a key pest of California-grown avocados causing necrotic lesions on leaves and defoliation in severe cases. Wide host range Hass variety seems particularly susceptible. Will also attack grapes, summer fruit, persimmons
Avocado brown mite	Mite	*Oligonychus punicae*	(US, Mexico, central America, Brazil), sporadic problem, causing bronzing and occasionally defoliation. Similar to Tea Red spider mite.
Tea red spider mite	Mite	*Oligonychus coffeae*	Already present in Australia. Leaf feeding. Low impact in Australia. Major impact in California - particularly severe on Hass. Wide spread in sub tropical - has established in Tasmania. Likely to establish in avo growing regions. Wide host range
Avocado thrips	Thrips	*Scirtothrips perseae* (Synonyms = *S. aguacate, S. kupande)*	Cool temperate thrips (Mexico, Central America, California, Chile), considered an important pest in Mexico, is causing issues in California. May be responsible for fruit drop and external damage to fruit leading to reject fruit of up to 85%. Would do well in NZ's climate
Red Bay ambrosia beetle	Beetle	*Xyleborus glabratus*	A borer insect. Vectors the disease/fungus Laurel wilt (*Raffaelea lauricola*) and possibly other fungal pathogens. Main pathway wood packaging. India, Taiwan, Florida and California - from Asia. Quite invasive in America. Main pathway seems to be firewood.

Common name	Life form	Scientific name	Notes
Ambrosia beetles	Beetle	Euwallacea fornicatus species complex (Euwallacea fornicatus sensu lato).	Vectors the disease/fungus Fusarium dieback (*Fusarium* sp.) and other fungal pathogens. The species complex (Euwallacea fornicatus sensu lato) now lists the existence of four species: E. fornicatior, E. fornicatus, E. perbrevis, and E. kuroshio
Avocado seed moth	Moth	*Stenoma catenifer*	(Brazil, Mexico, Peru), Major pest in Latin America (Up to 100% damaged fruit). Larvae bore into fruit flesh and seed, Is a US quarantine issue. Also bore into stems effecting flowering. Serious invasion threat because of their cryptic habits when they are small larvae inside fruit you are unlikely to see them or evidence of damage.
Avocado seed/stem weevil(s)	Beetle	*Conotrachelus aguacatae* *Conotrachelus perseae* *Copturomimus hustachei* *Copturomimus perseae* Copturomimus*lauri*	(Mexico) Can cause serious damage to avocados by burrowing into the stones of the fruit. Serious invasion threat because of their cryptic habits when they are small larvae inside fruit. When in large number reported to cause up to 80% losses.
Pathogens			
Avocado Sunblotch (ASBVd)	Virus	Avocado Sunblotch Viroid	Specific to avocados. Coming in on infected fruit and nursery stock. This is a well-managed pathway. Multiple potential routes. Can get unequal distribution within the plant so difficult to be sure we have completely removed the risk on nursery stock. In Australia - they are trying to establish areas of freedom. Yield loss and kills trees. Damages fruit.
Avocado scab	Fungus	*Sphaceloma perseae*	Widely spread. Produces symptoms so easier to spot than ASBVd. Scabby symptoms on leaves and fruit. Major trade impact. Spreads easily so hard to control.
Brown root rot	Fungus	*Phellinus noxius*	In Australia, Large host range, Carried in soil/spores. Potential for long distance transport.
Cercospora spot	Fungus	*Pseudocercospora purpurea*	Widely distributed and also in Australia. Spreads easily as it causes lots of spores. Prefers warm, humid climates. Potential latent infection. Present in Australia, but only in 2 states. Major impact would be cost of control. Copper spray. Causes disfiguration of fruit.
Fusarium dieback	Fungus	*Fusarium sp.*	Vectored by the Polyphagous shot hole borer (*Euwallacea* sp.) and possibly other beetles of the *Xyleborini* tribe.
Laurel wilt	Fungus	*Raffaelea lauricola*	Vectored by the Red Bay ambrosia beetle (*Xyleborous glabratus*) and possibly other beetles of the Xyleborini tribe.

Exotic Pests of Avocado

The below table provides a comprehensive list of potential exotic pest threats to the New Zealand avocado industry. This is an evolving list that contains pests known to impact avocado production or trade through literature reviews and/or expert knowledge. An assumption has been made that pest impact will be similar across most avocado fruiting and root stock varieties (although for some pathogens this may not be an accurate assumption). Therefore, no distinction has been made between avocado cultivars. NZ predominantly grows and exports the 'Hass' variety of fruit but does use a range of different root stock cultivars.

Invertebrates		
ACARI (Mites e.g. spider mites)		
Oligonychus coffeae	Tea red spider mite, Red spider mite	Found in Queensland and NSW Australia, seasonal pest requiring management
Oligonychus perseae	Persea mite	(Australia, India, China, France and Egypt, Mexico, Costa Rica, California, Italy, Portugal (Madeira Is.) and Israel), can cause necrotic lesions on leaves and defoliation in severe cases. Hass variety seems particularly susceptible. Will also attack grapes, summer fruit and persimmons
Oligonychus peruvianus	Spider mites	A nearctic (Mexico, US) and neotropical species (S. and Central America) Can be morphologically very similar to *Oligonychus persea*, often leading to species misidentifications.
Oligonychus punicae	Avocado brown mite	(US, Mexico, central America, Brazil), sporadic problem, causing bronzing and occasionally defoliation. Similar to Tea Red spider mite.
Oligonychus yothersi	Avocado red mite	(US, Mexico, central America, Brazil, Chile, Hawaii, China and Iran), similar to above, though less of an issue

Tegalophus perseaflorae	Eriophyid mite	(Brazil, Florida, Mexico), generally feeds on apical buds, causing necrotic spots on leaves, but can feed on small fruitlets resulting in distortion and discolouration.
COLEOPTERA (Beetles, weevils, etc.)		
Adoretus versutus	Rose beetle	
Ambrosiodmus lecontei	Ambrosia beetle	USA – Known to transmit Laurel wilt (**Journal of Economic Entomology**)
Batocera rufomaculata	Mango tree borer	
Caulophilus oryzae	Broad nosed grain beetle	
Conotrachelus aguacatae	Small avocado seed weevil	(Mexico). It is a USA quarantine pest. can cause serious damage to avocados by burrowing into the stones of the fruit. Serious invasion threat because of their cryptic habits when they are small larvae inside fruit you are unlikely to see them or evidence of damage.
Conotrachelus perseae	Small seed weevil	(Mexico), when in large number reported to cause up to 80% losses. It is a USA quarantinable pest
Copturomimus hustachei	Small seed weevil	(Mexico, Costa Rica)
Copturomimus perseae	Small seed weevil	(Mexico, Costa Rica)
Copturus aguacatae	Avocado branch/stem weevil	(Mexico), problem poorly managed orchards. Pruning and burning affected branches required to limit impact and spread It is a USA quarantinable pest.
Copturus constrictus	Weevil	(Brazil), listed as non fruit problem by US
Copturus lunatus	Weevil	(Brazil)
Copturus perseae	Weevil	(Columbia)
Diabrotica fucata		
Diaprepes abbreviatus	Citrus weevil	

Diaprepes splengleri	Golden leaf weevil	(North & South America and France) Avocado roots are injured by the larvae, causing wilting and die back
Euplatypus parallelus	Neotropical ambrosia beetle	Previously known as Platypus parallelus, native to Central and South America, and has been introduced into Africa, Asia, and Oceania. highly polyphagous – incl avocado (may transmit pathogenic fungi)
Euwallacea fornicatus	Tea shot-hole borer	Known to be found on avocados (will transmit fungal pathogens). In Australia, Italy, Germany, parts of the Middle East, Asia, Oceania, Costa Rica, Panama, and the United States Inc. Hawaii
Euwallacea sp.	Polyphagous shot hole borer Kuroshio shot hole borer	Vectors the disease/fungus Fusarium dieback (*Fusarium* sp.) and possibly other fungal pathogens. Originating from Southern China and Vietnam (PSHB) and Taiwan (KSHB). Both beetles are now present in Southern California but are concentrated in different regions. Quercivorol baits are commercially available for Euwallacea sp. females (males do not fly) so potential for mass trapping
Helipus apiatus	Weevil	(Florida), can occasionally kill a tree by girdling the trunk, generally a minor problem.
Heilipus lauri	Large seed weevil	(Mexico), poor hygiene practices contribute to severity and local selections more susceptible, when in large number reported to cause up to 80% losses. It is a USA quarantine pest.
Heilipus squamosus	Avocado tree girdler	Native pest of US. Larvae feed in the inner bark of trees at the ground level, occasionally killing young trees.
Heilus freyreissi	Bumpy weevil	(Brazil) feeds on branches, leaves, inflorescences, and immature fruit, resulting in flower and fruit drop. Up to 100 percent of branches and fruit can be damaged. Fruit injury has been associated with rot (*Colletotrichum* sp) symptoms
Hypomeces squamosus	Green weevil	
Monolepta apicalis		(South Africa), similar to M. austalis, sporadic pest but can cause damage in large numbers.

Monolepta australis	Redshouldered leaf beetle	(In Australia) Can appear suddenly in spring in swarms and do a lot of damage but is easy to control if noticed in time
Naupactus xanthographus	South American fruit tree weevil	Polyphagous weevil. Damage by larvae feeding on roots. Adult feeding causes superficial damage to leaves (irregular leaf margins) and fruit.
Oribius destructor	Oribius weevil	As for Oribius inimicus
Oribius inimicus	Oribius weevil	The major pest of horticulture in the PNG Highlands. Highly susceptible crops include citrus, apples, capsicum, strawberries and avocado. Damage is caused by adult feeding which causes leaf shot-holing, stem and fruit scarring, and branch die-back.
Oribius tessellatus	Oribius weevil	As for Oribius inimicus
Pagiocerus fiorii	Seed borer	(Argentina), minor pest known to bore into avocado seed
Rhynchophorus ferrugineus	Red/Asian palm weevil	Questionable impacts to avocado - more of a palm weevil
Rhynchophorus palmarum	South American palm weevil	Questionable impacts to avocado - more of a palm weevil
Sinoxylon conigerum	Conifer auger beetle	
Suana concolor		
Xyleborinus andrewesi	Ambrosia beetle	USA and old world tropics – Known to transmit Laurel wilt (**Journal of Economic Entomology**)
Xyleborus bispinatus	Ambrosia beetle	USA – Known to transmit Laurel wilt (**Journal of Economic Entomology**)
Xyleborus congeners	Ambrosia beetle	USA – Known to transmit Laurel wilt (**Journal of Economic Entomology**)
Xyleborus glabratus	Red Bay ambrosia beetle	Vectors the disease/fungus Laurel wilt (*Raffaelea lauricola*). India, Taiwan, Florida and California - from Asia. Quite invasive in America. Main pathway is infested wood.
Xyleborus immaturus	Bark beetle	
Xyleborus morstatti	Boring beetle	Bores into trunk and branches of avocado tree.
Xyleborus neivai		
Xyleborus perforans	Island pinhole borer	
Xyleborus volvulus		
Xylosandrus compactus	Black twig/Shot-hole borer	Widely distributed - Wide host range, a borer of seedlings, shoots and small twigs

Xylosandrus crassiusculus	Asian/granulate ambrosia beetle	Subtropical Asian origin, now in Africa, India, Sri Lanka, China, Japan, Southeast Asia, Indonesia, New Guinea, South Pacific, Hawaii, and the United States and more recently in Brazil, French Guiana and Guatemala. Visible symptoms include wilted leaves and strings of boring dust from numerous small holes in branches
Xylosandrus morigerus	Brown twig beetle	
Zeuzera coffeae		
DIPTERA (Flies and midges)		
Anastrepha fraterculus	South American fruit fly	
Anastrepha ludens	Mexican fruit fly	
Anastrepha obliqua	West Indian fruit fly	
Anastrepha serpentine	Sapote fruit fly	
Anastrepha striata	Guava fruit fly	
Anastrepha suspensa	Caribbean fruit fly	
Asphondylia websteri	Alfalfa gall midge	Polyphagous which deforms Hass fruit. Known to occur in the United States and regions of Mexico.
Bactrocera dorsalis	Oriental fruit fly	
Bactrocera carambolae	Carambola fruit fly	
Bactrocera cucurbitae	Melon fly	
Bactrocera facialis	Tropical fruit fly	
Bactrocera kandiensis	Fruit fly	
Bactrocera kirki	Fruit fly	
Bactrocera melanotus	Fruit fly	
Bactrocera papayae	Papaya Fruit fly	

Bactrocera passiflorae	Fijian fruit fly	
Bactrocera tryoni	Queensland fruit fly	
Bactrocera xanthodes	Pacific fruit fly	
Ceratitis capitata	Mediterranean fruit fly	
Ceratitis cosyra	Mango fruit fly	
Ceratitis rosa	Natal fruit fly	
Ceratitis spp.	South Africa fruit flies	
Drosophila suzukii	Spotted-wing drosophila	Avocados (being a thick skinned fruit) are not a known host – damaged fruit may be at risk yet this is un-tested. i.e. would never be a significant pest for the industry.
HEMIPTERA (Stink bugs, aphids, mealybugs, scale, whiteflies and hoppers)		
Abgrallaspis sp.	Armored/Cyanophyllum scale	Over ten species most causing more quarantine that plant health issues
Aethalion quadratum	Avocado treehopper	Mexico and Guatemala dense colonies kill shoots and reduce tree vigour
Alconeura candida	Leafhopper	Mexico
Aleurocanthus woglumi	Citrus blackfly	Parasites have worked as control in Florida. Minor pest. (Aleurocanthus spp. found in Qld Australia.)
Aleurodicus cocois	Coconut whitefly	
Aleurodicus dispersus	Spiraling whitefly	Very wide host range and worldwide distribution like with most white flies they will contribute to virus transmission
Aleurodicus dugesii		
Aleurodicus neglectus		
Aleurodicus pulvinatus	Coconut whitefly	

Amblypelta bilineata	Spotting Bug	(New Caledonia), similar to fruit spotting bug and likely controlled at same time, adaptable to cooler locations, given its in NC probably unlikely. Likely controlled with FSB, would not be attracted to pheromones when developed for FSB
Amblypelta lutescens	Fruit spotting bug	In Australia - major pests in subtropical and tropical avocado
Amblypelta nitida	Fruit spotting bug	In Australia - major pests in subtropical and tropical avocado
Anolcus campestris	Stink bug	Can be found in large numbers in South African avocado orchards. (impacts pack out)
Anoplocnemis curvipes	Tip wilter or dahlia Bug	(Kenya), sap sucking insect
Atelocera raptoria	Woolly stink bug	(South Africa), worst of the stink bugs in SA avocado orchards
Austropeplus sp.	Citrus blossom bug	(In Australia) appears to cause damage to flowering which affect yields in the area around the hinterland of Gosford, NSW.
Bathycoelia naticola	Two-spotted stink bug	(South Africa)
Bathycoelia rodhaini	Yellow –spotted stink bug	(South Africa)
Cerataphis lataniae	Palm aphid	
Ceroplastes cirripediformis	Barnacle scale	(Mexico, Bolivia, Florida, Asia), considered a serious pest in Bolivia, pest also of citrus, lychee, longan.
Ceroplastes rusci	Fig wax scale	
Chrysomphalus dictyospermi	Dictyospermum/Spanish red scale	(Spain, South Africa, Canary Islands, Mexico, US), Important hard scale in South Africa. most important scale on US avocado.
Chrysomphalus pinnulifer	False purple scale	Not recorded in Australia but most probably in NZ and widely distributed across the globe, Citrus is also a primary host
Coenomorpha nervosa	Brown stink bug	Found in moderate numbers in South African avocado orchards.
Daghbertus fasciatus	Avocado mirid	fasciatus, Daghbertus olivaceous, Rhinacloa sp
Daghbertus olivaceous	Avocado mirid	
Elimaea punctifera	narrowwinged katydid	
Empoasca angustella	Leaf hopper (*Typhlocybinae* family)	Causes chlorosis and curling with later necrosis and defoliation (Mexico)

Empoasca deskina	Leaf hopper (*Typhlocybinae* family)	Causes chlorosis and curling with later necrosis and defoliation (Mexico)
Fiorinia fioriniae	Avocado/Fiorinia scale	Australia and most other continents. Widespread pest of Avocado
Halyomorpha halys	Brown Marmorated Stink Bug	Unknown risk to the avocado industry. Found across Asia: China, Japan, and Korea; it has recently aggressively invaded the US. More than 300 hosts. Frequently intercepted at the NZ border within containers/cargo/vehicles.
Helopeltis bakeri	Mirid bug / Capsid bug	(Philippines), piercing bugs, can cause significant damage in high numbers, may cause black spots on fruit and premature fruit drop, Related spp recorded in Queensland.
Helopeltis collaris		
Homalodisca vitripennis	Glassy winged sharpshooter	
Icerya seychellarum	Seychelles scale	A polyphagous scale insect widespread in tropical areas and also occurs in France, Spain and Portugal
Idona minuenda	Leaf hopper (*Typhlocybinae* family)	feeds on and induces chlorotic spots on the face of mature leaves (Mexico)
Ischnaspis longirostris		South Africa, PNG, South America, Japan, USA
Joruma krausi	Leaf hopper (*Typhlocybinae* family)	Feeds on and deforms vegetative buds (Mexico)
Lagocheirus araneiformis		
Melanaspis obscura	Obscure scale	
Metcalfiella monogramma	Avocado treehopper	(Mexico), seems reasonably wide spread in Mexico. Pyrethrum treatments to control this pest could disrupt natural predator balance for other pests. Reportable pest in US if intercepted.
Nezara pallidoconspersa	Yellow-edge stink bug	(South Africa), can occasionally cause damage
Nipaecoccus nipae	Spiked mealybug	Minor pest of avocados and guavas in Hawaii, Bermuda and Puerto Rico
Niphonoclea spp.		
Parabemesia myricae	Japanese bayberry whitefly	(Israel), minor leaf damage, normally controlled naturally, can be a viral vector.
Paracoccus marginatus	Papaya mealybug	

Paradasynus spinosus	Coreid fruitspotting bug	(Taiwan), similar to Australia's fruit spotting bug.
Paraleyrodes goyabae		
Paraleyrodes minei	Nesting whitefly	
Paraleyrodes perseae	Plumeria whitefly	(Mexico)
Parthenolecanium corni	European fruit lecanium scale	(Canary Islands, West Indies, US)
Penthimiola bella	Citrus leafhopper	(South Africa)
Pinnaspis strachani	hibiscus snow scale	Widespread
Planococcoides njalensis	West African cocoa mealybug	
Planococcus ficus	Vine mealy bug	(California, Israel, Canary Islands), listed as a frequent and serious pest in Canary Islands.
Planococcus lilacinus	Mealy bug	(Philippines), normally a minor problem, though it can cause fruit drop when in large numbers
Protopulvinaria pyriformis	Pyriform scale (Heart-shaped scale)	(Chile, South Africa, Israel, California, Canary Islands), can affect fruit through sooty mould development, considered to be a significant pest, modest natural control occurring in most countries.
Pseudacysta perseae	Avocado lace bug / Camphor lace bug	(Florida, West Indies, Mexico, Madeira, Hawaii), generally a minor pest, do not feed on fruit. They suck leaf sap and can cause necrosis on the leaves and cause defoliation when in large numbers, may result in entry points for anthracnose.
Pseudocaecilius citricola		
Pseudotheraptus devastans	Coreid bug	
Pseudotheraptus wayi	Coconut bug	(South Africa), considered a significant pest of the same family as Australia's fruit spotting bug. Likely controlled with FSB, but would not be attracted to FSB pheromones when developed.
Pulvinaria mammeae	large cottony scale	Wide variety of hosts including avocado (Australia and North America & Hawaii)
Pulvinaria psidii	Green shield scale	Attacks a variety of fruit including avocado (widely distributed)

Rastrococcus invadens	Mango mealy bug	(West Indies), can be a significant pest at times, bigger issue with mangoes though
Selenaspidus articulatus	West Indian red scale	
Sophonia orientalis	Two-spotted leafhopper	widely distributed in South and South-East Asia, USA and Hawaiian islands
Taylorilygus spp. *(Taylorilygus apicalis* Present in N.Z)	Avocado Bug	(South Africa), piercing style of bug, producing similar damage to stink bugs, Hass apparently quite susceptible, damage usually occurring early on in fruit development. Related species recorded in Australia
Tetraleurodes perseae	Red banded whitefly	US, Israel. Lebanon, Latin America. Feeding by large numbers can deform immature leaves which can lead to premature leaf drop.
Trialeurodes floridensis	Avocado Whitefly	(Mexico, US), minor pest of avocado.
Trioza anceps	Avocado Psyllid	(Mexico, Guatemala), mostly effects Mexican varieties, severe infestations can cause leaf drop, is a reportable pest in US if detected.
LEPIDOPTERA (Butterflies and moths)		
Aegeria sp.	Avocado bark borer	Philippines, minor pest, can weaken branches which will snap in strong winds
Amorbia cuneana	Leaf roller	(California, Mexico, Central America), sporadic, but also effects citrus
Amorbia emigratella	Mexican Leaf roller	(Mexico, Hawaii) similar to A. cuneana
Amorbia essigana	Avocado leaf roller	(Mexico) similar to A. cuneana
Argyrotaenia citrana	Orange tortrix	A number of *Argyrotaenia* species are common in US avocado orchards
Ascotis reciprocaria reciprocaria	Looper	(South Africa), related to Boarmia spp.
Attacus atlas	Atlas moth	
Boarmia selenaria	Giant Looper	(Israel), sporadic problem, modest control with parasites and BT

Bracharoa mixta	Tussock moth	In 2019 in South Africa, tussock moth larvae were observed feeding on leaves and fruit of avocado plants, leading to defoliation and fruit scarring. This is the first report of B. mixta infesting avocado
Cacoecimorpha pronubana	Carnation leafroller	(Israel), sporadic problem, can be significant, modest control with parasites and high tolerance to Bt.
Cryptaspasma perseana	Tortricid moth	Puerto Rico, Mexico (Michoacán), and Guatemala
Cryptophlebia leucotreta	False codling moth	(Canary Islands, South Africa), larvae bore into fruit, but are unable to complete development in avocado fruit, spasmodic pest problem.
Gracillaria perseae	Avocado leaf miner	(Mexico), causes only minor damage.
Marmara salictella	Citrus peel miner	(California), minor problem
Papilio garamas garamas	Magnificent swallowtail	(Mexico, Central America), minor pest occasionally causing defoliation
Papilio victorimus morelius	Victorine swallowtail	Same as P. garamas
Peridroma saucia	Pearly underwing moth	
Platynota stultana	Omnivorous leaf roller	Known to occur in USA and Mexico & Spain.
Pyrrhopyge chalybea	Orange –rimmed firetip	(Mexico), reportable if detected by US.
Sabulodes aegrotata	Omnivorous looper	(California, Mexico, Central America), generally a sporadic pest, usually controlled naturally, Bt generally effective.
Spodoptera eridania	Southern armyworm	
Spodoptera littoralis	Cotton leafworm	
Stenoma catenifer	Stenomid (avocado) bone borer moth, Avocado fruit borer, Seed moth	(Brazil, Mexico), Major pest in Latin America (Up to 100% damaged fruit). Larvae bore into fruit flesh and seed, Is a US quarantine issue. Also bore into stems effecting flowering. Egg parasitoids (Trichogramma) and BT may be effective. Serious invasion threat because of their cryptic habits when they are small larvae inside fruit you are unlikely to see them or evidence of damage.
Stericta albifasciata	Avocado moth	
Xyleutes punctifer		

THYSANOPTERA (Thrips)		
Chaetanaphothrips orchidii	Anthurium (orchid) thrips	
Dinurothrips hookeri		
Frankliniella bispinosa	Florida Flower thrips	
Frankliniella bruneri		(Mexico), reportable by US if intercepted, not normally considered as mature fruit pest
Frankliniella cephalica		(Mexico, Central America, Chile, US), causes bronzing of leaves and fruit when in high numbers, more problem in sub tropical and tropical areas.
Frankliniella chamulae		(Mexico), non reportable by US if intercepted, not normally considered as mature fruit pest
Liothrips persea		(Mexico, Central America, Chile), more of a problem in sub-tropical and tropical regions, can cause sporadic problems (Mature fruit not considered a host by US)
Neohydatothrips burungae	Avocado neohydatothrips	(California, Colombia, Guatemala, Mexico), more dominant in sub-tropical and tropical areas.
Neohydatothrips narroi	Avocado neohydatothrips	New species of thrips on avocado described from Mexico.
Retithrips syriacus	Castor or black vine thrips	(Israel, Brazil), may be selective in the varieties of avocado it attacks, controlled by 'sabadilla' sprays.
Scirtothrips aceri		(Mexico, Central America, California, Chile), noted pest problem in sub-tropics and tropics coastal regions. Little information available.
Scirtothrips aurantii	South African citrus thrips	Avocados recorded as a natural host in South Africa
Scirtothrips perseae	Avocado thrips	Synonyms: S. aguacate, S. kupande (Mexico, Central America, California, Chile), considered an important pest in Mexico, is causing issues in California. May be

		responsible for fruit drop and external damage to fruit leading to reject fruit of up to 85%.
Selenothrips rubrocinctus	Redbanded thrips	Can become numerous enough to cause defoliation of trees

Pathogens

FUNGI

Akaropeltopsis spp.	Sooty blotch	Preharvest sprays with copper oxychloride reduced the disease, (US)
Armillaria mellea	Armillaria root rot (shoestring root rot)	
Armillaria tabescens	Clitocybe root rot	
Asteridiella perseae	Black mildew	
Botryosphaeria disrupta	Botryosphaeria branch cankers	
Calonectria illicicola	Black root rot (Nursery root rot)	(In Australia)

Colletotrichum tropicale	Anthracnose fungus	Emerging reports from Mexico of fungus infecting avocado
Cylindrocladiella peruviana	Stem and crown rot	Also infects Vitis
Dactylonectria spp.	(Nursery root rot)	(In Australia)
Fusarium sp.	Fusarium dieback	A range of symbiotic fungi i.e. *Fusarium euwallacea, Graphium euwallaceae sp. nov* + others
Ganoderma zonatum	Butt rot	
Grovesinia pyramidalis		< 1cm round grayish/brown lesions on leaves with dark margins
Lasiodiplodia theobromae	Fruit rot	(Israel) An endophyte that causes symptoms on fruit only after they ripen
Mycosphaerella perseae	Leaf spot or Silver spot	(Mexico, Central US, Irian Jaya) minor disease.
Neofusicoccum mangiferae	Fruit Rot	Taiwan, smooth, brown, circular spots first on the surface of harvested fruits
Oidium perseae-americanae. *(Pseudoidium perseae-americanae)*	Powdery Mildew	California avocado disease
Paracremonium pembeum sp. nov		A symbiotic fungi contributing to Fusarium dieback transmitted by Ambrosia beetles
Pestalotiopsis clavispora	Postharvest stem end rot	
Phellinus noxius	Brown root rot	(In Australia) probably too cold in NZ . Spreads by root to root contact. has survived for 4+ years after dead avocado trees were removed. Thus, replanting fails.
Phyllachora grattissima	Red-brown leaf spot	(Mexico, Puerto Rico, Virgin Islands), reportable in US if detected
Phymatotrichopsis omnivora	Texas root rot	(Mexico, US tropics), minor disease.
Physalospora perseae	Physalospora canker	
Pleiocarpon algeriense	Stem and crown rot (and root rot)	Newer reports from Italy of this fungus also causing stem crown and root rot symptoms in avocado
Podosphaera perseae-americanae	A powdery mildew species	(Indonesia)

Pseudocercospora purpurea	Cercospora spot	
Raffaelea lauricola & Raffaelea canadensis	Laurel wilt	Requires the Ambrosia beetle to vector the disease. Would have a high impact on native trees as well.
Rosellinia bunodes	Black root rot	(Mexico), Rosellinia spp have been recorded in Australia, but none yet pathogenic to avocado trees. Tropical and soil borne.
Rosellinia necatrix	White root rot	(In South Africa) Causes yellowing, wilting and eventual death of the tree, and spreads by root grafts. Control is very difficult.
Rosellinia pepo	Black root rot	(Mexico), as for Rosellinia bunodes.
Sphaceloma perseae	Avocado scab	
Thanatephorus cucumeris	Seed and root rot	
OOMYCETES		
Phytophthora megakarya		Causes black pod disease in cocoa trees across Africa –Avocado was established as a host in 2014
Phytophthora mengei	Bark canker	Causes bark canker in Mexico and USA, previously considered as belonging to a subgroup of P. citricola.
Phytophthora ramorum (exotic pathovars)	Sudden oak death, Ramorum leaf blight	(Many US and Aust restrictions listed by AQIS).
Phytophthora capsici		
Phytophthora palmivora	Seedling blight	
Phytopythium sp. amazonianum (synonym: Pythium sp. amazonianum	Pythium sp. (Tristeza del aguacate" disease)	(Mexico, Guatemala, Ecuador, Peru, and Spain) Yellow leaves and necrotic and brittle roots, leading to plant death
BACTERIA		

Erwinia herbicola	Avocado blast (Also caused by Pseudomonas syringae = an avocado blast complex)	(California, Florida, Mexico, Israel), cultivars vary in susceptibility, generally associated with cold wet weather (potential issue in southern growing areas), causes marked cracking at the blossom end of the fruit leading to fruit rejection when grading.
Pseudomonas syringae pv. syringae	Avocado blast (also caused by Erwinia herbicola = an avocado blast complex)	Listed here twice as causes two separate disease complexes, avocado blast AND bacterial canker.
Pseudomonas syringae pv. syringae	Bacterial canker Also caused by Xanthomonas campestris (avocado pathovar) = bacterial canker complex)	See also cause of Avocado Blast. Although P. syringae and X. campestris are found throughout Australia, the SA and Cal organisms are considered to be new 'pathovars'.
Xanthomonas campestris (avocado pathovar)	Bacterial canker Also caused by Pseudomonas syringae pv. syringae van Hall = bacterial canker complex)	(South Africa, California), generally considered a quite minor problem with normally low numbers of cankers seen. Although P. syringae and X. campestris are found throughout Australia, the SA and Cal organisms are considered to be new 'pathovars'
Xylella fastidiosa	Leaf scorch	The bacterium had 99 to 100% match for a Pierce's disease strain from California and 94 to 95% match to a citrus variegated chlorosis strain from Brazil
VIRUSES and VIROIDS		
Avocado Sunblotch Viroid	ASBVd	
~~*Potato spindle tuber viroid*~~	~~PSTVd~~	MPI's China market access report (2015) demonstrates a lack of evidence of avocados being a host of PSTVd.

Unknown etiology	Avocado blackstreak disease	(California, Florida, Canary Islands), trunk and branch cankers, poor tree health, occasionally death, triggered by stress.
Unknown etiology	Duke 6 stem pitting	(South Africa, California?), severe stem pitting of rootstock, leading to reduced vigour, defoliation and even death, severe symptoms often associated with stress so is more severe in drought. DS RNA spread to trees via rootstocks.
NEMATODES		
Pratylenchus vulnus	Root-lesion nematode	

Current resources for detection and identification of high priority pests

Diagnostic and surveillance capacity for the priority pests of the avocado industry are listed below. The importation of diagnostic tools and reference material into New Zealand can be a lengthy process. Maintaining a diagnostic capability for the industry's priority pests ensures industry is prepared to respond swiftly and effectively to an exotic pest incursion.

Diagnostic capability

The Plant Health & Environment Laboratory (PHEL) is located in two sites (Auckland and Christchurch) and provides diagnostic testing and technical advice for exotic (regulated) pests and diseases affecting plants and the environment. PHEL has the technical capability to identify the industry's current priority pest organisms. Although NZ diagnostic labs are able to identify the priority fungal pests, they currently don't have rapid molecular protocols developed for some. The adoption of new or improved diagnostic methods to readily and accurately identify and/or confirm these priority pest organisms may be undertaken as a GIA readiness activity.

	Relevant expert	Diagnostic protocol / standard / tool(s)	Targeted Surveillance programme(s)
Pathogens			
Avocado Sunblotch Viroid (ASBVd)	Kerry Everett (PFR)	MPI approved protocol for sampling and testing of ASBVd	Testing requirements under the Avocado High Health Scheme
Avocado scab (*Sphaceloma perseae*)	Kerry Everett (PFR)	B3 Published diagnostic tool	None
Cercospora spot (*Pseudocercospora purpurea*)	Kerry Everett (PFR)		None
Fusarium dieback (*Fusarium* spp) vectored by Polyphagous shot hole borer (PSHB) (*Euwallacea* spp)	Kerry Everett (PFR)		None
Brown root rot (*Phellinus noxius*)	Kerry Everett (PFR)		None
Laurel wilt (*Raffaelea lauricola*) vectored by Red Bay ambrosia beetle (RAB) (*Xyleborous glabratus*)	Kerry Everett (PFR)	Diagnostic manual and molecular diagnostic assays for both X. glabratus and R. lauricola were	None

		developed in Australia 2013 (HIAL/AAL project)	
Invertebrates			
Avocado brown mite (*Oligonychus punicae*)	Zhi-Qiang Zhang (Landcare Research taxonomist) David Logan (mites on avocado)		None
Persea mite (*Oligonychus perseae*)	Zhi-Qiang Zhang (Landcare Research taxonomist) David Logan (mites on avocado)		None
Red Bay ambrosia beetle (RAB) (*Xyleborous glabratus*) Vector of Laurel wilt (*Raffaelea lauricola*)	Rich Leschen (landcare Research taxonomist)		None
Avocado thrips (*Scirothrips perseae*)	Asha Chaggan (thrips)	• Australian endorsed National Diagnostic Protocol	None
Tea red spider mite (*Oligonychus coffeae*)	Zhi-Qiang Zhang (Landcare Research taxonomist) David Logan (mites on avocado)		None
Polyphagous shot hole borer (PSHB) (*Euwallacea sp*)	Rich Leschen (landcare Research taxonomist)		None
Fruit flies (*Anastrepha* spp, *Bactrocera* spp, *Ceratitis* spp, *Rhagoletis* spp)	Karen Armstrong (Lincoln University) Max Suckling (Fruit fly surveillance, control)	• 2013 Tropical Fruit Flies of South-East Asia (ISBN: 9781780640358) • 2011 Australian Handbook for the Identification of Fruit Flies (ISBN: 978-0-9872309-0-4)	National Fruit Fly surveillance programme

RISK MITIGATION

Risk mitigation

A range of strategies can be adopted at the national, regional and orchard level to minimise the risk of exotic pest introductions, spread and establishment.

Pathway management

There are a number of potential pathways that avocado pest invertebrates and pathogens could enter New Zealand and then be transported to avocado production areas. Some of these are listed below:

- Imported avocado propagation material – seed for sowing, seedlings, budwood, tissue culture. (*The issuing of Import Permits for all Persea propagation material is suspended until the Nursery Stock Import Health Standard has been reviewed – new version due Dec 2017*).
- Legally imported avocado plant material – fruit (*Last fruit imports from Australia were in 2010*)
- Illegal importation of plant material
- Importation of used orchard equipment or contaminated/infested personal effects
- Passenger movements; and the risk items they may carry
- Pest samples for diagnostic work/research
- Avocado cultivar samples for research
- Hitchhiker pests on international craft/vessels
- Hitchhiker pests on the cargo/mail pathway
- Legally imported plant material that may host avocado pests (i.e. cut flowers/foliage)
- Wind dispersal of fungal or other pest organisms from Australia or other countries

National level – importation restrictions

The Ministry for Primary Industries (MPI) is responsible for maintaining and improving international trade and market access opportunities and achieves this through:

- establishment of scientifically-based quarantine policies
- provision of effective technical advice and export certification services
- government to government negotiations with key trading partners
- participation in multilateral forums and international sanitary and phytosanitary (SPS) standard-setting organisations
- collaboration with industries through GIA processes

MPI is responsible for the management of quarantine policy, as it relates to the introduction into New Zealand of Avocado fruit, seed or other propagation material, that could harbour or be a host of avocado pests. Other commodities and plant material legally imported could also pose a risk of plant pathogens or other risk organisms. Therefore, Import Health Standards (IHS) are continually being reviewed by MPI and industry groups to ensure these risks are managed.

Specific Import conditions for avocado fruit and germplasm (as of Oct 2016):

Commodity	Import Health standard	Import status	Import permit	Additional comments
Avocados – Fresh (with seeds)	**152-02** Importation and Clearance of Fresh Fruit and Vegetables (**Tonga**) **Avocado-au** Importing Fresh Fruit/Vegetables - Avocado (Persea americana) from **Australia**	Additional Declarations relating to (*Liriomyza trifolii* and fruit fly). Plus Additional Declarations relating to *Pseudocercospora purpurea, ASBVd* and fruit fly measures	Required Required	IHS not used since 2010 but still valid
Avocados – Fresh (seedless)	As above	As above	Required	
Avocados – Frozen fruit/flesh	BNZ-NPP-HUMAN	Fruit fly host material must meet definition of 'frozen' (minus 18°C for 7 days)	Not required	
Avocados – *Persea americana* seed	**155-02-05** Importing Seeds for Sowing (**Only USA permitted**) **155-02-05** Importing Seeds for Sowing (All other countries)	IHS current Pests of concern (ASBVd and Blackstreak) Prohibited	Required N/A	Level 3 PEQ for 1 growing season
Avocados – *Persea americana* tissue culture and cuttings and seedlings	**155-02-06** Importing Nursery Stock	IHS Suspended	Trade Suspended	No permits being issued at present)*

* The *Persea* schedule of the Import Health Standard requires the exotic pest list, testing and quarantine conditions for avocado germplasm to be updated before an import permit can be issued. The associated Pest Risk Assessment (PRA) is being conducted by MPI and industry during 2021.

Post border pathways

The list of risk items that could harbour and transport avocado pests is diverse. Long distance pest (especially pathogen) movements are often associated with plant material including nursery stock, pruning's and fruit. However, any item whether organic or inanimate moved between an infected or infested property has the potential to transport a pest to a new location.

Industry specific movements of plant material, equipment or other risk items include:

- Truck and fruit bin movements between orchard and packhouse
- Footwear and vehicles from multiple properties converging at field day events
- Nursery stock movement between properties
- Movement of hitchhiker pests onto or off the property by harvest contractors, Avogreen monitors, consultants, researchers, service providers, utility companies.
- Contaminated harvesting, spraying and pruning equipment (i.e. shared hydroladders)

Surveillance

A key aspect of any early warning system is the need for regular general monitoring and targeted surveillance that is based on understanding pest/host biology and likely entry pathways. Pest specific surveys increase the chances of early detection, minimise costs of eradication and in some cases be necessary to meet obligations of the World Trade Organisation's (WTO) Sanitary and Phytosanitary Agreement (SPS) with respect to the pest freedom status within New Zealand. There may also be additional Official Assurance Programme or trade requirements that require a formal targeted surveillance/pest monitoring regime.

Surveillance can be either targeted toward specific pests, or general in nature. General, passive or non-targeted surveillance is based on recognising normal versus symptomatic plant material, noticing suspect pests or signs of pest presence. Targeted surveillance is usually pest-specific, based on set methodology or protocols and is important for establishing whether particular pests are present in a defined location or to understand their distribution/spread during a response.

Growers, rural professionals and postharvest personnel can provide very effective general surveillance through their normal on-orchard activities, provided individuals are aware of what to look for and of reporting procedures. Consultants and AvoGreen crop monitors can also provide valuable information as they are regularly in the field and are often best placed to observe any unusual pest activity or plant symptoms.

National surveillance programs

Fruit Fly

The National fruit fly surveillance programme was initiated in the mid 1970's to provide assurance of country freedom from economically important fruit fly to facilitate market access, and early warning of fruit fly incursions to facilitate eradication.

Fruit fly surveillance consists of seasonal monitoring September to June for the presence of fruit fly through the use of lure traps placed at appropriate locations throughout New Zealand, and transport of specimens from traps to the appropriate Diagnostic Laboratory for identification.

The surveillance programme targets economically important fruit fly of the family Tephritidae such as, but not limited to, Queensland fruit fly (*Bactrocera tryoni*), Oriental fruit fly (*Bactrocera dorsalis*), Mediterranean fruit fly (*Ceratitis capitata*) and Melon fruit fly (*Bactrocera cucurbitae*).

The programme deploys about 7500 lure-baited traps placed in potential host trees and arranged in a grid pattern designed to cover urban areas identified as likely points of entry because of their proximity to international airports, seaports and transitional facilities.

GIA signatories are now helping to design and fund the national fruit fly surveillance programme through a joint Operational Agreement.

Industry surveillance programs

AvoGreen

AvoGreen monitors could be better utilised as biosecurity scouts if they were provided with formal/accredited training on exotic pest identification and reporting. Already the regular monitoring of avocado orchards under the AvoGreen programme provides for a network of trained pest scouts that are well placed to provide early warning of exotic pests. This 'First Detector Network' (FDN) would also provide a resource of competent people that could be called upon in the event of an incursion and may be recognised as in-kind contributions to GIA cost shared response activities.

Avocado High Health Scheme

The New Zealand Avocado Growers Association High Health Scheme (HHS) was produced by the NZ Avocado Growers Association (AGA) with the participation of the NZ Avocado Nurseries Association (NZANA). It is compulsory for all nurseries to comply with the HHS if they hold sublicenses to propagate of the clonal cultivars of which the AGA holds the master licenses for NZ.

Objectives of the HHS is to certify that plants produced under the scheme are propagated under a nursery management system that will:

- Ensure plants produced are True to Type.
- Minimize the risk of producing plants infected by Avocado Sunblotch Viroid (ASBVd).
- Minimize the risk of producing plants infected by *Phytophthora cinnamomi* (Pc).
- Comply with the minimum physical specifications.
- Allow the traceability of all propagation material (seed/graftwood) back to the orchard it was sourced from.

Official surveillance programs that target pests of the avocado industry:

Surveillance program	Pests targeted	Region	Deliverer
AvoGreen	Endemic pests Also provides general/passive surveillance of all pest activity in orchards	National / every export orchard	Licenced AvoGreen Monitors
National Fruit fly surveillance programme	Queensland fruit fly (Bactrocera tryoni), Oriental fruit fly (Bactrocera dorsalis), Mediterranean fruit fly (Ceratitis capitata) and Melon fruit fly (Bactrocera cucurbitae).	High risk areas of NZ	MPI, Assure Quality and GIA industry partners
Avocado High Health Scheme	Avocado Sunblotch Viroid (ASBVd) Phytophthora cinnamomi (Pc)	Avocado nurseries growing AGA licenced cultivars	Nurseries
Industry Gene Block monitoring	Monitoring for any potential exotic threats Testing for Avocado Sunblotch Viroid (ASBVd)	Bay of Plenty	NZAGA

Pest-specific information

As part of the implementation of the biosecurity plan, pest-specific information and emergency response documents, such as fact sheets, contingency plans, will be developed for all high risk pests. All documents listed are available through NZ Avocado.

Pest-specific information currently available for industry priority pests

Pathogens	Fact sheet	Readiness documents	Priority pest data sheets
Avocado Sunblotch Viroid (ASBVd)	Yes (Published in Avoscene and on website)		Completed 2014 by Market Access solutionz and P&FR
Avocado scab (*Sphaceloma perseae*)	Yes (Published in Avoscene and on website)		Completed 2014 by Market Access solutionz and P&FR
Cercospora spot (*Pseudocercospora purpurea*)	Yes (Published in Avoscene and on website)		Completed 2014 by Market Access solutionz and P&FR
Fusarium dieback (*Fusarium* spp)	Yes (Published in Avoscene and on website)	Drafted (2014)	Completed 2014 by Market Access solutionz and P&FR
Brown root rot (*Phellinus noxius*)	Yes (Published in Avoscene and on website)		Completed 2014 by Market Access solutionz and P&FR
Laurel wilt (*Raffaelea lauricola*)			Completed 2014 by Market Access solutionz and P&FR
Invertebrates			
Avocado brown mite (*Oligonychus punicae*)	Yes (Published in Avoscene)		Completed 2014 by Market Access solutionz and P&FR
Persea mite (*Oligonychus perseae*)	Yes (Published in Avoscene)		Completed 2014 by Market Access solutionz and P&FR
Red Bay ambrosia beetle (RAB) (*Xyleborous glabratus*) Vector of Laurel wilt (*Raffaelea lauricola*)			Completed 2014 by Market Access solutionz and P&FR
Avocado thrips (*Scirothrips perseae*)	Yes (Published in Avoscene)	Investigation plan developed (2018)	Completed 2014 by Market Access solutionz and P&FR
Tea red spider mite (*Oligonychus coffeae*)	Yes (Published in Avoscene)		Completed 2014 by Market Access solutionz and P&FR
Polyphagous shot hole borer (PSHB) **Kuroshio shot hole borer** (*Euwallacea sp*)	Yes (Published in Avoscene)	Drafted (2014)	Completed 2014 by Market Access solutionz and P&FR
Fruit flies (*Anastrepha* spp, *Bactrocera* spp, *Ceratitis* spp, *Rhagoletis* spp)		Fruit Fly Operational Agreement developed	
Avocado seed moth (*Stenoma catenifer*)			
Avocado seed weevil(s) (*Conotrachelus aguacatae, Conotrachelus perseae Copturomimus hustachei, Copturomimus perseae, Heilipus lauri*)			

Biosecurity research priorities

The avocado biosecurity group will use the High Priority Pests list and other potential threat lists to develop focus areas for future biosecurity research. Below are some initial ideas yet to be developed into research projects.

1. *Understanding the risk of Brown Marmorated Stink Bug (BMSB) to avocados.*
   Research needs to be completed to understand whether or not avocado 'fruit' are attractive when in an un-ripened state, which fruit maturity ranges are going to be suitable for BMSB feeding, whether or not internal damage results from feeding and how many feeding BSMB for what period of time results in internal damage.
2. *Understanding the climatic limits of Australia's avocado pests not currently present in NZ.*
   Modelling work is needed to understand how different avocado growing regions of NZ may support Australian pathogens like Brown root rot (Phellinus noxius) and insects such as tea shot-hole borer *(Euwallacea fornicatus)* and Australia's warmer climate avocado pests i.e. fruit spotting bugs**.**
3. Work alongside Australian researchers, PHA and DPI's to identify threats to avocados in Australasia and build collaborative surveillance/response strategies.
4. Understand avocado host status to various and evolving strains of Xyella.
5. Understand the threat Spotted lanternfly may pose to avocados.

Awareness

Industry awareness activities raise the profile of biosecurity and exotic pest threats to growers and stakeholders right through the value chain. Any activity to promote early reporting of suspect pests increases the chance of early detection and successful containment.
NZ Avocado includes an exotic pest alert fact sheet within every Avoscene focused on priority pests to the industry. Awareness of the exotic pest hotline is also displayed through industry communications.

Spotted anything unusual banner used in all Avoscenes

Urban, Peri-urban and lifestyle landowners

Like many fruit crops, avocado trees also grown in back yards throughout urban areas. These metropolitan areas have been identified as high risk areas for biosecurity incursions as they are highly populated centres for tourism and/or trade. Likewise, many peri-urban and rural lifestyle landowners have also been identified as a potential biosecurity risk group as many have little knowledge of primary production issues and are not linked into industry networks or existing awareness campaigns.

There is no simple or single way of communicating with such a diverse, highly mobile, group from both English and non-English speaking backgrounds. Working towards providing the public with a very basic understanding of biosecurity is the first step in increasing the rate of suspect pest reporting in an attempt to detect incursions early before pest populations increase and are able to spread to areas of commercial production.

Further information/relevant web sites

A range of government and grower organisation details and websites are provided below for further information on avocado industry biosecurity.

Organisation	Website
Ministry for Primary Industries	**www.mpi.govt.nz**
Plant & Food Research	**www.plantandfood.co.nz**
Plant Health Australia / farm biosecurity	**www.planthealthaustralia.com.au** **www.farmbiosecurity.com.au**
GIA Secretariat	**www.gia.org.nz**
Avocados Australia Limited	**industry.avocado.org.au**

GIA risk management activities

Pests or biosecurity activities agreed through GIA Operational Agreements

Pest	Operational Agreement title	Activity	Start/End date	Link to resources or OA
Fruit Fly	*Fruit Fly Operational Agreement*	*Agreement between GIA signatories for Readiness and Response activities for Fruit Flies of economic importance including a National Surveillance strategy and draft response guidelines*	*Jan 2016 – Dec 2021*	***Fruit fly OA summary***
Brown Marmorated Stink Bug	*Brown Marmorated Stink Bug Operational Agreement*	*A multi-sector agreement for the readiness and response activities for BMSB.*	*Juy 2017 →*	***BMSB OA summary***

Pest	Operational Agreement title	Activity	Start/End date	Link to resources or OA
Xylella fastidiosa	*Cross industry Readiness plan*	*Xylella Action Group developing Readiness Manual and response operational Specifications*	*2019 →*	
Pathway plan (multi-pest)	*Plant Production Biosecurity Scheme (PPBS)*	*Cross sectoral pathway plan to implement a baseline of biosecurity practices through NZ's plant producers/nurseries*	*2021 →*	

Supply chain risk management

A biosecurity response may involve new or even mandatory requirements for growers, post-harvest facilities, freight forwarders, transport operators and exporters in order to meet national pest management orders as well as international phytosanitary obligations for trade. MPI Approved Organisations (MAOs) will need to prepare and implement procedures to manage risk pathways.

Current industry assurance programmes:

- Post-harvest water-blasting requirements for the risk mitigation of Light Brown Apple Moth (LBAM) to USA.
- Contingency Official Assurance Programme (cOAP) relating to the export protocols that will need to be implemented through the post-harvest sector in the event of a fruit fly incursion.
- China market access Official Assurance Program (OAP) requiring pest monitoring and pest management both on-orchard and post-harvest.

Field Harvest bins

Post-harvest facilities use the same harvest bins for both avocado and kiwifruit. Most facilities have an internal procedure where all bins regardless of use are manually inspected and pressure washed before being returned to the field. During the Kiwifruit season, the National Psa-V Pest Management Plan requires regional segregation and sanitising of all bins used between kiwifruit orchards. In the event of an incursion where bin movement could be a risk factor the avocado industry would look to implement these increased hygiene measures for all avocado bins.

Orchard Equipment / hydroladders

Sharing of equipment and machinery between orchards presents a risk when a soil borne, fungal or bacterial pest is known to be present tin a region. During a formal response controls will be established both voluntary and those imposed as part of a controlled area established to limit the spread of a pest to neighbouring properties/regions.

RESPONSE MANAGEMENT

National response process (under GIA)

An aim of the Government Industry Agreement for Biosecurity (GIA) is to ensure there are consistent and agreed management and funding arrangements in place in advance of a pest incursion.
The **GIA Response Guide** developed by the Response Guide Joint Working Group is intended to be a reference document for strategic decision-makers in biosecurity responses. It clearly sets out the things that members of the response governance group need to know in order to operate effectively during a response and to meet their organisation's Deed commitments. The Response Guide is a living document. It will be updated as industry and government gain experience in working together in biosecurity responses and as the National Biosecurity Response System evolves
MPI's National Biosecurity Response System (NBRS) sets out a consistent approach to manage responses and is based on the New Zealand Coordinated Incident Management System (**CIMS**) which ensures there is consistent management of multi-agency emergency responses.
The guiding principles for GIA responses are available on the GIA website **www.gia.org.nz**

Notification and response process

The ministry for Primary Industries (MPI) is responsible for all activities, decisions and costs during the Investigation phase of a response. MPI will investigate suspected reports, manage any immediate risks, and make a recommendation on whether a response should be initiated. The Investigation phase requires a call to be made through the Exotic Pest and Disease Hotline **0800 80 99 66.**
All NZ Avocado staff have been made aware of this notification process to ensure they can guide industry members through the correct procedure when reporting

Governance

This is the group that provides governance and oversight of the response. The response governance group is made of MPI and any GIA signatory identified as directly affected by an unwanted organism. Their responsibility is to provide strategic guidance, set response outcomes, agree the budget/funding arrangements, approve the response plan and support the response manager. The response governance group needs people who can make informed decisions so membership may extend to individuals who have an advisory role with no decision-making responsibilities.
Key points:

- MPI will fill the role of the response governance group Chair
- Decision making is by consensus or as agreed through specific OA provisions.
- Response strategic decisions start and stop with the response governance group.
- There will be one decision-maker per potentially impacted GIA signatory on the response governance group
- Response governance group membership numbers will not be capped.

- Members are responsible for providing information and feedback to and from the response governance group to their organisation and its members.
- Cost-shares and fiscal caps for a biosecurity response will be pre-agreed and documented in an Operational Agreement. Where cost-shares and fiscal caps have not been pre-agreed, they will be negotiated in a separate process outside of the response.
- At its first meeting, the response governance group will agree any interim measures and MPI will present cost estimates for these.

Avocado representation on the response governance group

The avocado industry will be represented on the response governance group by the NZAGA CEO. Support will also be provided by relevant NZAGA technical staff. However, it is recognised that key decisions relating response funding, grower compensation and fiscal caps may need to be referred to the NZAGA Executive.

Before attending a response governance group meeting NZ avocado representatives will have to:

- Read and understood the response governance group **Terms of Reference**
- Sign a confidentiality agreement

Response plan

Developed by the response management team during a response, the response plan is an evolving document that sets out the plan for implementing response governance group decisions and guides all subsequent activities. The response plan reflects any pre-agreed strategies or contingency plans that have been documented in an operational agreement, and will include response review and exit triggers.

Any Response Plan developed must follow the procedures set out in MPI's National Biosecurity Response System (**NBRS**) and be endorsed by the response governance group prior to implementation.

Related documents

- **The Biosecurity Act 1993 www.legislation.govt.nz/act/public/1993/0095/latest/DLM314623.html**
- **The GIA Deed www.gia.org.nz/Portals/79/Content/Documents/Key finals/Deed-Final-2013.pdf**

Industry specific response procedures

Industry communication

In the event of a pest incursion affecting the avocado industry, NZ Avocado will be the key industry contact point and will have responsibility for relevant industry communication and media relations.

Table 1. *Contact details for NZAGA Limited*

Website	**www.nzavocado.co.nz**

Street address	Level 5 Harrington House Harington Street PO Box 13267 Tauranga
Telephone	07 571 6147
Fax	07 571 6145
Email	**info@nzavocado.co.nz**
Contacts	Jen Scoular, CEO

Industry stakeholders

The avocado industry value chain extends from growers, through the postharvest sector, service providers to exporters. Records are held for the following groups:

- All commercial growers who have been assigned a PPIN
- Database of all AvoGreen® operators and monitors (may include both growers and third party operators and monitors)
- NZAIL registered exporters
- NZAIL registered Pack houses
- NZAIL registered spray contractors
- NZAIL registered harvest contractors
- NZAIL registered nurseries

NZ Avocado internal response management procedure

The Ministry for Primary Industries (MPI) is responsible for all activities, decisions and costs during the ***Investigation phase*** of a response. Therefore, notification of both a suspect or verified pest detection should ideally come to NZ Avocado from MPI. If another member of the industry contacts the industry with a suspected biosecurity incident they should leave their full contact details and be supported through the process of notifying MPI's **Exotic Pest and Disease Hotline 0800 80 99 66**. MPI will investigate the report, notify potential affected industry groups, manage any immediate risks, and make a recommendation on whether a response should be initiated.

Unverified risk – *early phases of an investigation*
At the early stages of a suspect or undiagnosed biosecurity issue, the CEO will make a determination of notifying the Chair, ARC or Board based on potential risk, possible industry/media attention and confidentiality requirements.

Note: All internal communications and any notifications to stakeholders, whether by phone or email, should include a statement on confidentiality (e.g. *this message contains confidential information and is intended only for the individual named. Please do not share this information unless otherwise instructed*).

	Actions/Notification process	Responsibility	Details to include
1	**Notify NZAIL/NZAGA Chair** - By phone (021 458 782) - and email **linda@kauripak.co.nz**	CEO	- Provide summary of information received to date - Include any relevant GIA Operational Agreement, pest contingency plan and/or fact sheet - Confirm preferred notification process to other NZAIL directors
			-
	Notify all NZ Avocado staff - By email	CEO	- Provide summary of information received to date - Confirm that the CEO is the official industry spokesperson and that the CEO and biosecurity manager are the first point of contact for any emails/phone calls related to the event
	Notify NZAIL/NZAGA board - By email 'NZAIL Directors' outlook group	CEO	- Provide summary of information received to date - Include any relevant GIA Operational Agreement, pest contingency plan and/or fact sheet
2	**Inform MPI who will be involved in the response governance group**	CEO	- CEO (NZAIL chair & biosecurity manager as observer) can be on the response governance group - CEO, biosecurity manager and relevant NZAGA staff may also be industry advisors to the Response Governance - Set response governance group meeting date and inform NZAGA staff of any required travel arrangements
3	**Make contact with any other potentially affected industry groups or stakeholders**	CEO or delegated rep	- Confirm a point of contact within each sector to share information
4	**Notify exporter and packer representatives** - By Email Chair of AVEC: Neil McLoughlin **neil.mcloughlin@xtra.co.nz** Chair of NZAPF: Tom Clark **tom@fnpack.co.nz**	CEO or delegated rep	- Arrange teleconference to provide update - If incident is related to a commercial production property, confirm strategy to communicate with relevant packer and grower. - Discuss potential trade implications or regional movement controls - Depending on the nature of the organism voluntary fruit and equipment quarantine measures by be required until formal controls are established.
5	**Identify and contact any technical expert(s)**	Biosecurity Manager	- If it is an industry Priority Pest the expert(s) will be listed in the avocado industry biosecurity plan (otherwise Plant & Food Research is the primary contact **philippa.stevens@plantandfood.co.nz** 09 925 7233 or 0212268233). - The relevant expert maybe asked to attend the response governance group meeting
6	**Arrange meeting or teleconference with NZAIL board**	CEO	- Discuss potential funding arrangements and delegated authority in relation to the upcoming response governance group meeting
7	**Attend response governance group meeting**	CEO (AGA Chair, Biosecurity Manager)	- A communications plan (with media talking points) will be drafted at this first meeting

8	**Develop industry communications**	NZAIL Communications Manager	- Develop NZ avocado communication strategy based on approved media talking points - MPI will be requesting grower and industry information from the NZAIL databases for trace back/forward work (Consider confidentially requirements)
9	**Arrange a site visit to affected property**	Relevant NZAGA staff	- Where relevant, arrange to visit property in coordination with the MPI response team - Follow site biosecurity/hygiene measures (listed below) - Where possible, visit/contact neighbouring avocado properties

On-orchard hygiene requirements

During initial site visits, when pest containment will be seen as a priority by both industry and the Media, NZ Avocado staff should set the example and ensure strict hygiene practices are followed.

The NZ Avocado biosecurity kit is located in the Harrington house underground car park tech store room

Upon arrival to the affected property

- **Contact the owner/manager** before arriving to make your presence known and to discuss their own biosecurity requirements
- **Do not drive the vehicle onto the production area** (this would result in extensive cleaning/decontamination requirements) - keep to sealed driveways or park outside
- **Comply with any MPI biosecurity requirements while on site**
- **Sign the visitor register** (create one at the entrance if one is not available)
- **Wear boot covers when entering production areas** (unless a foot bath – with disinfectant – is available)
- **Do not remove plant material or equipment** as this can be an offence under the Biosecurity Act if the property in under a *Restricted Place Notice* so check with MPI investigation staff before taking samples
- Coveralls maybe a requirement depending on the type of organism and extent of infection
- Gloves on arrival or hand sanitiser on exit should be used

On exit

- **Use hand sanitiser**
- **Dispose of used gloves, booties and other disposable items on site** (do not take potentially contaminated items with you)
- **Ensure you are not carrying risk material** (leaves/soil) on your person or footwear

Post-establishment spread scenarios & mitigation

The list of risk items that could harbour and transport avocado pests is diverse. Long distance pest (especially pathogen) movements are often associated with plant material including nursery stock, pruning's and fruit. However, any item whether organic or inanimate moved between an infected or infested property has the potential to transport a pest to a new location.

Between July and March fruit bins and fruit are trucked between orchard to packhouse and once containerised move to either Auckland or Tauranga ports for export.

Industry specific movements of plant material, equipment or other risk items include:

- Uncovered fruit/truck and bin movements between orchard and packhouse
- Footwear and vehicles from multiple properties converging at field day events
- Nursery stock movement between properties
- Movement of hitchhiker pests onto or off a property by harvest contractors, Avogreen monitors, consultants, researchers, service providers, utility companies.
- Contaminated harvesting, spraying and pruning equipment (i.e. shared hydroladders)

There are limited records of any wild avocado trees however in years of low production there will be instances of neglected commercial planting that due to the lack of regular pest monitoring could pose a risk of exacerbating pest establishment/spread within a region.

Trade and industry Impacts

Trade impacts will depend on the species of pest and the nature and scale of the incursion. Estimating the total cost of pest incursions or establishment is difficult as an accurate assessment requires impact evaluations at individual species level. Specific impacts will therefore be detailed in pest-specific contingency plans. In most cases the economic costs of an incursion will have a number of components:

- **Defensive expenditure**: the financial cost of resources devoted to restricting pest populations (examples include surveillance, research and pest control/spray programmes)
- **Output losses**: the economic output lost each year as a result of the existing level of infestation (Examples include the limited production of product due to direct fruit damage or through the destruction of trees).
- **Barriers to operations:** The consequential losses by not being able to move fruit or vital equipment within regions of NZ for harvesting, packing and exporting due to official movement restrictions.
- **Trade losses**: Official restrictions on international trade or the costs of meeting new quarantine treatment programmes for exported fruit. This may extend to meeting on-orchard and post-harvest Official Assurance Programmes (OAP's)