New Zealand Avocado

NZ Avocado Growers' Association Inc.
NZ Avocado Industry Ltd

Quality Manual

2023-24

New Zealand Avocado Industry Limited

Quality Manual

Effective 1 July 2023 – 30 June 2024

New Zealand Avocado Industry Limited
PO Box 13267
Tauranga 3141

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Part 5: Packer Responsibilities

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Part 7: Packaging

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Part 9: Food Safety

Part 10: New Zealand Market Guidelines

Document Control

Record of Amendments Version 13.0 July 1, 2023

The Avocado Quality Manual has been updated for the beginning of the 2021-2022 season. Please take the time to familiarise yourself with the changes. While it is useful to be familiar with the whole document, the parts that are most relevant to a particular industry group are indicated at the top of the table below. The major changes to sections are also indicated in the table below:

Industry Group	Supporting Parts	Relevant Parts
Growers	Cover Page, Contents	Parts 1, 2, 3, 8 and 9
Contract Harvesters		Parts 1, 4 and 9
Packers		Parts 1 – 9 (whole document)
Exporters		Parts 1, 3 and 9

CHANGES

Section	Page	Type	Rationale	Reason For Change
PART 1 - INTRODUCTION				
7.3	1-8	Additional information		Additional supporting information describing the Exemption process
PART 2 - GROWER RESPONSIBILITIES				
PART 3 - AGRICHEMICALS				
3.0	P3-7 – P3-22	Updated and re-formated	Agrichemical Product details	Added LC and GC rather than have √ in column Added dates under product of when registration obtained for calculating when product registration expires.
4.0	**3-23**	Insert new table	Additional information	Plant Growth regulator information
7.0	3-29	Additional reference inserted	clarification	as defined in Section 2.1 of this document page 3-5.
PART 4 – CONTRACT HARVESTERS RESPONSIBILITIES				
PART 5 – PACKER RESPONSIBILITIES				
1.2.9	5-6	Updated	Clarification	**Where applicable,** ensure that at least one packhouse …
2.4	5-9	Additional reference		**Please see Section 10.12 for Coolstore ethylene control**
3-3	5-12	Updated		Food Safety Declarations as per Appendix 3 are no longer used so removed
6.1.1	5-28	Additional market added		Australia OAP requirements

Section	Page	Type	Rationale	Reason For Change
6.6	5-32	Updated		Appendix Numbers updated
7.1	5-32	Updated		ORANGE labels for processing and Food Service Fruit
7.6	5-54	Class 4		Class 4 replaces the word processing Grade
8.5.3	5-57	Clarification		Samples should be taken from a range of count sizes **and be representative of all of the export Classes being packed across the Grower** line.
8.10	5-58	Updated	Action 5	**After the issue of a non-compliance and following corrective action, record all actions taken.**
8.11.1	5-59	Clarification		To assist Growers to identify fruit quality problems and to assess the effectiveness of grading staff, at least one reject fruit analysis will be completed for each Grower line. **Sample fruit for reject analysis should be sampled immediately after Class 1 grading.**
811.1	5-59	Guidance		**Guidance** **Reject analysis should be completed on fruit immediately post Class 1 grading and include all Classes of fruit below Class 1 – see following diagram.**
8 13	5-62	Guidance		**Guidance** **Both individual fruit weights and individual tray weights are required to be monitored for the USA as there is Californian State Law that governs the weight of fruit in that state that results in legal compliance to state law.** **Only individual weights of fruit are required to monitored for all other markets where weight is not set in law**
9.1.2	5-67	Update count size for bulk packs		**28 to 42**
9.3.3 and 9.5.4	5-68 5-71	Updated for clarity		Update wording for individual cartons for Thailand
PART 6 – EXPORTER RESPONSIBILITES				
3.3.2, 3,3,3	6-5, 6-6	Update		ORANGE label for Non Class 1 fruit
4.2	6-7	Update		Residue reporting
4.3.5	6-7	Updated		Notification Mock Recall
7.4.3, 7.4.4, 7.4.5, 7.4.9	6-13, 6-14	Updated		
PART 7 - PACKAGING				
4.5	7-12	Updated		Addition of MacroWrap

Section	Page	Type	Rationale	Reason For Change
PART 8 – EXPORT MATURITY STANDARDS				
1.0.6	8-2	Addition	Recording of Custom and Practice	**NZ Avocado will cover the collection and testing cost of all export maturity clearance samples that pass the export clearance criteria. The cost of samples that fail will be recouped by NZ Avocado by way of invoice back to the Grower via the packhouse.**
2.0		Addition	Clarity	○ Average dry matter exceeds 23.8% DM (provided 18 out of 20 fruit meet or exceed 20.8% DM) **OR** ○ 17 out 20 meet or exceed 20.8% DM (provided average dry matter exceeds 24%DM)
PART 9 – FOOD SAFETY				
PART 10 – NEW ZEALAND MARKET GUIDELINES				
3.0	10-2	Addition	Recording custom and proctice	**NZ Avocado will cover the collection and testing cost of all export maturity clearance samples that pass the export clearance criteria. The cost of samples that fail will be recouped by NZ Avocado by way of invoice back to the Grower via the packhouse.**
4.0	10-3	Updated	Clarity	Dry matter **meets or exceeds** used
10.0	10.9	Update	Reference to Class not processing	Updated table of all Classes

PART 1

INTRODUCTION AND ADMINISTRATION

Table of Contents

1.0 DEFINITIONS

AGA	NZ Avocado Growers' Association Incorporated
Approved Handler certificate	HSNO requirement for handling, buying and storing some chemicals
AVEC	Avocado Exporter Council
AvoGreen®	System for pest monitoring and targeted spray application
China	Peoples Republic of China
Culled fruit	Fruit that is removed from the market or the inventory and has no commercial value
Contractor	A person engaged by any person (other than as an employee) to do any work for risk, gain or reward.
Contract Harvester	A person engaged by any person (other than as an employee) to harvest fruit for risk, gain or reward.
DCA	Dynamic controlled atmosphere
Distressed fruit	Fruit that has been dropped from a market or market segment for any reason or is in a poor state
EMS	Export Marketing Strategy
Exporter	Any person/entity exporting fresh avocado from New Zealand under a license issued by HEA
FSA	Food Safety Authority
GC-MS / LC-MS	Liquid chromatography (LC), the flowing or mobile phase is a liquid, whereas in gas chromatography (GC) is a gas. Detection of the separated components in both GC and LC can be made by various means, one of the most sensitive being a mass spectrometer.
Grower	A person whose business is, or includes, the growing of avocados in New Zealand, for sale in New Zealand or export, and is a member of NZAGA.
Growsafe® certificate	Application of pesticides certificate
HEA	New Zealand Horticulture Export Authority
HEA Act	Horticulture Export Authority Act 1987
HSNO Act	Hazardous Substances and New Organisms Act 1996
IATPA	Independently accredited third party auditor
ICPR	Importing Country Phytosanitary Requirements
ITO	Independent Testing Organisation
IVA	Independent Verification Agency
LC-MS / GC-MS	Liquid chromatography (LC), the flowing or mobile phase is a liquid, whereas in gas chromatography (GC) is a gas. Detection of the separated components in both GC and LC can be made by various means, one of the most sensitive being a mass spectrometer.
MAFBNZ	Ministry of Agriculture and Forestry Biosecurity New Zealand
ML	Maximum Limits (Heavy Metals)
MPI	Ministry for Primary Industries

MRL	Maximum Residue Level (Agrichemicals)
MSDS	Material Safety Data Sheets
NZ Avocado	New Zealand Avocado Industry Limited
NZAGA	New Zealand Avocado Growers Association Inc.
OAP	Official Assurance Programme
Packer	A packhouse registered with NZ AVOCADO to pack avocados in New Zealand
PHI	Pre-harvest Interval (see also WHP)
PPIN	Persea Property Identification Number
QM	Avocado Quality Manual
RPG	Recognised Product Group
Spray Diary	NZ AVOCADO electronic spray diary
Tray equivalent (TE)	Fruit volume (kg) packed in a 5.5kg tray expressed as tray equivalent
TTMRA	Trans-Tasman Mutual Recognition Act
Variety	Subspecies or cultivar (e.g. Hass, Reed, Lamb Hass)
WHP	Withholding Period (see also PHI)

2.0 SCOPE

The requirements outlined in this manual apply to fruit of all avocado cultivars that are exported from New Zealand.

Any cultivar specific requirements will be clearly highlighted by variety.

3.0 EXPORT MARKETING STRATEGY

New Zealand Avocado Industry Limited (NZ Avocado) is a recognised product group under section 24 of the New Zealand Horticulture Export Authority Act. As such it prepares an Export Marketing Strategy (EMS) that, amongst other things, defines requirements for export.

The EMS states

"Failure to comply with requirements of this EMS jeopardises an Exporter's ongoing ability to export avocados. Such failure could be prejudicial to the EMS and could result in action taken under sections 38 and 39 of the HEA Act."

It is the Growers, Harvesters, Packers and Exporters who are registered, who have responsibilities under the EMS when involved in the export of avocados. Hence this quality manual is partitioned according to the areas of responsibility of each of these groups. The manual is also prepared so 'EMS requirements' and 'Best Practice' recommendations are clearly identified and distinguished.

NZ Avocado vigorously promotes the building of quality throughout the production chain by the active and willing participation of all involved. The emphasis in this quality manual is on best practice guidelines and support of NZ Avocado's educational role.

Concentration is on those things that must be done consistently well by all participants if the whole industry is to prosper.

This quality manual is focused on industry quality management.

Phytosanitary compliance under MPI Export Certification Standard is the responsibility of individual growers, packers and exporters.

4.0 ANNUAL REGISTRATION OF GROWERS, PACKERS AND EXPORTERS

Growers, Packers and Exporters must complete and submit the annual registration application to NZ AVOCADO. This process is completed by the payment of fees as articulated annually in the EMS.

Confirmation of a completed annual registration is provided by NZ Avocado

In return, NZ Avocado provides the following services on behalf of all financially registered participants as follows:

4.1 Maintenance of an Annual Register of Growers, Packers and Exporters

- This information is available for Exporters to check and verify the registration of their Grower and Packer suppliers. Under the EMS, Exporters may only export the fruit of registered avocado Growers and Packers.
- Details of financial registered Exporters will be forwarded to HEA, for presentation to Customs.
- **Details of growers registered for export will be available to MPI, as per export market requirements.**

4.2 Setting and Monitoring Industry Standards

NZ Avocado will set and monitor industry standards as follows:

- Grade
- Maturity
- Food Safety
- Spray residue compliance
- Phytosanitary requirements including waterblaster commissioning for market access
- Packaging
- Maturity clearance
- Best Practice guidelines and education.
- Quality

4.3 Avoconnect

AvoConnect is NZ Avocado's e-bulletin circulated at regular intervals during the export season. This provides an update of industry information and quality management issues as the season develops.

4.4 Annual Crop Estimate

NZ Avocado will co-ordinate and report an annual crop estimate.

5.0 OBJECTIVES OF QUALITY AND FOOD SAFETY PROGRAMMES

Part of the 'Mission' of the Industry is achieved through the implementation and management of a number of quality and food safety programmes, each having a specific objective. These are:

5.1 Education

This brings to all participants the reasons why 'best practice' recommendations are made, and also training in the skills needed to achieve 'best practice.' These are achieved through face to face meetings in regions (pre-season and during the season) as well as updates through the AvoConnect during each season.

5.2 Quality Manual

This provides an accurate reference of EMS requirements and industry best practice recommendations. It is updated when required and may also be considered an educational tool.

5.3 Industry Quality Auditing

This provides a measure of the degree to which participants are achieving requirements under the EMS and 'best practice' recommendations. Each Packer will receive 3-5 audits by NZ Avocado in each season.

5.4 Product Monitoring

This examines selected 'best practice' functions and identifies/measures both:

- Successes.
- Areas where improvement is needed.

Note: The information that comes from industry auditing and monitoring will be used to assist in better achieving industry quality objectives.

6.0 INITIATIVES

Each EMS requirement or best practice recommendation of this quality manual should be viewed as general and/or the minimum. NZ Avocado encourages any initiatives of growers, packers, harvesters or exporters to establish any individual standards they choose, additional to (but not in conflict with) those described here.

7.0 EXEMPTIONS AND DISPENSATIONS

7.1 Background

All exemptions and dispensations will be administered under the NZAIL Exemptions and Dispensations Policy
This policy sets out the rules in for exemptions to the Export marketing strategy (EMS) and dispensations to the Quality Standards in the Quality Manual, and AvoGreen® Manual and terms and conditions of the Spray Diary.

7.2 Dispensation process

Dispensations are to be emailed to dispensations@nzavocado.co.nz

The type of dispensation request should be entered into the subject line of the dispensation request.

There are prepopulated selections for requesting a dispensation on the NZ Avocado website:

1. Dispensation for pick to pack
2. Dispensation for pick to load or pick to ship
3. Justified approvals for off label agrichemical use
4. Dispensation to pack outside export grade standards and weight bands
5. AvoGreen® dispensation
6. All other dispensation

Other dispensation can include, but are not exclusively limited to, the following:

- Dispensation for AvoGreen compliance
- Pick to cool
- Storage prior to packing
- Fruit age
- Loadout temperatures
- Waterblaster use
- Spray diary clearance
- Package labelling
- Fruit labelling
- Ethylene monitoring
- Sanitiser use
- Packaging

All dispensation must include where applicable:

- PPIN (S)
- No of bins
- Pick Date
- Pack Date
- Storage conditions
- Reason for Dispensation
- Has the affected grower(s) been notified?
- Supporting information
- Name of exporter and has the exporter been notified

For Justified Approvals for off label agrichemical use:

- PPINS
- Name
- Blocks applying the product
- What is the target pest?
- What is the product you want to use and at what rate?
- What is the reason for use of this product off-label?
- When do you want to apply this product?
- Please also attach associated supporting AvoGreen monitoring results and/or photos
- Name of exporter and has the exporter been notified

7.3 Exemption process

The following Quality Manual exemptions require a dispensation to be considered by the RPG

- Exporting outside of standard grades
- Exporting outside of weight bands
- Packaging and labeling

Process for applying for an exemption to the above is as follows:

An application is made detailing the following:

- **Describe the detail of the nature (name) of the exemption.**
- **Describe in detail the rationale for the exemption**

The request for dispensation to operate outside the Grade Standards all now go to the RPG. The following process has been designed to avoid delays:
The ISM oversee the process by being the single point of triage of all applications and manage the timelines and communication to and from the submitter and the QSCG and RPG to help keep things on track.

That all decisions about Grade Standard be automatically submitted to the QSCG for consideration and recommendation the recommendation from the QSCG be submitted with the request to the RPG.
A reasonable timeline developed and agreed upon for the process so that the submitter understands the timelines and any constraints in the process and the QSCG and the RPG are aware of the timeframes working to.

8.0 AUDIT NON-COMPLIANCE REPORTING

Auditor report monthly in form of dashboard to NZA. Available for reporting to Board meetings.

Annual collation of list sent to all packhouses by March 30 each year listing all non-compliances identified across the season. In addition, this list is to be reported at the pre-season meetings each year.

PART 2

GROWER RESPONSIBILITIES

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GROWER RESPONSIBILITIES SUMMARY

Grower responsibilities include:

- **Annual Export Registration with NZ Avocado** and retaining a copy of the registration for verification.
- Meet the Importing Country Phytosanitary Requirements (ICPR) of market countries (Thailand)
- **AvoGreen®** compliance including pest monitoring and management on orchard
- **Crop Protection** including timely spray diary entries, spray diary declaration of phytosanitary treatments
- **Maturity** testing to ensure fruit harvested meets minimum requirements
- **Phytosanitary** treatment compliance including the requirements as detailed in the OAP for market access to China
- **Food Safety** compliance including growing and harvesting
- **Contract Harvester** food safety compliance
- **Audits** including co-operation with the auditor and actions in the event of non-compliance

In all of these industry-defined responsibilities, the grower is encouraged to maintain a professional interface with:

- Phytosanitary requirements applicable to our export markets
- Packer and exporter requirements

GROWER RESPONSIBILITIES

Described here are the principal areas of grower responsibility, in respect of export fruit, that can affect the wellbeing of the total industry.

1.0 REGISTRATION FOR EXPORT OF FRUIT

EMS Requirement

1.1 Growers are required to complete an annual on-line export registration via the industry Avo hub by clicking the "Register Now" button and complete the payment of fees as outlined below. Current registration fees can be viewed on the NZ Avocado website under FEES.

https://industry.nzavocado.co.nz/about-us/fees/

1.2 Growers are required to be AvoGreen® compliant in order to register for export.

1.3 Growers are responsible for arranging the harvesting and delivery of fruit for export through registered packers and exporters only. A list of those packers and exporters currently registered are located on the industry website www.nzavocado.co.nz under the Export tab.

Note: Registered packers must only pack fruit from registered growers and registered exporters must only purchase fruit from registered growers. Registered growers must provide export quality fruit that complies with NZ Avocado requirements outlined in this quality manual.

2.0 ANNUAL REGISTRATION TO EXPORT UNDER AN ICPR AND OAP

EMS Requirement

All growers whose fruit is being packed under the Thailand ICPR or the China OAP are to be registered annually with MPI. Growers' PPINs that are registered will be listed on the MPI website. This indicates they are compliant for packing fruit for these markets.

2.1 An agreement and declaration form must be completed and signed by 31 October each year. This is to coincide with the beginning of the production season. The access to the online market declarations are found under the tab "Market Declarations" in Avo hub (see Section 12 Appendix 1).

2.2 These Grower declarations must be completed by the 31 October or at the point of 'change of ownership" in the online format in Avo hub annually.

2.3 The applicable season is to be notated on the online declaration.

2.4 The annual registration will cover fruit being picked and exported in the following season.

2.5 **The registration process must be completed as part of the Packer-Grower contract and to ensure continuity of Grower compliance, registration should occur every year regardless of crop load**.

2.6 A grower must maintain AvoGreen® compliance throughout the production season and keep on file all evidence of AvoGreen® monitoring results (including when no pests have been detected) for audit purposes.

2.7 Growers must notify the Packer and the Exporter immediately they withdraw or become non-compliant with the Grower conditions of the China OAP.

Change of Ownership of Property and Grower requirements

2.8 At the change of ownership of an orchard property, the new grower/property owner must complete a declaration and agreement form in their name and the new PPIN assigned to the orchard for all as detailed in 2.2 above.

2.9 The previous grower/property owner must make available the AvoGreen® monitoring records to the new property owner.

2.10 The new property owner must obtain the AvoGreen® monitoring records applicable to the production season they are seeking compliance for and keep on file for audit purposes. If a NZ Avocado, accredited AvoGreen® Operator holds these, the new owner should confirm the existence of such records with the Operator.

2.11 If there has been no AvoGreen® monitoring of the property or there are no AvoGreen® monitoring records available, the compliance for the applicable production season will be withdrawn, and the new grower/property owner will not be eligible **to export to China.** The eligibility for Thailand will be based on when the property changed hands and when AvoGreen® compliance was confirmed.

2.12 The Packer will be responsible for verifying compliance of the PPIN by referring to the MPI website prior to packing of fruit for export.

2.13 NZ Avocado will confirm any change in PPIN and compliance to MPI within five working days of being notified of the change.

3.0 FOOD SAFETY – GROWER REQUIREMENTS

The objective of any compliance to an accredited Food Safety Programme is to provide consumers of New Zealand avocados, both locally and internationally, with fruit that is free of significant health hazards and may have residues of only approved products at or below the allowable MRL.

Please refer to Part 9 of this Quality Manual for generic Food Safety requirements applicable to Growers, Contract Harvesters, Packers and Exporters.

Please refer to your Exporter for additional requirements customers and markets may have.

3.1 Registration under the Food Act

EMS Requirement

New Zealand Market Food Safety

3.1.1 Growers must register their business for compliance to the New Zealand Food Act 2014, with their local council or MPI. This is a requirement for those working with food products and supplying the New Zealand market.

3.1.2 Growers must develop a documented plan for their Food Safety Programme and have this verified by an independent third party such as the Local District Council or an IVA (i.e. AsureQuality and SGS).

3.1.3 Once verified, Growers-will be issued with a Food Act registration number.

Export Market Food Safety

3.1.4 Growers must register their business for compliance to the New Zealand Food Act 2014, with their local council or MPI. This is a requirement for those working with food products and supplying the export market.

3.1.5 Growers will need to have developed a documented plan for there Food Safety Programme and have this verified by an independent third party such as the local council or an IVA (i.e. AsureQuality, and SGS).

Growers can achieve verification in one of two ways:

- By individual Grower certification. This pathway gives the Grower flexibility to choose their exporter, harvest for more than one exporter, and/or have fruit packed across packhouses who pack for different Exporters. This pathway may also be applicable for a Grower growing multiple crops where a single Food Plan and audit can cover multiple crops. Templates for food safety documentation are provided by the individual schemes. OR
- By enrolling in an Exporter (Producer Group) GAP Scheme. This certification is not transferable outside the Producer Group, so this pathway is applicable to Growers who are packing and marketing their fruit under a single group scheme. This pathway will exclude Growers from being compliant for harvesting and packing fruit (such as late New Zealand market fruit) with a separate entity outside their Group scheme.

3.1.6 Growers must be able to provide evidence of accreditation to a Global Food Safety International Standards program for avocados, such as GlobalGAP, for export fruit to Packers and Exporters.

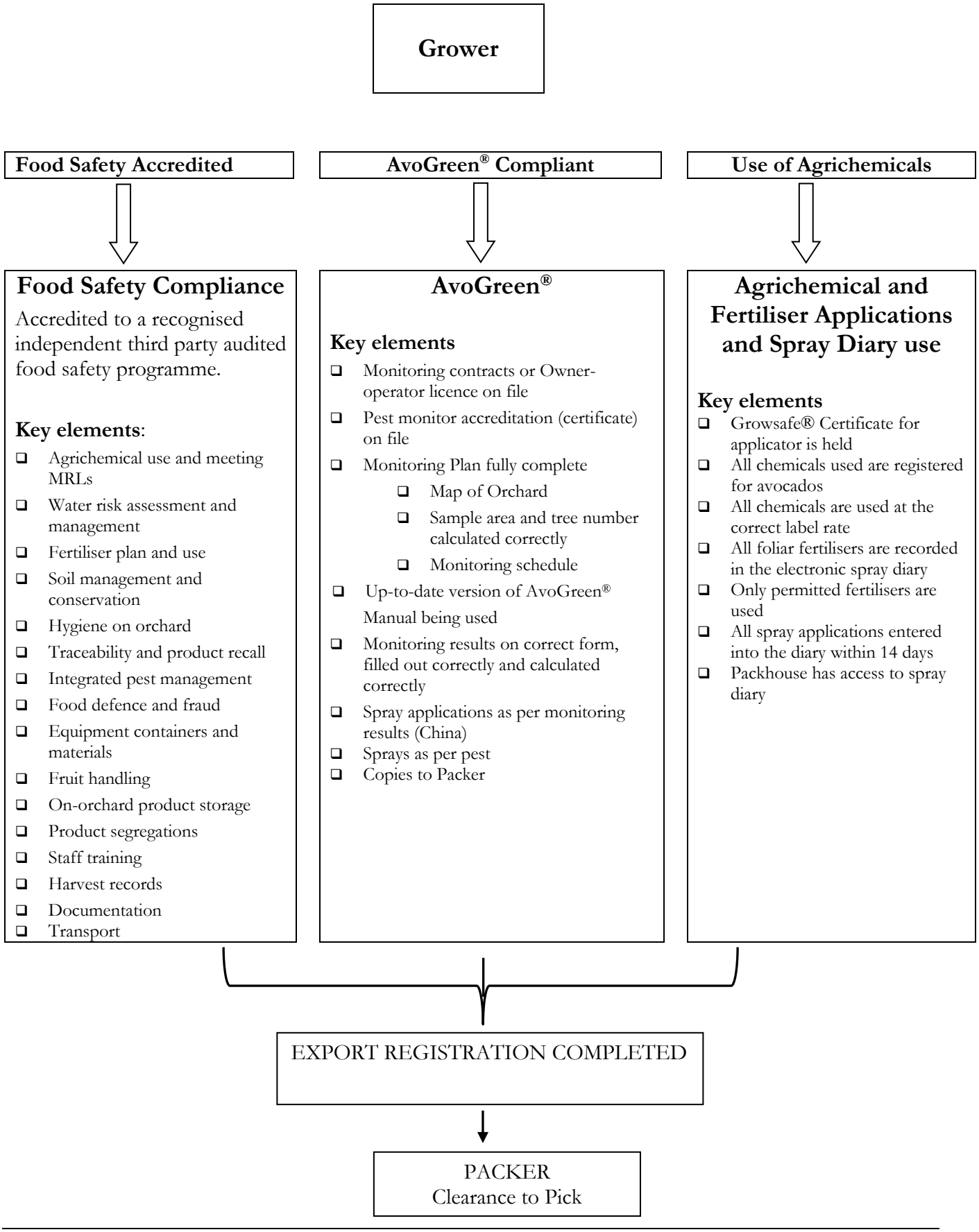
3.1.7 These programs have equivalence and are therefore recognised as meeting the requirements of the Food Act 2014. In addition, they cover the export requirements of importers and retailers.

3.2 Agrichemical and Foliar Fertiliser Use in Avocados

EMS Requirement

3.2.1 Growers must comply with all NZAvocado and the applicable Food Safety Standards requirements for the use and storage of Agrichemicals and the maintenance of applicable records. See Section 13, Appendix 2 for Agrichemical Storage Checklist

3.3 Flow Diagram of Grower Responsibilities for Export



4.0 FOOD SAFETY - HARVEST REQUIREMENTS

Each Harvester, whether the Grower, the Packer or an independent Contract Harvester picking avocados is responsible for ensuring that each consignment of product complies with the relevant requirements of an recognised food safety programme.

4.1 Compliance

EMS Requirement

4.1.1 The Grower who undertakes harvesting in their orchard is covered by their internationally recognised Food Safety Programme so long as it is included in the verification audit of their Food Safety Programme.

4.1.2 Growers using a Contract Harvester to harvest export fruit and/or to transport fruit (including New Zealand supply only) must obtain from the Contractor, a copy of evidence of their accreditation to an internationally recognised Food Safety Programme such as GlobalGAP or NZGAP for the crop they are working on or transporting.

4.1.3 The auditing and verification body (IVA) will issue this certificate to the Contract Harvester once the verification process is completed.

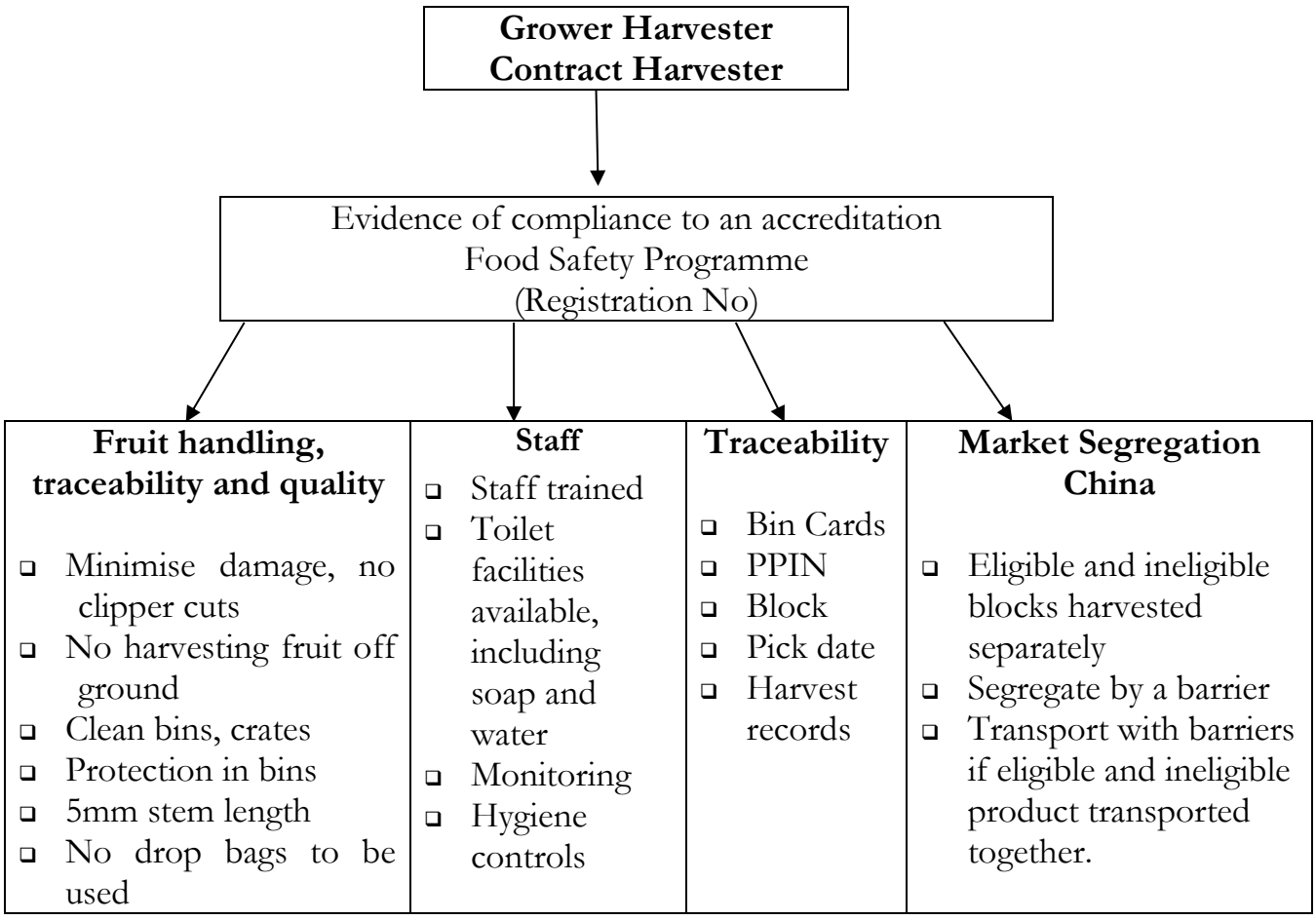
Note: Contract Harvesters working on any kiwifruit orchards that supply Zespri require a separate Compliance Assessment Verification (CAV). To get a CAV, kiwifruit contractors must be inspected annually by a Zespri-approved inspector and this audit and verification is not transferable to other crops

4.2 Traceability and Fruit Handling into Bins

EMS Requirement

4.2.1 All fruit must comply with the traceability and handling as detailed in Section 8 Harvest Responsibilities

4.3 Flow Diagram of Harvest Food Safety and Market Segregation Responsibilities



Note: Contract Harvesters working on any kiwifruit orchards that supply Zespri require a separate Compliance Assessment Verification (CAV). To get a CAV, kiwifruit contractors must be inspected annually by a Zespri-approved inspector and this audit and verification is not transferable to other crops

5.0 AVOGREEN® REQUIREMENTS

5.1 AvoGreen® Compliance – all markets

EMS Requirement

5.1.1 All export fruit must be AvoGreen® compliant as defined in the AvoGreen® Manual under the AvoGreen® Standard. This includes both organic and unsprayed crops.

5.1.2 A PPIN is deemed compliant when the following criteria are met:

- There is a monitoring agreement with an accredited AvoGreen® Operator which includes the agreement to all components of a **Monitoring Plan** (or Plans) and the monitoring all pests under the AvoGreen® programme as defined in the AvoGreen® manual **OR**
- There is a licenced AvoGreen® Owner Operator and an accredited AvoGreen® Pest Monitor monitoring the orchard
- All of the components of a **Monitoring Plan** (or Plans) are completed and reviewed annually and include an orchard map and monitoring frequency.
- **The Monitoring Plan** states that "all pests including the pests of concern to China will be monitored".
- Monitoring records are complete, maintained and available for audit.
- All sprays applied are justified by monitoring results.

5.1.3 Monitoring records', spray application records and spray diary maintenance are the responsibility of the Grower.

5.1.4 AvoGreen® compliance will be confirmed by NZ Avocado at the time of export registration.

5.2 AvoGreen® Compliance for China OAP - Grower

EMS Requirement

5.2.1 All the components of the **Monitoring Plan** are complete.

5.2.2 All Operator contracts, Owner–operator licences, Pest Monitor accreditation certificates and Growsafe certificates of sprayers are on file.

5.2.3 The latest copy of the AvoGreen® Manual is being referenced.

5.2.4 Growers have a copy of the China OAP and understand their responsibilities.

5.2.5 For compliance to the China OAP all monitoring records that indicate exceeding the industry thresholds must have response actions as defined in Part 9 of the AvoGreen® Manual.

5.2.6 The correct Agrichemical has been used against the pest.

5.3 Pre-harvest Quarantine Monitoring

EMS Requirement

5.3.1 Pre-harvest Quarantine Monitoring China

- A pre-harvest quarantine monitor is required within 28 days prior to harvest.

5.3.2 Pre-harvest Quarantine Monitor – unsprayed crops

- A pre-harvest quarantine monitoring is required within 28 days of harvest.

5.3.3 Unsprayed crop

If a Grower does not apply any sprays to their crop and this is supported by a spray diary declaration, the following shall apply:

To export fruit from an unsprayed crop the grower must be registered with a licensed AvoGreen® Operator or be a licensed AvoGreen® Owner operator to be compliant to the AvoGreen® programme. This is to support the requirement for a pre-harvest quarantine monitor in 3.3.2 above.

5.4 Non-Compliant Crop

In general, a non-compliant crop will not be eligible to be exported. Crops for which AvoGreen® compliance has lapsed may still be accepted for export **in extenuating circumstances** at the discretion of NZ Avocado and after a review of each case.

6.0 CROP PROTECTION AND SPRAY DIARY

6.1 Regulatory Requirements

Best Practice

Each property must prepare a spray plan to comply with Regional Council Resource Management plans. Growers will need to check with their local council, as agrichemical spray rules relating to the following can be different between regions as follows:

- Signage
- Notification,
- Sensitive areas and
- Managing spray drift

It is recommended there be appropriate boundary shelter on each property to minimise spray drift both within and beyond the boundaries of the property. This should take into account the identified sensitive areas (including environmental) within and beyond the property.

Information and templates to develop a spray plan template are available on the Growsafe website.

6.2 Registered Export Spray Chemicals

See also Part 3: Agrichemical Information for Avocados

EMS Requirement

6.2.1 NZ Avocado will provide annual up-to-date guidance regarding spray chemicals.

6.2.2 All products sprayed on avocados for export must be registered and have label claim for use on avocados.

6.2.3 Sprays are to be applied at no more than the recommended rates. ALWAYS refer to the product label for rate and use information.

6.2.4 All PHIs must be observed. If unsure check with your Packer or Exporter before applying any spray. Observance of the PHI does not guarantee non-detectable residues.

Note: Day zero equals the day of spray applications for the calculation of pre-harvest interval (PHI).

6.2.5 **Specific chemicals of concern are chlorpyrifos (Lorsban), taufluvalinate (Mavrik), and pirimiphos methyl (Attack) as detectable residues may be present even when the PHI has been observed. It is recommended that residue tests be carried out on any lines of fruit intended for export where any of these chemicals have been applied.**

Note: For Malaysia, Singapore, Korea and Thailand, the use of chlorpyrifos, taufluvalinate and pirimiphos methyl is not recommended. It is recommended that you contact your Exporter before using these products.

6.2.6 Off Label use of Agrichemicals

Growers may under extenuating circumstances (e.g. in times of unexpected pest outbreaks) apply in writing to NZ Avocado for **Justified Approval by way of a dispensation** to use a non-registered chemical appropriate to the situation. The procedure for applying for a dispensation is outlined in the **Part 1 Introduction, Section 8.0 of this Quality Manual, and EMS Section 4.6.16.**

Justified Approval for the dispensation is given at the discretion of NZ Avocado under the dispensation policy (see also Part 3 Agrichemical Information). In such circumstances a residue test is mandatory prior to harvest and a zero residue or nil detect result is required.

Best Practice

6.2.7 A fungicide such as copper or its equivalent should be applied at monthly intervals

6.3 Maximum residue Limits and Preharvest Intervals

Each country sets it MRLs (maximum residue limits) for agrichemicals and MLs (maximum limits) for heavy metals. Those limits vary from country to country. When exporting fruit, the first MRL that has to be met is that of New Zealand as a byproduct of export packing is fruit going to the New Zealand market.

Pre-harvest Intervals are established from data from residue decay curves and the continual monitoring through the industry residue testing programme to confirm PHIs are meeting the expected MRLs.

6.4 Markets where no MRLs have been set ("None Set" or "Not Listed")

EMS Requirement

6.4.1 Where a country has not set an MRL for a pesticide under the notation **"None set",** this means that no MRLs exist for the pesticide and that detectable residues should not be present. MRLs for these will be set to nil detect (0.01mg/kg). The PHI to achieve nil detect will apply or if no PHI has been set, then a residue test will apply.

6.4.2 Where a country has no MRL for a pesticide listed **"Not Listed"** this means that no MRL exists for the pesticide, but that the presence of residues should not be of concern. In such a case if there is a corresponding pre-harvest interval for New Zealand then that PHI should be applied.

6.4.3 Under mutual recognition under the Trans-Tasman Mutual Recognition Act (TTMRA), the New Zealand MRL and pre-harvest interval can be used for Australia against some products.

6.4.4 Codex MRL's are normally recognised by India, Korea, Malaysia, Singapore and Thailand in the absence of a specific national MRL. New Zealand has 'country recognition' in Indonesia and Vietnam and in the absence of specific national MRL's, the New Zealand MRL and pre-harvest interval can be used

6.5 Pre-harvest Intervals and MRLs for New Zealand and Export markets

EMS Requirement

6.5.1 **Pre-harvest interval for Export Markets**

Pre-harvest intervals for export markets are for guidance only and are based on the best available information, including residue decay curves. Observance of the PHIs for products with no maximum residue limit (MRL) set does not guarantee non-detectable residues.

6.5.2 **Pre-harvest interval "Not Set"**

For some products, it has not been possible to determine a PHI that will provide fruit with no detectable residues. Those products with no MRL and a PHI "not set" (e.g. carbaryl (Carbaryl), tebufenozide (Mimic)), applied after flowering may require a residue test for some markets. It is the Grower's responsibility to be aware of these requirements and to comply with any residue testing requirements of the Exporter and NZ Avocado to ensure that there are no detectable residues on the fruit.

Note: Independent auditors, on behalf of NZ Avocado, will draw random fruit samples from the packing line for laboratory analysis and these will support a system of verification and assurance.

6.5.3 Information on the list of chemicals registered for use in Avocados, the application rates and the PHI and MRL can be found **in Part 3 of this Quality Manual**. However it is the applicators responsibility to be familiar with and comply with the conditions of each product label.

6.6 Spray Residue

EMS Requirement

6.6.1 No avocados are to be exported with residues in excess of industry standards (Section 4.6.13 of the EMS). The procedures outlined in this Quality Manual are designed to verify this.

6.6.2 Where a residue is detected during random residue testing or via any post-harvest national or international testing programme that is from a chemical that is either; not recorded as applied, not approved for use on avocados or exceeds any exporting country MRL in the spray diary, NZ Avocado will investigate the findings and will then consider appropriate action.

6.6.3 Findings from the investigation may include imposing restrictions on the Grower's ability to export to specific markets for a specified and/or extended period of time.

A copy of the EMS is available on the industry website www.nzavocado.co.nz

6.7 Agrichemical use and regulatory requirements in Avocados

EMS Requirement

6.7.1 All persons, including Growers, applying sprays to each export registered PPIN without supervision must hold a minimum of a current Growsafe® Standard Certificate. Spray Contractors must hold a Growsafe RCA or for aerial application, Pilot Chemical Rating. Details of the holders certificate must be held in the industry spray diary and be verified by industry audit.

6.7.2 A Grower/Spray Contractor as the Growsafe certificate holder purchasing and/or applying sprays must have a copy of the product MSDS sheets on file and maintain an up to date inventory of agrichemicals purchased, and associated spray applications for audit.

6.7.3 Products that must be under the control of a Certified Handler (or locked away securely) are those with the classification 6.1A and 6.1B.

6.7.4 In accordance with Growsafe®:

- Storage and disposal of chemicals must meet the requirements of NZS8409:2021 or any other legislative requirements (see Growsafe storage checklist Section 13, Appendix 2)
- A grower must maintain an inventory of agrichemicals held on site and a record of the associated spray applications for audit

6.7.5 If a Grower is using a spray contractor to apply sprays, the Grower must ensure that a 'relationship' with the spray contractor has been set up in their electronic spray diary. This is to enable the link of the individual Growsafe accredited individual to each spray application and to enable a Spray Contractor access to the diary to make inputs on the Grower's behalf if required.

6.7.6 The Grower must keep all records of the sprays applied to the orchard, on file, as a reference to what has been entered into the spray diary by either the Grower or the Spray Contractor.

6.8 Fertiliser Use in Avocados

Best Practice

4.5.1 A management plan should be implemented for the use and application of fertiliser (e.g. consultant's recommendation). This should include soil, water, and leaf tests, as applicable from a testing laboratory on an annual basis.

4.5.2 Only fertilisers known to be safe for use on Avocado fruit should be applied. This includes any product currently commercially available in New Zealand.

6.9 Electronic Spray Diary (Avo dairy) Requirements

EMS Requirement

6.9.1 The industry electronic spray diary (Avo diary) is an important legal document, which is covered by the EMS. Please complete carefully.

The terms and conditions of NZ Avocado Avo diary are EMS requirements.

6.9.2 Use of the Avo diary

The Grower must obtain a username and password from the system administrator at NZ Avocado (info@nzavocado.co.nz), to set up and use the electronic spray diary system. Only those Growers with a valid PPIN will be able to register as a user.

6.9.3 A separate electronic spray diary must be completed for each property (PPIN), either by the Grower, or on behalf of the Grower by a Spray Contractor, Packer or delegated agent of the Grower.

To comply with the EMS all requested information must be entered.

6.9.4 The spray diary application page has two parts–

- The top section of the page is to record insecticide and fungicide sprays
- The bottom section is to record foliar and ground fertiliser applications.

The spray diary must record all foliar applications of fungicides and pesticides fully and accurately.

6.9.5 There is a requirement for all foliar fertilisers (liquid sprays) to be recorded separately as part of the food safety programme. The fertiliser diary **MUST** be used to record foliar fertiliser applications and should be used for ground/fertigation fertiliser inputs.

6.9.6 Timing of Spray Diary Entries

Spray diaries will be kept up to date with spray details being entered into the diary within 14 days of the spray application. This is to assist the Packer and Exporter in assessing fruit suitability for market and picking dates. This is a supports the requirements of the China OAP.

This condition must be included in the Grower/Sprayer/Packer contracts.

6.9.7 The electronic spray diary must be linked to the Registered Packer to allow them to complete the spray diary verification prior to harvest as specified in **Part 2 Section 5.4.**

6.9.8 It is the Growers responsibility to ensure the diary is correctly filled in and declared.

7.0 PRIOR TO HARVEST

7.1 Relative Fruit Maturity

EMS Requirement

7.1.1 The Grower must comply with industry maturity testing requirements as stated in **Part 8:** Maturity Assessment of the Avocado Quality Manual.

7.1.2 Before fruit is harvested for the first time, from any PPIN, the Packer must obtain a maturity clearance to pick showing that the fruit meets industry minimum standards for export.

7.1.3 A clearance to pick will be issued by an Independent Verification Agency on behalf of NZ Avocado. This clearance must be retained for audit purposes and made available to NZ Avocado if requested.

7.1.4 Only fruit from orchards that achieve minimum maturity requirements are to be harvested for export.

- The average across the 20 fruit must achieve 24% dry matter content.
- At least 18 out of 20 fruit from each sample must achieve 20.8% dry matter content.

7.1.5 Regional Dispensation and Blanket Dispensation from the requirement to maturity test may be issued by NZ Avocado (see Part 8 for details) at times during the season.

7.2 Pre-harvest Quarantine Monitoring, Residue Testing and Unsprayed Crops

EMS Requirement

7.2.1 Pre-harvest Quarantine Monitoring China

- A pre-harvest quarantine monitor is required within 28 days prior to harvest.

7.2.2 Pre-harvest Quarantine Monitor – unsprayed crops

- A pre-harvest quarantine monitoring is required within 28 days of harvest.

7.2.3 A residue analysis test is required on all unsprayed crops unless the Grower holds a registered organic certification. This supports the industry assurance programme to confirm residue status for export (see Section 5.3).

7.3 Grower Declaration of Spray Diary

EMS Requirement

7.3.1 Harvesting can only commence after the spray diary has been declared by the Grower and verified by the Packer. Failure to observe this requirement may prevent the export of a Grower's fruit.

7.3.2 The declaration regarding the accuracy of the information entered as a true and correct record must be completed by the Grower or their agent by ticking the check box. In so doing the Grower confirms that the relevant PHIs have been met. The clearance date (based on the PHI of the sprays applied) will be calculated automatically by the spray diary for each block for each of the key markets.

7.3.3 If the Grower is using an agent to declare the accuracy of the spray diary – the agent must have evidence, by way of an email or a hard copy, on file, that the spray diary has been reviewed by the Grower and is indeed accurate.

7.3.4 Declaration of the spray diary also applies to organic orchards or orchards where no sprays have been applied during the season.

7.4 Packer Verification of Spray Diary

EMS Requirement

7.4.1 The Grower must ensure that a 'Relationship' with the Packer has been set up in their electronic spray diary. This is to give the Packer access to their diary to verify it **prior to harvesting any fruit for export**.

7.4.2 The Grower or their agent must create a harvest line by selecting the blocks to be harvested. and adding the intended picking date.

7.4.3 The Packer must verify that the line of fruit has been cleared to pick for the intended market. Picking can only commence after the Packer has verified the spray diary.

7.4.4 Once **verified** by the Packer the spray diary and associated harvest remains active (valid) for a **period of 14 days** from the verified intended harvest date. The Grower must not apply any sprays during this period to those blocks from which fruit is still being harvested.

7.4.5 If the Grower intends to apply sprays to any blocks included in an active harvest where harvesting has been completed, but harvesting is continuing on the other blocks in the active harvest - the Grower must notify the Packer before applying a spray.

7.4.6 In such a case in 7.4.4 the Grower will be required to generate a new harvest declaration excluding the blocks in the active harvest they intend to spray and the diary verified again.

7.4.7 Organic orchards and unsprayed orchards
Packer electronic verification of the spray diary also applies to organic orchards or orchards where no sprays have been applied during the season.

7.5 Fertiliser Diary

EMS Requirement

7.5.1 All foliar fertilisers (liquid sprays) applied to avocados must be recorded as a separate diary line in the fertiliser diary as part of the requirements of a food safety programme.

7.5.2 The second section of the electronic spray diary application is to be used to record all foliar, ground or fertigation applied fertiliser inputs.

8.0 HARVEST RESPONSIBILITIES

8.1 Windfall Fruit and Fruit touching the Ground

EMS Requirement

8.1.1 Fruit must not be harvested if it is on the ground or it has fallen to the ground in the process of harvesting.

8.1.2 The Grower and the Harvester must ensure that under no conditions are windfall fruit collected and packed for export.

Best Practice

8.2 Harvesting following rainfall

8.2.1 It is strongly recommended that fruit is not harvested when more than 5mm of rain has fallen in the previous 24 hours.

8.2.2 Rainfall data for the 24 hours preceding harvest should be recorded and forwarded to the Packer.

8.2.3 The appropriate period to wait before harvest will depend on the drying conditions on that day. If the fruit cannot "lose" water, then the lenticels may still be hydrated and susceptible to handling damage.

8.2.4 Follow the "Roll test for lenticel damage"

8.2.5 Wet soils lead to increased turgor in fruit, and this may increase handling damage and subsequent fruit rot development. This has been confirmed both through field experimentation and with the industry library-tray database.

8.2.6 If less than 5mm of rain has fallen in the previous 24 hours picking should only commence / recommence when fruit are dry to the touch and at least 2 hours after the rain has stopped. Roll test is recommended.

8.3 Ambient Temperatures at Harvest

8.3.1 Harvesting should be done undertaken at temperatures less than 30°C, and certainly should be curtailed at 35°C when conditions are excessively hot.

8.3.2 It is recommended that exposed fruit at tops of trees be harvested first, to avoid sunburn/colour that will show later in the season.

NB: Fruit picked at higher temperatures will:

- Lose up to 10% more weight
- Respire at a much higher rate whilst hot, and
- Take significantly longer to cool

8.4 Harvesting Techniques, Traceability and Handling into Bins

EMS Requirement

8.4.1 Clipping fruit - all stems should be carefully cut to a maximum of 5 mm in length. Long or poorly cut stems may become dislodged and/or cause damage to other fruit during handling.

8.4.2 Under no circumstances are drop bags to be used from a fruit quality perspective.

8.4.3 Bins are to be identified with:

- PPIN Grower registration number.
- Block number
- Date of picking
- Market compliance (e.g. China) where applicable.

Best Practice

8.4.4 Fruit should be placed carefully into bins to avoid damage.

8.4.5 Bins should not be overfilled, as this will lead to fruit damage when double stacked.

8.5 China Requirements – Harvest, Traceability, Bin Handling and Segregation

Bins must be clearly marked with the unique production site identifier (PPIN) and date of harvest prior to the bins leaving the production site.

8.5.1 Where only some blocks within an eligible production site are to be packed for China, block identifiers must be included on the harvest bins at the time of harvest.

8.5.2 Where there are eligible and ineligible production sites on the same property (PPIN), the grower will ensure that bins of eligible fruit intended for China are segregated, or separated with a physical barrier from ineligible fruit when held on orchard and during transport to the packhouse.

8.5.3 A segregation of 1 metre is considered adequate at ambient temperature.

8.6 Temperature and Time Requirements for Holding Fruit On-Orchard

EMS Requirement

To maximise post-harvest life and to minimise weight-loss and sun-burn:

8.6.1 Every effort must be made to deliver fruit to the Packer on the day that harvesting occurs. In all cases, harvested fruit is to be delivered to the Packer within 24 hours of harvesting.

8.6.2 The Grower may apply to NZ Avocado in writing for a dispensation to hold fruit in a suitable storage facility when delivery to the Packer exceeds 24 hours. A suitable facility is defined as a cool storage facility with the demonstrated ability to draw down avocado fruit flesh temperatures to 4-6 ºC within 24 hours. It is the Grower's responsibility to demonstrate the suitableness of the proposed facility as part of the dispensation request.

Best Practice

8.6.3 Fruit held on orchard awaiting transportation to the packhouse should be:

- Held in shade under cool and hygienic conditions.
- Moved in regular batches to the Packer.

8.7 Harvest Records

EMS Requirement

8.7.1 The Grower and/or Contract Harvester must maintain adequate documentation of harvesting activities. This includes on-orchard daily logs showing:

- Staff details
- Tally sheets including daily picking volumes
- The picking locations (PPINs and Blocks)
- Trucking documentation

9.0 GROWER LIBRARY TRAYS – QUALITY AND RETENTION SAMPLES

EMS Requirement

9.1.1 Library trays are the only opportunity for Growers to receive direct feedback on their fruit quality. For this reason, library trays will be collected by the Packer, for each Grower (PPIN) packing fruit for export.

9.1.2 Packhouse Managers will have the responsibility for ensuring library trays are collected and dispatched for assessment.

9.1.3 A sample shall comprise a minimum of 1 tray **of 20 export quality, export count 20 fruit per PPIN.**

9.1.4 One tray shall be collected at every picking round per PPIN, or one tray every 28 days for PPINs where that property is picked either continuously or with breaks within a 28-day period.

10.0 ACTIONS TO BE TAKEN FOR NON-COMPLIANT PRODUCT

EMS Requirement

10.1 The Grower and /or Contract Harvester must have a documented plan outlining how any non-compliant (ineligible) product will be kept separate from compliant (eligible) product.

10.2 Non-compliant product must be clearly labelled as such.

10.3 Product for China must be clearly marked "China Compliant" on the bin cards as supplied by Packer and segregated from any other non-compliant product.

10.4 The Grower and/or Contract Harvester must notify the Packer, in writing within 24 hours, if they become aware of any issue affecting the food safety of picked product (e.g. a worker with a communicable disease).

10.5 **Failure to Comply**

In the event of a biosecurity breach or where alleged failure to follow the requirements of the EMS or non-compliance with the Food Safety Programme or Quality Manual obligations is identified, NZ Avocado will:

- Investigate the alleged breach as outlined in NZ Avocado EMS Breach Procedure.
- If the breach is confirmed the following actions outlined in **Section 6.2 of the EMS** may be considered by NZ Avocado:
  - Instruct the Grower to cease harvesting for export
  - Instruct the Packer to cease packing the fruit of the defaulting Grower for export.
  - Instruct the Exporter not to export the fruit of the defaulting Grower and notify the Recognised Product Group (RPG).
- Subject to the procedures set out in the EMS and a decision from HEA, NZ Avocado shall be entitled to decline any application for registration in any subsequent export season by a Grower, Packer or Exporter who has previously failed or refused to comply with the requirements of the EMS.

11.0 AUDIT

EMS Requirement

11.1 The Grower harvesting their own product will be covered for food safety under the Grower functions of their accredited Food Safety programme (see Section 4.1.1).

11.2 In the event of an audit, the Grower shall provide such assistance and documentation as reasonably requested by the auditor. Non-compliances may be issued as per the individual Food Safety Programme or under Section 9.0 of NZ Avocado Quality Manual.

11.3 Failure to comply with the instructions of the auditor or to remedy any major non-compliance may result in the cancellation of the Food Safety Compliance Certificate and deregistration.

12.0 APPENDIX 1: THAILAND AND CHINA MARKET RESOURCE LIST

The following processes can be completed electronically through the **NZ Avocado Avo hub (see Section 2.0 of this document):**

Thailand Application for Registration and Agreement: Grower
Thailand Change of Ownership/Withdrawal Registration and Agreement: Grower
China OAP Registration and Agreement: Grower
China OAP Change of Ownership/Withdrawal Registration and Agreement: Grower

13.0 APPENDIX 2: GROWSAFE STORAGE OF AGRICHEMICALS CHECKLIST

GROWsafe®

NEW ZEALAND Agrichemical Education Trust

✓ Tick box

	Yes	No	N/A	Actions required:
Location				
Away from obvious hazards such as incinerators, welding gear, and storage areas for fuels or other flammables				
Protected from strong winds and away from flood-prone areas				
At least 15 metres from dwellings and areas where staff work (eg packhouses)				
At least 20 metres from sensitive areas including waterways, bores and farm dairies (45 metres from water sources on dairy farms)				
Preferably 10 metres or more from livestock and feed storage				
Keep surrounding area clear of combustible vegetation and refuse by at least 6 metres				
Near a source of clean water.				
Construction				
Fully bunded impervious floor (or drip trays to contain any spilled product)				
Walls and roof made of fire-resistant materials				
Sturdy, non-absorbent shelving suitable for products being stored				
Moisture control, good lighting, ventilation and not exposed to extreme temperatures				
Convenient access (eg for forklift).				
Security and restricted access				
Secure and lockable to prevent unauthorised access (eg children, unauthorised people, livestock, birds)				
Products with very high human toxicity only accessible to certified handlers, not all staff.				
Signage				
Minimum of 'No Smoking' and 'HAZCHEM Agrichemicals'				
Full signage including nature of hazards, precautions to be taken and actions to take in the event of an emergency is required if thresholds are exceeded (eg more than 100 litres of aquatic toxicity category 1 (9.1A).				
Safety equipment				
First aid equipment nearby or in airtight container				
Suitable PPE nearby or in airtight container				
Source of clean water for washing hands nearby.				

Separation and segregation				
Store flammable products and products with aquatic toxicity at least 3 metres from incompatible products				
Store toxic and corrosive products at least 5 metres from incompatible products (unless both powders, or separately bunded)				
Store herbicides separately from insecticides and fungicides				
No food, lubricants/fuel, animal feed, solid fertilisers or pool chemicals in the store				
Keep veterinary medicines in a separate store.				
Managing the risk of fire				
Manage the risk of ignition (sparks from machinery, electrical equipment, lighting, temperature in the store)				
Fire extinguisher (rated 30B) readily accessible within 30 metres.				

Storage of Agrichemicals Checklist

	✓ Tick box			
	Yes	No	N/A	Actions required:
Spill management				
Spill kit readily available (including suitable PPE, absorbent material, grate covers/absorbent socks, broom and shovel, bag or container for contaminated material etc)				
Secondary containment such as bunding and/or drip trays able to contain at least 50% of total liquid stored (100% of liquid in containers bigger than 60 litres)				
Stormwater protection.				
Management of store				
Nominated, qualified person in charge of store				
Up-to-date inventory kept away from the store				
Current safety data sheet (SDS) available for each product (hard copy or downloaded digital copy, less than 5 years old)				
Tracking records kept up-to-date for products with very high human toxicity				
Emergency plan written and tested annually, kept away from the store and easily located by emergency services				
Location compliance certificate may be required if thresholds exceeded.				
Decanting				
Only decant product into appropriately labelled containers, preferably an empty container of the same product				
Floor must be capable of containing any spill whilst decanting.				
Good storage practices				
Store powders and granules above liquids				
Store herbicides below insecticides and fungicides				

Store products with labels facing outwards/able to be read				
Keep all products in their original container unless containers are damaged				
Do not stack 20 litre containers more than two high				
Avoid overloading shelves				
Store large containers on the floor				
Store corrosives below eye level				
Check products on receipt for leaks, label intact, correct product				
Establish a safe drop-off point for agrichemicals (away from dwellings and farm dairy)				
Use oldest products first				
Have measuring equipment designated for agrichemical use only (eg jugs, scales)				
Keep store tidy, and clean up any spills immediately				
Dispose of unwanted agrichemicals via Agrecovery				
Dispose of clean, dry empty containers via Agrecovery.				

This checklist is a guide only and reflects general requirements for small scale storage of agrichemicals in a standalone building.

If large quantities are stored, or other hazardous products such as fuel, oxidisers or explosives are stored, then additional requirements will apply. For example, emergency shower and eye-washing facilities will be required if more than 50 kg of acute toxicity category 1 (6.1A) product are stored. Similarly, if the agrichemical store is within another building, there are additional restrictions.

For full details refer to Section 4 and Appendix F of NZS 8409:2021 Management of Agrichemicals.

PART 3

AGRICHEMICAL INFORMATION FOR AVOCADOS

Table of Contents

AGRICHEMICAL INFORMATION FOR AVOCADOS

1.0 CROP PROTECTION

1.1 Regulatory requirements

Best Practice

Each property must prepare a spray plan to comply with Regional Council Resource Management plans. Growers will need to check with their local council, as agrichemical spray rules relating to the following can be different between regions:

- Signage
- Notification timelines
- Sensitive areas and distances to sensitive areas
- Mitigating and managing spray drift

It is recommended there be appropriate boundary shelter on each property to minimise spray drift both within and beyond the boundaries of the property. This should take into account the identified sensitive areas (including environmental) within and beyond the property.

Information and templates to develop a spray plan are available on the Growsafe website.

1.2 Registered Export Spray Chemicals

Note: Day zero equals the day of spray applications for the calculation of pre-harvest intervals (PHI).

EMS Requirement

1.2.1 NZ Avocado will provide annual up-to-date guidance regarding spray chemicals.

1.2.2 All products sprayed on avocados for export must be registered and have label claim for use on avocados.

1.2.3 Sprays are to be applied at no more than the recommended rates. ALWAYS refer to the product label for rate and use information.

1.2.4 All PHIs must be observed. If unsure check with your Packer or Exporter before applying any spray. Observance of the PHI does not guarantee non-detectable residues.

1.2.5 **Specific chemicals of concern are chlorpyrifos (Lorsban), taufluvalinate (Mavrik), and pirimiphos methyl (Attack) as detectable residues may be present even when the PHI has been observed.**

It is recommended that residue tests be carried out on any lines of fruit intended for export where any of these chemicals have been applied.

NB: For Malaysia, Singapore, Korea and Thailand, the use of chlorpyrifos, taufluvalinate and pirimiphos methyl is not recommended. It is recommended that you contact your Exporter before using these products.

1.2.6 Off Label use of Agrichemicals

Growers may under extenuating circumstances (e.g. in times of unexpected pest outbreaks) apply in writing to NZ Avocado for **Justified Approval by way of a dispensation** to use a non-registered chemical appropriate to the situation. The procedure for applying for a dispensation is outlined in the **Part 1 Introduction, Section 8.0 of this Quality Manual, and EMS Section**

1.2.7

Justified Approval for the dispensation is given at the discretion of NZ Avocado under the dispensation policy. In such circumstances a residue test is mandatory prior to harvest and a zero residue or nil detect result is required.

Best Practice

1.2.8 A fungicide such as copper or its equivalent should be applied at monthly intervals.

1.3 Spray residue

EMS Requirement

1.3.1 No avocados are to be exported with residues in excess of industry standards **(Section 4.6.13 of the EMS).** The procedures outlined in this Quality Manual are designed to verify this.

1.3.2 Where a residue is detected during random residue testing or via any post-harvest national or international testing programme that is from a chemical that is either not recorded as applied, not approved for use on avocados or exceeds any exporting country MRL in the spray diary, NZ Avocado will investigate the findings and will then consider appropriate action.

1.3.3 Findings from the investigation may include imposing restrictions on the Grower's ability to export to specific markets and/or extended period of time.

1.3.4 Exporters may not export product with residues in excess of industry standards. For those countries where Maximum Residue Limit's (MRL's) are specified, all fruit exported to those countries must meet the importing country MRL requirements.

1.3.5 For those countries where an MRL has not been specified for a chemical then the relevant New Zealand MRL may apply for that chemical. It is the responsibility of the Exporter to be aware of the requirements of both the importing country and the importer (refer to Part 6, Section 3.0).

1.3.6 It is the Exporter's responsibility to ensure Packers have verified Grower spray diaries.

1.4 Agrichemical use and regulatory requirements in Avocados

EMS Requirement

1.4.1 All persons, including Growers, applying sprays to each export registered PPIN without supervision must hold a minimum of a current Growsafe® Standard certificate. Spray Contractors must hold a Growsafe Registered Chemical Applicator (RCA), or for aerial application, Pilot Chemical Rating. Details of the certificated will be held in the industry spray diary and be verified by industry audit.

1.4.2 A Grower/Spray Contractor as the Growsafe certificate holder purchasing and/or applying sprays must have a copy of the product MSDS sheets on file and maintain an up to date inventory of agrichemicals purchased, and associated spray applications for audit.

1.4.3 Products that must be under the control of a Certified Handler (or locked away securely) are those with the classification 6.1A and 6.1B.

1.4.4 In accordance with Growsafe®:

- Storage and disposal of chemicals must meet NZS 8409:2021 or any other legislation requirements (see Growsafe storage checklist Part 2: Section 13 Appendix 2)

- A grower must maintain an inventory of agrichemicals held on site and a record of the associated spray applications for audit.

1.4.5 If a Grower is using a contractor to apply sprays, the Grower must ensure that a 'relationship' with the spray contractor has been set up in their electronic spray diary. This is to enable the link of the individual Growsafe accredited individual to each spray application and to enable a Spray Contractor access to the diary to make inputs on the Grower's behalf if required.

1.4.6 The Grower must keep all records of the sprays applied to the orchard, on file, as a reference to what has been entered into the spray diary by either the Grower or the Spray Contractor.

1.5 Label Rates, Conditions and Off-Label use of Agrichemicals

EMS Requirement

1.5.1 All agrichemicals must be used at the stated label rate on the product for avocados. All PHIs have been established for use at the label rates.

1.5.2 All application conditions on the label of the product must be adhered to. This includes the number of applications of the active ingredient per year or pest season.

1.5.3 Growers may under extenuating circumstances (e.g. in times of unexpected pest outbreaks) apply in writing to NZ Avocado for Justified Approval by way of a dispensation to use a non-registered chemical appropriate to the situation. The procedure for applying for an "Off label Use" dispensation is outlined in Section 1.5.4 below. Justified Approval for "Off-Label use" is given at the discretion of NZ Avocado under the dispensation policy. In such circumstances a residue test is mandatory prior to harvest and a zero residue or nil detect result is required

1.5.4 Information required for Justified approvals for off label agrichemical use is as follows:

- PPIN(S):
- What the target pest is
- What is the product to be used?
- What is the reason for use of this product off-label?
- When is this product going to be applied
- How many applications are intended?
- Associated supporting AvoGreen® monitoring results

1.5.5 **Under exceptional circumstances,** written dispensation may also be granted to harvest within the pre-harvest interval for markets other than NZ or Australia, **only on condition** that a residue test is done demonstrating compliance with the relevant MRL.

1.6 Fertiliser Use in Avocados

A management plan should be implemented for the use and application of fertiliser (e.g. consultant's recommendation). This should include soil, water, and leaf tests, as applicable from a testing laboratory on an annual basis.

Only fertilisers known to be safe for use on Avocado fruit should be applied. This includes any product currently commercially available in New Zealand.

EMS Requirement

1.6.1 All foliar fertilisers (liquid sprays) must be recorded, on a separate line, in the fertiliser section of NZ Avocado Electronic Spray Diary, as part of the food safety programme.

1.6.2 A completed fertiliser diary (foliar, ground and fertigation applications) shall be submitted to the Packer (in compliance with points listed below), with each picking round.

1.6.3 Growers who are accredited to any of the industry recognized Food Safety Programmes (e.g. GlobalGAP, NZGAP, SQF1000, etc.) **are exempt** from the requirement to produce a fertiliser diary prior to each harvest as this is audited through their food safety accreditation.

1.6.4 The industry electronic spray diary should be used to record foliar, ground and fertigation **fertiliser** inputs.

2.0 MAXIMUM RESIDUE LIMITS AND PRE-HARVEST INTERVALS

Each country sets it MRLs (maximum residue limits) for agrichemicals and its MLs for heavy metals. Those limits vary from country to country. When exporting fruit, the first MRL that has to be met is that of New Zealand as a byproduct of export packing is fruit going to the New Zealand market.

Pre-harvest Intervals are established from data from residue decay curves and the continual monitoring through the industry residue testing programme to confirm PHIs are meeting the expected MRLs.

2.1 Markets where no MRLs have been set ("None Set" or "Not Listed")

EMS Requirement

2.1.1 Where a country has not set an MRL for a pesticide under the notation **"None set",** this means that no MRLs exist for the pesticide and that detectable residues should not be present. MRLs for these will be set to nil detect (0.01mg/kg). The PHI to achieve nil detect will apply or if no PHI has been set, then a residue test will apply.

2.1.2 Where a country has no MRL for a pesticide listed **"Not Listed"** this means that no MRL exists for the pesticide, but that the presence of residues should not be of concern. In such a case if there is a corresponding pre-harvest interval for New Zealand then that PHI should be applied.

2.1.3 Under mutual recognition Trans-Tasman Mutual Recognition Act (TTMRA), the New Zealand MRL and pre-harvest interval can be used for Australia against some products.

2.1.4 Codex MRL's are normally recognised by India, Korea, Malaysia, Singapore and Thailand in the absence of a specific national MRL. New Zealand has 'country recognition' in Indonesia and Vietnam and in the absence of specific national MRL's, the New Zealand MRL and pre-harvest interval can be used.

2.2 Pre-harvest Intervals and MRLs for Export markets

EMS Requirement

Pre-harvest interval for Export Markets

2.2.1 Pre-harvest intervals for export markets are for guidance only and are based on the best available information, including residue decay curves. Observance of the PHIs for products with no maximum residue limit (MRL) set does not guarantee non-detectable residues.

2.2.2 For some products, it has not been possible to determine a PHI that will provide fruit with no detectable residues. Those products with no MRL and a PHI "not set" (e.g. carbaryl (Carbaryl), tebufenozide (Mimic)), applied after flowering may require a residue test for some markets. It is the Grower's responsibility to be aware of these requirements and to comply with any residue testing requirements of the Exporter and NZ Avocado to ensure that there are no detectable residues on the fruit.

Note: When requesting a residue test, ensure that the appropriate test method is specified to detect the relevant chemical (e.g. abamectin, spinosad, shall be tested using the LCMS method – see Section 3.0).

2.2.3 Note: Independent auditors, on behalf of NZ Avocado, will draw random fruit samples from the packing line for laboratory analysis and these will support a system of verification and assurance.

2.2.4 Information on the list of chemicals registered for use in Avocados, the application rates and the PHI and MRL can be found in Part 3 of this Quality Manual. However it is the spray applicators responsibility to be familiar with and comply with the requirements of the product label.

Best Practice

2.3 Importing Country Specific Notes

Growers are encouraged to consult with their Exporter on any specific customer residue requirements required for export.

2.3.1 **Residue Testing for Japan**

It is recommended that all fruit destined for Japan be cleared by a residue test PRIOR to harvest using the appropriate screening method (see Section 3.0) as indicated by the chemicals used in the individual spray diary.

2.3.2 **Indonesia**

New Zealand has been confirmed as included on the 'Country Recognition (CR) list' allowing products to be shipped (sea freight) direct to Jakarta port.

2.3.3 **New Caledonia**

New Caledonia is politically aligned to France, and therefore the EU MRL's apply.

2.3.4 **Pacific Islands**

South Pacific countries have less well defined (if any) residue MRL requirements. Under these circumstances, the avocado industry works on the basis that either Codex MRL's will be recognised in the first instance or if there is no Codex MRL then 'country-of-origin' (i.e. NZ) MRL's apply.

While using the best data available at the time of production of this document NZAIL disclaims liability relating to the use of this information. Always refer to the label of the product that you are using.

3.0 REGISTERED CHEMICAL LIST FOR AVOCADOS – Product & Application Rates

Products indicated by trade name are representative of product groups (active ingredients) only. Please refer to the actual label of the specific product used. Information on product rates is provided for guidance only. ALWAYS refer to the product label for rate and use information.

Residue Test Methods
Liquid chromatography Mass Spectrometry (LC-MS)
Gas chromatography Mass Spectrometry (GC-MS)

- Both LC-MS and GC-MS are methods to separate chemicals in a mixture or a sample.
- Both methods separate the chemicals by chromatography first, then further examine and identify them by the mass spectrometer.
- Both methods require a mobile phase and a stationary phase. The only difference is that LC-MS uses a solvent (liquid) as its mobile phase, while GC-MS uses inert gases (like helium) in the same capacity.
- Generally, it is considered best practice to complete a combined GCMS- LCMS test to provide comprehensive assurance that any residues (including from neighbouring spray drift) are able to be detected.

Chemical/Pesticide *F = fungicide* *I = insecticide* *PGR = growth regulator* *S = synergist*	**Active Ingredient** (common name)	**Pest** (Label claim)	**May also affect** Requires **Justified Approval** for use in avocados	**Residue Testing Method**	**Product Rate** g/100L ml/100L	**Class of Chemical**	**Re-entry Interval (hours)**	**Label Information regarding Bees** L= Label Claim NC = Novachem Agrichemical Manual	**Observations**
Abamectin- Hortcare (I) (2019)	Abamectin	Six spotted mite	Leafroller	LC	37.5 ml	Avermectins, Milbemycins	12	Very toxic to bees must not contact plants in flower if they are likely to be visited by bees. (L)	Max of 3 applications of active ingredient /pest season + non-ionic surfactant or +500 ml Oil
Accolade 5SG (I) (2020)	Emmamectin benzoate	Leafroller		LC	4 g	Avermectins, Milbemycins	12	Maximum control achieved in 4 days	Applications must be made with SYNERGY TM sticker wetter Max of 6 sprays of active ingredient per crop cycle
AG Copp 75 (F) (2021)	Cuprous oxide	Anthracnose		n/a	70 g	Mineral	WFD		High Volume spraying

Chemical/Pesticide ***F = fungicide*** ***I = insecticide*** ***PGR = growth regulator*** ***S = synergist***	**Active Ingredient** **(common name)**	**Pest (Label claim)**	**May also affect** Requires **Justified Approval** for use in avocados	**Residue Testing Method**	**Product Rate** **g/100L** **ml/100L**	**Class of Chemical**	**Re-entry Interval (hours)**	**Label Information regarding Bees** L= Label Claim NC = Novachem Agrichemical Manual	**Observations**
Agri-fos 600 (F) Injection only (2019)	Phosphorous Acid	Phytophthora		n/a					**Injection only**
Aliette WG (F) (2019)	Fosetyl alluminium	Phytophthora		n/a	250 – 500g	Mineral	WFD	Non Bearing trees	Non Bearing trees
Alpasso (I) (2022)	Thiacloprid	Thrips	Scale, mealybug	LC	15 ml (30ml)	Neonicatinoid	12	Toxic to bees	
Altacor (I) (2022)	Chlorantraniliprole	Leafroller caterpillars		LC	9 g	Diamides	12	Activity of bees will not be disrupted provided this product is applied in non-foraging periods and once spray has dried (NC).	+ non-ionic surfactant **Max of 2 applications of this active ingredient /season**
Ambush (I) (2021)	Permethrin, Pirimiphos methyl	Scale, Leafroller, Mealybug	Passionvine hopper	GC	100 ml	Pyrethoid, Pyrethrin,Organophosphate	24		**CAUTION** **DO NOT apply without consulting your Export** **Not acceptable for retail programs**
Announce (I) (2022)	Emamectin benzoate	Leafroller caterpillars		LC	4 g	Avermectins, Milbemycins	12	Toxic to bees – sprays Must Not contact plants in flower if bees are foraging (L)	**Max of 6 applications of this active ingredient per crop cycle.**
Apostle (I) (2018)	Abamectin	Six spotted mite	Leafroller	LC	37.5 ml	Avermectins, Milbemycins	12	Very toxic to bees must not contact plants in flower if they are likely to be visited by bees. (L)	+ 500 ml Oil or + non-ionic surfactant Max of 3 applications of this active ingredient /pest season

Chemical/Pesticide ***F = fungicide*** ***I = insecticide*** ***PGR = growth regulator*** ***S = synergist***	**Active Ingredient** **(common name)**	**Pest (Label claim)**	**May also affect** Requires **Justified Approval** for use in avocados	**Residue Testing Method**	**Product Rate** **g/100L** **ml/100L**	**Class of Chemical**	**Re-entry Interval (hours)**	**Label Information regarding Bees** L= Label Claim NC = Novachem Agrichemical Manual	**Observations**
Approve 70WP (I) (2020)	Tebufenozide	Leafroller caterpillars		LC	8.6 g	Diacylhydrazine	12	No notation (L & NC)	Min 2000 L/ha water High volume spraying
Attack (I) (2023)	Permethrin, Pirimiphos methyl	Leafroller, mealybug, greedy scale	Thrips	GC	100 ml	Pyrethoid, Pyrethrin,Organophosphate	24	Toxic to bees. Sprays must not contact plants in flower if they are likely to be visited by bees. (L)	**CAUTION:** **DO NOT apply without consulting your Export** **Not acceptable for retail programs**
Avid (I) (2021)	Abamectin	Six spotted mite	Leafroller	LC	37.5 ml	Avermectins, Milbemycins	12	Toxic to bees. Sprays must not contact plants in flower if they are likely to be visited by bees. (L)	+ 500 ml Oil or + non-ionic surfactant **Max of 3 applications of this active ingredient /pest season**
Bactur WDG – *Hortcare* (I) (2020)	Bacillus thuringiensis	Leafroller			50 g	Organic insecticide	WFD	No notation GRAS	High volume spaying
Beaublast (no label claim for avocados) (2018)	Beauveria bassiana, blastospores (strain K4B3)	Psyllids, Thips, Aphids, Whitefly (su							See label for instructions.
Beaugenic (no label claim for avocados) (2018)	Beauveria bassiana	*Beauveria bassiana conida* (K4B1) for the control of Thrips							See label for instructions

Chemical/Pesticide ***F = fungicide*** ***I = insecticide*** ***PGR = growth regulator*** ***S = synergist***	**Active Ingredient** **(common name)**	**Pest (Label claim)**	**May also affect** Requires **Justified Approval** for use in avocados	**Residue Testing Method**	**Product Rate** **g/100L** **ml/100L**	**Class of Chemical**	**Re-entry Interval (hours)**	**Label Information regarding Bees** L= Label Claim NC = Novachem Agrichemical Manual	**Observations**
Biobit DF (I) (2019)	Bacillus thuringiensis	Leafroller caterpillars			50 g	Organic insecticide	WFD	**Contains live spores and endotoxin of a natural bacterium. It acts specifically against caterpillars and does not harm mammals, birds, fish or beneficial insects (L)**	Min 2000L/ha water Ensure good coverage
BioNeem (I) (2022)	Azadirachtin and Neem Oil	Aphids, Thrips, mealy bug and scale			1ml	Oil extract	WFD		Product has repellant and antifeedant properties
Blue Shield DF (F) Not registered	Copper hydroxide	Anthracnose			150 – 200 g	Mineral	WFD		High Volume Spraying
Caligula (2022)	Diazinon	Leafroller, mealy bug, scale, thrips		GC	100ml	Organophosphate	24		No more than 2 applications per crop cycle. Off label use NOT permitted. Note: Neighbours notification requirements
Calypso (I) (2021)	Thiacloprid	Thrips	Scale, mealybug, FRW	LC	15 ml (30ml)	Neonicatinoid	12	Toxic to bees	
Carbaryl 50F (I) (2020)	Carbaryl	Leafroller caterpillar, mealy bug, thrips, scale		GC	160 ml	Carbamate	12		+ 100g Diazinon

Chemical/Pesticide *F = fungicide* *I = insecticide* *PGR = growth regulator* *S = synergist*	Active Ingredient (common name)	Pest (Label claim)	May also affect Requires **Justified Approval** for use in avocados	Residue Testing Method	Product Rate g/100L ml/100L	Class of Chemical	Re-entry Interval (hours)	Label Information regarding Bees L= Label Claim NC = Novachem Agrichemical Manual	Observations
Champ DP (F). Not registered	Copper hydroxide	Anthracnose			107 – 140 g	Mineral	WFD		High volume spraying
Champ WG (F) (2020)	Copper hydroxide	Anthracnose			150 - 200 g	Mineral	WFD		High volume spraying
ChampION+++ (F) (2018)	Copper hydroxide	Anthracnose			70 - 90 g	Mineral	WFD		High Volume spraying
Chlorfos 480 (I) (2020)	Chlorpyrifos	Leafroller caterpillar	Thrips, mites, scale, mealy bug	GC	50 – 75 ml	Organophosphate	24	Very toxic to terrestrial invertebrates Toxic to bees. Sprays must not contact plants in flower if they are likely to be visited by bees. (L)	**Do not use with oil**
Chlor-P 480EC Not registered	Chlorpyrifos	Leafroller caterpillar	Thrips, mites, scale, mealy bug	GC	50 – 75 ml	Organophosphate	24	Very toxic to terrestrial invertebrates Toxic to bees. Sprays must not contact plants in flower if they are likely to be visited by bees. (L)	**Do not use with oil**
Chlorpyrifos 500EC (I) (2021)	Chlorpyrifos	Leafroller caterpillar	Thrips, mites, scale, mealy bug	GC	75 ml	Organophosphate	24	Very toxic to terrestrial invertebrates Toxic to bees. Sprays must not contact plants in flower if they are likely to be visited by bees. (L)	**Do not use with oil**

Chemical/Pesticide ***F = fungicide*** ***I = insecticide*** ***PGR = growth regulator*** ***S = synergist***	**Active Ingredient** **(common name)**	**Pest (Label claim)**	**May also affect** Requires **Justified Approval** for use in avocados	**Residue Testing Method**	**Product Rate** **g/100L** **ml/100L**	**Class of Chemical**	**Re-entry Interval (hours)**	**Label Information regarding Bees** L= Label Claim NC = Novachem Agrichemical Manual	**Observations**
Chlorpyrifos 50EC – *Hortcare* (I) (2018)	Chlorpyrifos	Leafroller caterpillar, Greedy scale	Thrips, mites, scale, mealy bug	GC	50 – 75 ml	Organophosphate	24	Very toxic to terrestrial invertebrates Toxic to bees. Sprays must not contact plants in flower if they are likely to be visited by bees. (L)	**Do not use with oil**
Comic (I) (2019)	Tebufenozide	Leafroller		LC	8.6 g	Diacylhydrazine	12	No notation (L) **Comic can be used in IPM management programme and can be sprayed during flowering as long as bees are not foraging (NC)**	Min 2000L/ha water Max of 4 applications of active ingredient /season
Commend - Hortcare (I) (2019)	Thiacloprid	Thrips	Scale, mealybug, FRW	LC	15 ml (30ml)	Neonicatinoids	12	**Toxic to bees**	
Contego BSub (I) (2020)	Beauveria bassiana	Flower thrips, mites			120-250 g	Organic insecticide	WFD		Repeat at 3-5 day intervals GRAS product
Copper Hydroxide 300 – Hortcare (F) (2020)	Copper hydroxide	Anthracnose			70 - 90 g	Mineral	WFD		High volume spraying only
Copper Oxychloride 800 WP – AgPro (F) (2020)	Copper Oxychloride	Anthracnose			400 – 500 g	Mineral	WFD		High volume spraying only
Copper Star (F) (2021)	Copper hydroxide	Anthracnose			70 - 90 g	Mineral	WFD		High volume spraying only
CuSol (F) (2023)	Copper ammonium acetate	Anthracnose, Cercospora spot, sooty blotch			500 ml	Mineral	WFD		High volume spraying only

Chemical/Pesticide ***F = fungicide*** ***I = insecticide*** ***PGR = growth regulator*** ***S = synergist***	**Active Ingredient** **(common name)**	**Pest (Label claim)**	**May also affect** Requires **Justified Approval** for use in avocados	**Residue Testing Method**	**Product Rate** **g/100L** **ml/100L**	**Class of Chemical**	**Re-entry Interval (hours)**	**Label Information regarding Bees** L= Label Claim NC = Novachem Agrichemical Manual	**Observations**
D-C Tron Plus (I) (2018)	Spraying Oil	Armored scale, greenhouse thrips, six spotted mite			1 litre 500 ml	Organic insecticide	WFD		High volume spraying only
Delfin WG (I) (No date)	Bacillus thuringiensis	Leafroller			50 g	Organic insecticide	WFD	No notation GRAS	High volume spraying only
Dew 600 (I) (2022)	Diazinon	Leafroller, mealy bug, scale, thrips		GC	80 ml	Organophosphate	24		**No more than 2 applications per crop cycle. Off label use NOT permitted.** **Note: Neighbours notification requirements**
Diazinon 600EW Zagro (I) (2018)	Diazinon	Leafroller, mealy bug, scale, thrips		GC	80 ml	Organophosphate	24		**No more than 2 applications per crop cycle. Off label use NOT permitted.** **Note: Neighbours notification requirements**
Diazol Insecticide (500SC) (I) (2019)	Diazinon	Leafroller, mealy bug, scale, thrips		GC	100 ml	Organophosphate	24		**No more than 2 applications per crop cycle. Off label use NOT permitted.** **Note: Neighbours notification requirements**
Dipel DF (I) (2019)	Bacillus thuringiensis	Leafroller caterpillars			50 g	Organic insecticide	WFD	No notation GRAS	Min 2000 L/ha water High volume spraying

Chemical/Pesticide ***F = fungicide*** ***I = insecticide*** ***PGR = growth regulator*** ***S = synergist***	**Active Ingredient** **(common name)**	**Pest (Label claim)**	**May also affect** Requires **Justified Approval** for use in avocados	**Residue Testing Method**	**Product Rate** **g/100L** **ml/100L**	**Class of Chemical**	**Re-entry Interval (hours)**	**Label Information regarding Bees** L= Label Claim NC = Novachem Agrichemical Manual	**Observations**
EM-1 (Soil treatment)	Effective microorganisms								
EnSpray 99 ® (I) (2022)	Mineral Oil	Armored scale, greenhouse thrips, six spotted mite			1 litre 500 ml	Organic insecticide	WFD		
Entrust SC Naturalyte (I) (2021)	Spinosad	Leafroller	Thrips	LC	20 ml	Spinosyns	12	Dangerous to bees. Avoid direct application or drift of spray mix onto bees. **Once the spray deposit has dries, foraging bees will not be affected. (L)**	**Max of 4 applications of active ingredient /season**
Eromite (I) (2021)	Etoxazole	Six spotted mite		GC	35 ml	Etoxazole	12	**May be harmful to non-target arthropods, but is deemed safe to bees** (L)	**Max 1 application active ingredient per year** High volume Ground based applications only
ET250 - Agrissentials (I) Not registered	Oil - essential	General pest deterrent			2 litre	Organic insecticide	WFD		**GRAS organic**
Etoxamite (I) (2019)	Etoxazole	Six spotted mite		GC	35 ml	Etoxazole	12	**May be harmful to non-target arthropods, but is deemed safe to bees** (L)	**Max 1 application active ingredient per year** High volume Ground based applications only
Excel Oil - Organic (I) (2021)	Spraying Oil	Armored scale, greenhouse thrips, six spotted mite			1 litre 500 ml	Organic insecticide	WFD	Dangerous to bees.	

Chemical/Pesticide ***F = fungicide*** ***I = insecticide*** ***PGR = growth regulator*** ***S = synergist***	**Active Ingredient** **(common name)**	**Pest (Label claim)**	**May also affect** Requires **Justified Approval** for use in avocados	**Residue Testing Method**	**Product Rate** **g/100L** **ml/100L**	**Class of Chemical**	**Re-entry Interval (hours)**	**Label Information regarding Bees** L= Label Claim NC = Novachem Agrichemical Manual	**Observations**
Excel Plus (I) (2020)	Spraying Oil	Armored scale, greenhouse thrips, six spotted mite			1 litre 500 ml	Organic insecticide	WFD	Dangerous to bees.	
FOSCHEK (F) (Injection) (2022)	Phosphorous acid	*Phytophthora*			1:2 and 1:4	Fungicide	n/a		
FOSCHEK (F) (Foliar) (2022)	Phosphorous acid	*Phytophthora*			1 litre	Fungicide	WFD		Do not apply with adjuvant Do not apply closer than 6 weeks to planned harvest Do not apply prior to and immediately after flowering
Fyfanon 440 EW (I) (2020)	Maldison (Malithion)	Thrips	Mealy bug, scale	GC	340 ml	Organophosphate	24		**No more than 2 applications of active ingredient per crop cycle.** **Off label use permitted.**
Genoxy 240 SC (I) (2021)	Methoxyfenozide	Leafroller		LC	25 ml	Diacylhydrazine	12	Certain insects may be killed from contact with this product. DO NOT allow to drift outside target area. L)	**No more than 4 applications of active ingredient per crop cycle.** **Not compatible with mineral oils**

Chemical/Pesticide ***F = fungicide*** ***I = insecticide*** ***PGR = growth regulator*** ***S = synergist***	**Active Ingredient** **(common name)**	**Pest (Label claim)**	**May also affect** Requires **Justified Approval** for use in avocados	**Residue Testing Method**	**Product Rate** **g/100L** **ml/100L**	**Class of Chemical**	**Re-entry Interval (hours)**	**Label Information regarding Bees** L= Label Claim NC = Novachem Agrichemical Manual	**Observations**
Hunter (I) (2020)	Methoxyfenozide	Leafroller		LC	25 ml	Diacylhydrazine	12	Certain insects may be killed from contact with this product. DO NOT allow to drift outside target area. L)	High volume spraying only **No more than 4 applications of active ingredient per crop cycle.** **Not compatible with mineral oils**
Insecta-Kill (I) Not registered	Silicon dioxide	Aphids, bronze beetle, scale, mites, leafroller, mealy bug			700 g	Organic insecticide	WFD		
Invert EW (I) (2019)	Abamectin	Six spotted mite	Leafroller	LC	37.5 ml	Avermectins, Milbemycins	12	Very toxic to bees must not contact plants in flower if they are likely to be visited by bees. (L)	+ 500 ml oil or non-ionic surfactant Max of 3 applications of active ingredient /pest season
Kocide Opti (F) (2022)	Copper hydroxide	Anthracnose			70 – 90 g	Mineral	WFD		High volume spraying
Lorsban 50 EC (I) Not registered	Chlorpyrifos	Leafroller	Thrips, mites, scale, mealy bug	GC	50 – 75 ml	Organophosphate	24		Do not use with oil
Lorsban 750 WG (I) Not registered	Chlorpyrifos	Leafroller	Thrips, mites, scale, mealy bug	GC	33 – 50 g	Organophosphate	24		Do not use with oil
Mavrik Aquaflo (I) (2022)	Taufluvalinate	Leafroller	Thrips,mites	GC	20 ml	Synthetic Pyrethoid, Pyrethrin	24	No notation (L) (NC)	**CAUTION:** **DO NOT apply without consulting your Export** **Not acceptable for retail programs**

Chemical/Pesticide *F = fungicide* *I = insecticide* *PGR = growth regulator* *S = synergist*	Active Ingredient (common name)	Pest (Label claim)	May also affect Requires **Justified Approval** for use in avocados	Residue Testing Method	Product Rate g/100L ml/100L	Class of Chemical	Re-entry Interval (hours)	Label Information regarding Bees L= Label Claim NC = Novachem Agrichemical Manual	Observations
Method 240SC (I) (2021)	Methoxyfenozide	Leafroller		LC	25 ml	Diacylhydrazine	12	Very toxic to some insects. Certain insects may be killed from contact with this product. Do not allow drift outside the target area to occur.	**Max of 4 applications of active ingredient /season** Not compatible with mineral oils
Mit e Mec (I) (2023)	Milbemectin	Six spotted mite		LC	75 ml	Avermectins, Milbemycins	12	Toxic to bees. Sprays must not contact plants in flower if they are likely to be visited by bees. (L)	+ 500 ml Oil Max of 3 applications of active ingredient /pest season
Naturally Neem (I) (2019)	Azadirachtin Neem Oil	Thrips, whitefly, scale, mites, mealy bug, aphids, leaf miners			200 ml	Organic insecticide	WFD	Low toxicity to bees but should be applied when bees not foraging	High volume spaying – coverage important
Nordox 75 WG (F) (2020)	Cuprous oxide	Anthracnose			55 - 70 g	Mineral	WFD		High volume spraying
Ovispray (I) (2022)	Mineral paraffinic oil	Scale, thrips, mites			0.5 - 1 L	Organic insecticide	WFD		
ParaMite (I) (2022)	Etoxazole	Six spotted mite		GC	35 ml	Etoxazole	12	**Paramite may be harmful to non-target arthropods, but is deemed safe to bees** (L)	**Max 1 application of active ingredient per year** **Low** volume spraying **NOT** recommended
Phosgard (F) Injection only (2022)	Phosphorous Acid	Phytophthora				Fungicide	Injection		Injection only
Phostemic 400SL Injection only (2019	Phosphorous Acid	Phytophthora			1:2	Fungicide	Injection		Injection only

Chemical/Pesticide ***F = fungicide*** ***I = insecticide*** ***PGR = growth regulator*** ***S = synergist***	**Active Ingredient** **(common name)**	**Pest (Label claim)**	**May also affect** Requires **Justified Approval** for use in avocados	**Residue Testing Method**	**Product Rate** **g/100L** **ml/100L**	**Class of Chemical**	**Re-entry Interval (hours)**	**Label Information regarding Bees** L= Label Claim NC = Novachem Agrichemical Manual	**Observations**
Proclain Opti (I) (2022)	Emamectin benzoate	Leafroller		LC	4 g	Avermectins, Milbemycins	12	Very toxic to terrestrial invertebrates (L) Toxic to bees. Sprays must not contact plants in flower if they are likely to be visited by bees. (NC	+ non-ionic wetting agent Must NOT be used more than 3 times per calendar year, with a minimum interval period of 21 days. Takes about 4 days to achieve maximum control
Prodigy (I) (2022)	Methoxyfenozide	Leafroller		LC	25 ml	Diacylhydrazine	12	Very toxic to some insects. Certain insects may be killed from contact with this product. Do not allow drift outside the target area to occur.	**Max of 4 applications of active ingredient /season** Not compatible with mineral oils
Pychlorex 48 EC (I) Not registered	Chlorpyrifos	Leafroller	Thrips, mites, scale, mealy bug	GC	50 – 75 ml	Organophosphate	24		**Do not use with oil**
Pyganic (I) (2019)	Pyrethrins	Greenhouse thrips	Passionvine Hopper	LC	100 ml	Pyrethoids, Pyrethrins	12	Toxic to bees	High volume spray Most effective when applied at night
Pylon (2022)	Pyrethrins	Greenhouse thrips	Passionvine Hopper	LC	50 ml	Pyrethoids, Pyrethrins	12	Toxic to bees	High volume spray Most effective when applied at night
Pyrinex Insecticide (I) (2020)	Chlorpyrifos	Broad spectrum	Thrips, mites, scale, mealy bug	GC	50 – 75 ml	Organophosphate	24		Caution is required for export market
Pyrinex 500EC (I) (2021)	Chlorpyrifos	Broad spectrum	Thrips, mites, scale, mealy bug	GC	50 – 75 ml	Organophosphate	24		Caution is required for export market

Chemical/Pesticide ***F = fungicide*** ***I = insecticide*** ***PGR = growth regulator*** ***S = synergist***	**Active Ingredient** **(common name)**	**Pest (Label claim)**	**May also affect** Requires **Justified Approval** for use in avocados	**Residue Testing Method**	**Product Rate** **g/100L** **ml/100L**	**Class of Chemical**	**Re-entry Interval (hours)**	**Label Information regarding Bees** L= Label Claim NC = Novachem Agrichemical Manual	**Observations**
Serenade Optimum (F) (2020)	Bacillus subtillis	Anthracnose			100 g	Organic fungicide	WFD		Apply to tank using lowest copper rate.
Sevin Flo (I) (2019)	Carbaryl	Leafroller caterpillars, mealy bug, thrips, scale		GC	160 ml	Carbamate	24		High volume spraying
Sparta (I) (2023)	Spinetoram	Leafroller, thrips		LC	20 ml (LR) 40 ml (GHT) Note different rate for LR and GHT	Spinosyns	12	**Dangerous to bees. Avoid direct application or drift of spray mix onto bees. Once the spray deposit dries, foraging bees will not be affected. (L)**	**Max of 4 applications of active ingredient per pest season.** Add Latron B 1956 if using for thrip.
Spinosad – Horticare (I) (2022)	Spinosad	Leafroller			40 ml	Spinosyns	WFD	**Dangerous to bees. Avoid direct application or drift of spray mix onto bees. Once the spray deposit dries, foraging bees will not be affected. (L)**	Alternate with products containing different modes of action **Max of 4 applications of active ingredient per pest season**
Sportak (F - Post-harvest only) (2022)	Prochloraz	Anthracnose		GC	55 ml	n/a post-harvest			Post-harvest fungicide
Stemshot AV-1 (F – injection) (2020)	Phosphorous acid	*Phytophthora*			See label	Mineral	N/A		**Trunk injection only**
Success Naturalyte (I) (2021)	Spinosad	Leafroller	Thrips	LC	40 ml	Spinosyns	12	**Dangerous to bees. Avoid direct application or drift of spray mix onto bees. Once the spray deposit dries, foraging bees will not be affected. (L)**	Alternate with products containing different modes of action **Max of 4 applications of active ingredient per pest season**

Chemical/Pesticide ***F = fungicide*** ***I = insecticide*** ***PGR = growth regulator*** ***S = synergist***	**Active Ingredient** **(common name)**	**Pest (Label claim)**	**May also affect** Requires **Justified Approval** for use in avocados	**Residue Testing Method**	**Product Rate** **g/100L** **ml/100L**	**Class of Chemical**	**Re-entry Interval (hours)**	**Label Information regarding Bees** L= Label Claim NC = Novachem Agrichemical Manual	**Observations**
Sunny (PGR – Foliar) (2021)	Uniconazole – P	Growth regulator		**LC**	0.5 – 1 litre	Plant Growth Regulator	24		+ non-ionic wetting agent at 0.05% Maximum application frequency of one application/year
Synergy Horticultural Oil (I) (2018) – check use	Mineral oil	Oil			0.5 – 1 litre	Organic insecticide	WFD		Do not apply to plants under stress
Talent (I) (2021)	Methoxyfenozide	Leafroller		LC	25 ml	Diacylhydrazine	12	**Test show no unacceptable effects on bees – spray when bees not foraging**	**Max of 4 applications of active ingredient /season** Not compatible with mineral oils
Toppel 500 (I) (2021)	Chlorpyrifos	Leafroller caterpillar	Thrips, mites,scale, mealy bug	GC	50 – 75 ml	Organophosphate	24		**Do not use with oil**
Topstar (I) (2018)	Thiacloprid	Thrips	Scale, mealybug	LC	15 ml (30ml)	Neonicatinoid	12		
Tree-Doc 400SL(F-injection) (2023)	Phosphorous acid	*Phytophthora*			See label	Fungicide	12		**TRUNK APPLICATION ONLY**
Tri-Base Blue (F) (2019)	Copper sulphate tribase	Anthracnose			280 ml	Fungicide	WFD		High volume spraying only
TripleX (I) (2021)	Bacillus amyloliquefaciens	Botrytis cinerea			500 ml	Fungicide	WFD		

Chemical/Pesticide ***F = fungicide*** ***I = insecticide*** ***PGR = growth regulator*** ***S = synergist***	**Active Ingredient** **(common name)**	**Pest (Label claim)**	**May also affect** Requires **Justified Approval** for use in avocados	**Residue Testing Method**	**Product Rate** **g/100L** **ml/100L**	**Class of Chemical**	**Re-entry Interval (hours)**	**Label Information regarding Bees** L= Label Claim NC = Novachem Agrichemical Manual	**Observations**
Unique 50SC (PGR) (2021)	Uniconizole	Growth Regulator		LC	0.5 – 1 litre	Plant Growth Regulator	24		Maximum application frequency of one application/year.
Uphold (I) (2021)	Spinetoram	Leafroller, thrips		LC	20 ml (LR) 40 ml (GHT) Note different rate for LR and GHT	Spinosyns	12	**Dangerous to bees. Avoid direct application or drift of spray mix onto bees. Once the spray deposit dries, foraging bees will not be affected. (L)**	**Max of 4 applications of active ingredient per pest season.** Add Latron B 1956 if using for thrip.
Velocity 50 SC (I) (2021)	Emamectin benzoate	Leafroller		**LC**	4 ml	Avermectins, Milbemycins	12	Very toxic to terrestrial invertebrates (L)	**Max 6 applications of activie ingredient per crop cycle.**
Verdex (I) (2019)	Abamectin	Six spotted mite	Leafroller	LC	37.5 ml	Avermectins, Milbemycins	12	Very toxic to terrestrial invertebrates (L) Very toxic to bees must not contact plants in flower if they are likely to be visited by bees. (L)	+ 500 ml Oil or + non-ionic surfactant Max of 3 applications of active ingredient /season
Vitis (I) (2021)	Emamectin benzoate	Leafroller		LC	4 g	Avermectins, Milbemycins	12	Toxic to bees. Must not contact plants in flower if bees are actively foraging (NC)	+ 50ml oil or + non-ionic wetting agent **No more than 6 applications of active ingredient per crop cycle.**
Warlock Insecticide (I) (2020)	Emamectin benzoate	Leafroller		LC	10.5 ml	Avermectins, Milbemycins	12		**No more than 6 applications of active ingredient per crop cycle.**

Chemical/Pesticide *F = fungicide* *I = insecticide* *PGR = growth regulator* *S = synergist*	Active Ingredient (common name)	Pest (Label claim)	May also affect Requires **Justified Approval** for use in avocados	Residue Testing Method	Product Rate g/100L ml/100L	Class of Chemical	Re-entry Interval (hours)	Label Information regarding Bees L= Label Claim NC = Novachem Agrichemical Manual	Observations
ZETaPy (I) (2021)	Pyrethrins	Greenhouse thrips	(Mealy bug, Passion vine hopper)	LC	50ml (150 ml)	Pyrethoid, Pyrethrin	12	Spray must not contact plants in flower if likely to be visited by bees. (L)	Most effective spray in evening/night after bees

Environmental Impact Rating

High = use should be limited or avoided
Med = Use sparingly
Low = Preferred option for use

Disclaimer: While using the best label data available at the time of production of the tables in this document,

The New Zealand Avocado Industry Limited disclaims any liability relating to the user of this information.

Always refer to the label before use.

WFD = When Fully Dry

4.0 REGISTERED PLANT GROWTH REGULATORS – Product & Application Rates

Chemical/Pesticide ***F = fungicide*** ***I = insecticide*** ***PGR = growth regulator*** ***S = synergist***	**Active Ingredient** **(common name)**	**Label claim**	**May also affect** Requires **Justified Approval** for use in avocados	**Residue Testing Method**	**Product Rate** **g/100L** **ml/100L**	**Product use**	**Observations**
AUSTAR (PGR) (2018)	Paclobutrazol	PGR	n/a	GC	1.5 to 3.0ml per m^2 of tree canopy. Use 1-2 litres of water to evenly apply the dose around the tree.	AUSTAR is NOT suitable for old, low vigour or unhealthy trees. Autumn or early winter applications are preferred. Late spring applications can lead to results not being seen that season. **See label for specific use information**	**SOIL (Collar) DRENCH APPLICATION ONLY** **Avoid applying to drip line**
Avocet (PGR) (2021)	Paclobutrazol	PGR	n/a	GC	1.5 to 3.0ml per m^2 of tree canopy. Use 1-2 litres of water to evenly apply the dose around the tree.	Avocet is NOT suitable for old, low vigour or unhealthy trees. Autumn or early winter applications are preferred. Late spring applications can lead to results not being seen that season. **See label for specific use information**	**SOIL (Collar) DRENCH APPLICATION ONLY** **Avoid applying to drip line**
Payback (PGR) (2022)	Paclobutrazol	PGR	n/a	GC	1.5 to 3.0ml per m^2 of tree canopy. Use 1-2 litres of water to evenly apply the dose around the tree.	Payback is NOT suitable for old, low vigour or unhealthy trees. Autumn or early winter applications are preferred. Late spring applications can lead to results not being seen that season. **See label for specific use information**	**SOIL (Collar) DRENCH APPLICATION ONLY** **Avoid applying to drip line**

5.0 PEST versus REGISTERED CHEMICAL

PEST	PRODUCT	ACTIVE INGREDIENT	NOTES	May also affect
LEAFROLLER	Altacor	Chorantraniloprole	Preferred option for use	
	Accolade, Announce, Proclaim Opti, Velocity, Vitis, Warlock Insecticide	Emamectin benzoate		
	Bactur WDG, Biobit, , DelfinWG, Dipel	Bacillus thuringirnsis		
	Genoxy, Method 240SC, Prodigy, Talent	Methoxyfenozide		
	Sparta, Uphold	Spinetoram		Thrips
	Spinosad – Horticare Success Naturalyte	Spinosad		
	Approve, Comic, Islandzide, Mimic, Prolan	Tebufenozide		
	Insecta-kil	Silicon dioxide		Mites, Mealybug, bronze beetle, Aphids
	Dew 600, Diazinon 600EW, Diazol 500SC,	Diazinon	Use sparingly	Armored scale, Mealybug
	Carbaryl 50F, Sevin Flo	Carbaryl	Use should be limited or avoided	
	Chlorfos 480, Chlorpyrifos 500EC, Chlorpyrifos 50EC Horticare, Lorsban 50EC, Lorsban 750WG, Pyrinex, , Toppel	Chlorpyrifos	Use should be limited or avoided	Armored scale, Thrips, Mites, Mealybug
	Mavrik Aquaflo	Taufluvalinate	**Use should be avoided for export market fruit**	Thrips, Mites
	Attack, Ambush	Pirimiphos methyl		Armored scale, Mealybug

PEST	PRODUCT	ACTIVE INGREDIENT	NOTES	May also affect
THRIPS The application of a second spray 14 – 21 days after the first application **is best practice.**	Alpasso, Calypso, Commend, Topstar	Thiacloprid	Preferred option for use	Scale, Mealybug
	Sparta, Uphold	Spinetoram		Leafroller
	DC-Tron Plus, EN Spray 99, Excel Oil - Organic,	Mineral Oil		Armored scale, Six Spotted Mite
	Naturally Neem	Azadirachtin Neem Oil		
	Ovispray	Mineral Paraffinic Oil		
	Pyganic, Pylon, ZetaPy	Pyrethrins	Use sparingly	Mealybug, Passion Vine Hopper
	Dew 600, Diazinon 600EW, Diazol 500SC	Diazinon	Use sparingly	Armored scale, Leafroller, Mealybug
	Fyfanon	Maldison (Malathion)	Use should be limited or avoided	Armoured scale, Mealy bug

PEST	PRODUCT	ACTIVE INGREDIENT	NOTES	May also affect
SIX SPOTTED MITE	Abamectin – Horticare, Apostle, Avid, Invert EW, Verdex,	Abamectin	Preferred option for use	
	DC-Tron Plus, EN Spray 99, Excel Oil - Organic,	Mineral Oil		Thrips, mites, Armored scale
	Eromite, Etoximite, ParaMite	Etoxazole		
	Insecta-Kill	Silicon dioxide		
	Mit e Mec	Milbemectin		
	Naturally Neem	Azadirachtin Neem Oil		Mealybug, scale

PEST	PRODUCT	ACTIVE INGREDIENT	NOTES	May also affect
SCALE For most effective control spray when crawlers are most prevalent November to January March to May	DC-Tron Plus, EN Spray 99, Excel Oil -	Mineral Oil		Thrips, mites
	Insecta-Kill	Silicon dioxide		Mites, Mealybug, bronze beetle, Aphids, Leafroller
	Naturally Neem	Azadirachtin Neem Oil		Mites, Mealybug
	Dew 600, Diazinon 600EW, Diazol 500SC	Diazinon	Use sparingly	Thrips, Leafroller, Mealybug
	Carbaryl 50F, Sevin Flo	Carbaryl	Use should be limited or avoided	Leafroller, Thrips, Mites, Mealybug
	Mavrik Aquaflo	Taufluvalinate	**Use should be avoided: these two chemical should not be used in an export programme.**	Thrips, Mites
	Attack, Ambush	Pirimiphos methyl		Armoured scale, Mealybug

Note: Specific chemicals of concern are chlorpyrifos (Lorsban), taufluvalinate (Mavrik), and pirimiphos methyl (Attack) as detectable residues may be present even when the PHI has been observed.

It is recommended that residue tests be carried out on any lines of fruit intended for export where any of these chemicals have been applied.

NB: For Malaysia, Singapore, Korea and Thailand, the use of chlorpyrifos, taufluvalinate and pirimiphos methyl is not recommended.

It is recommended that you contact your Exporter before using these products.

6.0 PRE HARVEST INTERVALS AND MRL'S (ACTIVE INGREDIENT) - Countries A-L

AVOCADO MRL and WHP Table

Season:2023-24 (July 2023)	Australia (AU)		China (CN) ∞		EU		Hong Kong (HK)		India (IN)		Japan (JP)		Korea (KR)	
	MRL	PHI	MRL	PHI	MRL	PHI	MRL	PHI	MRL	PHI	MRL	PHI	MRL	PHI
Abamectin	0.05	14	0.015	14	0.02	14	0.02	14	0.01	14	0.02	14	0.01	14
Bacillus subtillis	Exempt	0	Exempt	0	Exempt	0	Exempt	0	Not listed	0	Not listed	0	Exempt	0
Bacillus thuringiensis	Exempt	0	Exempt	0	0.01	0	Exempt	0	Not listed	0	Not listed	0	Exempt	0
Carbaryl	2	10	3 ∞	10	0.01	120	10	10	None set	120	0.01	120	0.01	120
Chlorantraniliprole	4	14	0.5 ∞	14	None set	180	4	14	None set	180	0.5	14	None set	180
Chlorpyrifos @	0.5	35	0.02 ∞	35	0.01	210 *	0.5	35	0.5	35	**0.01**	**210** *	0.01	210 *
Copper sprays	10	0	Not listed	0	20	0	Not listed	0	30	0	Exempt	0	Exempt	0
Diazinon	0.5	14	None set∞	14	0.01	Test	None Set	Test	0.01	Test	0.01	Test	0.01	Test
Emamectin benzoate	0.005	3	None set∞	3	**0.005**	**3**	None Set	3	0.01	3	0.01	3	0.01	3
Etoxazole	**0.1**	**14**	None set∞	14	0.01	**56**	0.2	14	0.01	**56**	0.01	**56**	0.01	**56**
Maldison (Malathion)	2	7	None set∞	7	0.02	180	8	7	4	7	8	7	**0.01**	**180**
Methoxyfenozide (do not use with oil)	0.5	14	0.7	14	0.7	14	0.7	14	0.01	Test	0.7	14	0.7	14
Milbemectin	0.02 ∞	14	None set∞	14	0.02	14	None Set	14	0.01	14	0.02	14	0.01	14
Mineral oil	Exempt	0	Not listed	0	0.01 #	0#	Exempt	0	Not listed	0	Exempt	0	Exempt	0
Paclobutrazol (soil drench only)	0.1	180	0.01	180	0.01	180	None Set	180	0.01	180	0.01	180	0.01	180
Permethrin + Pirimiphos methyl	0.02	28∞	0.1	28	0.01	Test	None set	Test	0.01	Test	0.1	28 *	0.01	Test
Phosphonic Acid (foliar)	500	1	20©	1	50	1∞	None set	1∞	0.01	1∞	150	1∞	0.01	1∞
Prochloraz (post-harvest use only)	5	0	7	0	7	0	7	0	0.01	0	**5**	0	5	0
Pyrethrin	1	1	None set∞	1	1	1	None set	**1**	0.01	**1**	1	1	1 ^	1
Pyrethrin + piperonyl butoxide	1	1	None set∞	1	1	1	None Set	14	0.01	14	1	1	0.01	14
Spinetoram	0.3	14	0.3	14	0.02	14	None Set	49	0.01	49	0.3	14	0.3	14
Spinosad	0.3	14	None set∞	14	0.02	28	0.3	14	0.01	28	0.3	14	0.3	14
(Tau) Fluvalinate	0.02∞	28	None set∞	28	0.01	Test	None Set	Test	0.01	Test	0.01	Test	0.01	Test
Tebufenozide	0.5	21	1	21	1	21	1	21	0.01	250	1	21	0.01	250
Thiacloprid	0.1	14	None set∞	14	0.01	Test(84)	None Set	Test(84)	0.01	Test(84)	0.01	Test(84)	0.01	Test(84)
Uniconazole - P	0.5	14	None set∞	14	0.01	60	None set	60	0.01	60	0.5	14	0.01	60

7.0 PRE HARVEST INTERVALS AND MRL'S (ACTIVE INGREDIENT) - Countries M-Z

AVOCADO MRL and WHP Table														
Season:2023-24 (July 2023)	Malaysia (MY)		New Zealand (NZ)		Singapore (SG)		Taiwan (TW)		Thailand (TH)		UAE (AE)		USA (US)	
	MRL	PHI	MRL	PHI	MRL	PHI	MRL	PHI	MRL	PHI	MRL	PHI	MRL	PHI
Abamectin	0.015 ©	14	0.02	14	0.015 ©	14	0.02	14	0.015 ©	14	0.01	14	0.02	14
Bacillus subtillis	Not listed	0	Exempt	0	Not listed	0	Exempt	0	Not listed	0	Exempt	0	Exempt	0
Bacillus thuringiensis	Exempt	0	Exempt	0	Not listed	0	Exempt	0	Not listed	0	0.01	0	Exempt	0
Carbaryl	None set	120	3	10	10	10	0.1	120	0.01	120	0.01	120	None Set	120
Chlorantraniliprole	0.5 ¥	14	0.5	14	0.5 ¥	14	0.5	14	None set	180	None set	180	4	14
Chlorpyrifos @	0.01	210 *	0.2	35	0.5	35	0.5	35	0.005	210 *	0.01	210 *	None Set	210 *
Copper sprays	Exempt	0	Exempt	0	Not listed	0	Exempt	0	Not listed	0	20	0	Exempt	0
Diazinon	None Set	Test	0.1	14	0.5	14	1	14	0.01	Test	0.01	Test	None Set	Test
Emamectin benzoate	0.01	3	0.005	3	None Set	3	None Set	3	0.005	3	0.005	3	None Set	3
Etoxazole	0.01	56	0.1	14	None Set	56	None Set	56	0.01	56	0.01	56	0.2	14
Maldison (Malathion)	0.01	180	2	7	None Set	180	1	7	0.01	180	0.02	180	8	7
Methoxyfenozide (do not use with oil)	0.7 ©	14	0.1	14	0.7 ©	14	0.7	14	0.7 ©	14	0.7	14	0.6	14
Milbemectin	0.01	14	0.02	14	None Set	14	0.2	14	0.01	14	0.02	14	None Set	14
Mineral oil	Exempt	0	Not listed	0	Not listed	0	Exempt	0	Not listed	0	0.01	0	Exempt	0
Paclobutrazol (soil drench only)	0.01	180	0.01	180	None Set	180	None Set	180	0.01	180	0.01	180	None Set	180
Permethrin + Pirimiphos methyl	0.01	Test	0.1	28	None Set	Test	1	28	0.01	Test	0.01	Test	None Set	Test
Phosphonic Acid (foliar)	20 ©	1	Exempt	1	20 ©	1	None Set	1∞	20 ©	1	20	1	Exempt	1∞
Prochloraz (post-harvest only)	7©	0	5	0	5	0	None Set	None set	7©	0	7	0	None Set	None set
Pyrethrin	Exempt	1	1	1	1	1	None Set	14	0.01	1	1	1	Exempt	1
Pyrethrin + piperonyl butoxide	None set	14	1	1	1	1	None Set	14	0.01	1	1	1	Exempt	1
Spinetoram	0.3©	14	0.02	14	0.3©	14	0.2	14	0.3©	14	0.3	14	0.3	14
Spinosad	0.01	28	0.1	14	None Set	28	None Set	28	0.01	28	0.02	28	0.3	14
(Tau) Fluvalinate	0.01	Test	0.1	28	None Set	Test	None Set	Test	0.01	Test	0.01	Test	None Set	Test
Tebufenozide	1©	21	0.2	21	1©	21	1	21	1©	21	1	21	None Set	250
Thiacloprid	**0.01**	**Test(84)**	0.05	14	**None Set**	**Test(84)**	**None Set**	**Test(84)**	**0.01**	**Test(84)**	**0.01**	**Test(84)**	**None Set**	**Test(84)**
Uniconazole - P	None Set	60	0.5	14	None set	60	0.01	60	None Set	60	None Set	60	None Set	60

Notes: All fruit exported to those countries where MRL's are set must meet the importing country MRL requirements.
For those countries where an MRL is notated as "Not listed" listed or specified as "None set" it is the Exporters responsibility to meet the requirements of both the country's import requirements and those their importer

Exempt	Generally Recognised As Safe (GRAS) Listed as Exempt
∞	PHI Based on acceptance of NZ MRL and in the case of Australia a TTMRA agreement
©	Based on acceptance of Codex
*	Residue test is recommended
^	Country has notified MRL to be revoked in future without notice
^	Country has notified MRL to be revoked in future without notice
~	MRL set applies to pre-harvest - not to be used post-harvest
#	European importers could insist as part of their contracts that no mineral oils be used on their shipments.
@	PHI set at NZ PHI for those countries with higher MRL than NZ to meet the NZ MRL requirements
¥	PHI based on agreed import 0.5 MRL

1 2022-23 Season changes this season are in BLUE, Updates during season RED
2 Under mutual recognition the NZ MRL and PHI can be used for Australia in the absence of an Australian MRL (TTMRA)
3 Hong Kong, Korea and India have now adopted default MRLs (no longer automatically recognising Codex or NZ MRLs)
4 Malaysia, Singapore and Thailand recognise Codex but only when they have not promulgated specific MRLS
5 Malaysia, Singapore and Thailand do not recognise NZ MRLs
6 Codex is normally recognised by India, Malaysia, Singapore and Thailand in absence of specific national MRL
7 UAE is moving from Codex to recognising EU MRLs

Disclaimer: While using the best data available at the time of production, the NZAIL disclaims any liability relating to the use of this information. As per the EMS it is the responsibility of the Exporter to be aware of the legal requirements of both the importing country and the importer.

PART 4

CONTRACT HARVESTERS RESPONSIBILITIES

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CONTRACT HARVESTERS RESPONSIBILITIES

1.0 REGISTRATION

EMS Requirement

1.1 Contract Harvesters will register with NZ Avocado including payment of any required fee. Current registration fees can be viewed on the NZ Avocado website under FEES.

1.2 The Contract Harvester shall indicate, where applicable, the accredited Food Safety Programme they are registered with and they will be listed on the NZ Avocado website.

2.0 FOOD SAFETY REQUIREMENTS

The objective of any compliance to an accredited Food Safety Programme is to provide consumers of New Zealand avocados, both locally and internationally, with fruit that is free of significant health hazards and may have only residues of approved products at or below the allowable MRL.

Please refer to Part 9 of this Quality Manual for generic Food Safety requirements applicable to Growers, Contract Harvesters, Packers and Exporters.

2.1 Compliance and Audit

EMS Requirement

2.1.1 The Contract Harvester shall be responsible for ensuring that harvest activities comply with the requirements of their certified food safety programme.

2.1.2 A Contract Harvester, harvesting export fruit and/or transporting fruit (including New Zealand market supply only) must provide the Grower and the Packer with a copy of evidence of accreditation to an internationally recognised Food Safety Programme.

Note: Contractors working on any kiwifruit orchards that supply Zespri require a separate Compliance Assessment Verification (CAV). To get a CAV, kiwifruit contractors must be inspected annually by a Zespri-approved inspector and this audit and verification is not transferable to other crops.

2.1.3 At all times the Contract Harvester must comply with the PCBU health and safety and hygiene requirements of all parties.

3.0 DOCUMENTED SYSTEM AND RESPONSIBILITIES

The Contract Harvester must ensure that the key elements of a Food Safety Programme are maintained and regularly updated and responsibilities for key tasks are allocated according to the requirements of their certified compliance program.

3.1 Compliance

EMS Requirement

3.1.1 Where required the Contract Harvester shall ensure that there is documented evidence to indicate to the receiving Packer that the fruit has been picked by a food safety accredited Contract Harvester.

4.0 HARVEST RESPONSIBILITIES

4.1 Windfall Fruit and Fruit Touching the Ground

EMS Requirement

4.1.1 Fruit must not be harvested if it is on the ground or it has fallen to the ground in the process of harvesting.

4.1.2 The Grower and the Contract Harvester must ensure that under no conditions are windfall fruit collected and packed for export.

Best Practice

4.2 Harvesting following rainfall

4.2.1 It is strongly recommended that fruit is not harvested when more than 5mm of rain has fallen in the previous 24 hours.

4.2.2 Rainfall data for the 24 hours preceding harvest should be recorded and forwarded to the Packer.

4.2.3 The appropriate period of time to wait before harvest will depend on the drying conditions on that day. If the fruit can't "lose" water, then the lenticels may still be hydrated and susceptible to handling damage.

4.2.4 Follow the "Roll test for lenticel damage"

4.2.5 Wet soils lead to increased turgor in fruit, and this may increase handling damage and subsequent fruit rot development. This has been confirmed both through field experimentation and with the industry library tray database.

4.2.6 If less than 5mm of rain has fallen in the previous 24 hours picking should only commence / recommence when fruit are dry to the touch and at least 2 hours after the rain has stopped. Roll test is recommended.

4.3 Ambient Temperatures at Harvest

4.3.1 Harvesting should be undertaken at temperatures less than 30°C, and certainly should be curtailed at 35°C when conditions are excessively hot.

4.3.2 It is recommended that exposed fruit at tops of trees be harvested first, to avoid sunburn/colouring that will show later in the season.

NB: Fruit picked at higher temperatures will:

- Lose up to 10% more weight
- Respire at a much higher rate whilst hot, and
- Take significantly longer to cool

4.4 Harvesting Techniques, Traceability and Handling into Bins

EMS Requirement

4.4.1 Clipping fruit - all stems should be carefully cut to a maximum of 5 mm in length. Long or poorly cut stems may become dislodged and/or cause damage to other fruit during handling.

4.4.2 Under no circumstances are drop bags to be used from a fruit quality perspective.

4.4.3 Bins are to be identified with:

- PPIN Grower registration number.
- Block number
- Date of picking.
- Market compliance (e.g. China) where applicable.

Best Practice

4.4.4 Fruit should be placed carefully into bins to avoid damage.

4.4.5 Bins should not be overfilled as this will lead to fruit damage when double stacked.

4.5 China requirements – Harvest, Traceability, Bin Handling and Segregation

Bins must be clearly marked with the unique production site identifier (PPIN) and date of harvest prior to the bins leaving the production site.

4.5.1 Where only some blocks within an eligible production site are to be packed for China, block identifiers must be included on the harvest bins at the time of harvest.

4.5.2 Where there are eligible and ineligible production sites on the same property (PPIN), the grower will ensure that bins of eligible fruit intended for China are segregated, or separated with a physical barrier from ineligible fruit when held on orchard and during transport to the packhouse.

4.5.3 A segregation of 1 metre is considered adequate at ambient temperature.

4.6 Temperature and Time Requirements for Holding Fruit On-Orchard

EMS Requirement

To maximise post-harvest life and to minimise weight-loss and sun-burn:

4.6.1 Every effort must be made to deliver fruit to the Packer on the day that harvesting occurs. In all cases harvested fruit is to be delivered to the Packer within 24 hours of harvesting.

4.6.2 The Grower may apply to NZ Avocado in writing for a dispensation to hold fruit in a suitable storage facility when delivery to the Packer exceeds 24 hours. A suitable facility is defined as a cool storage facility with the demonstrated ability to draw down avocado fruit flesh temperatures to between 4.0 and 6.0°C within 24 hours. It is the Grower's responsibility to demonstrate the suitableness of the proposed facility as part of the dispensation request.

Best Practice

4.6.3 Fruit held on orchard awaiting transportation to the packhouse should be:

- Held in shade under cool and hygienic conditions.
- Moved in regular batches to the Packer.

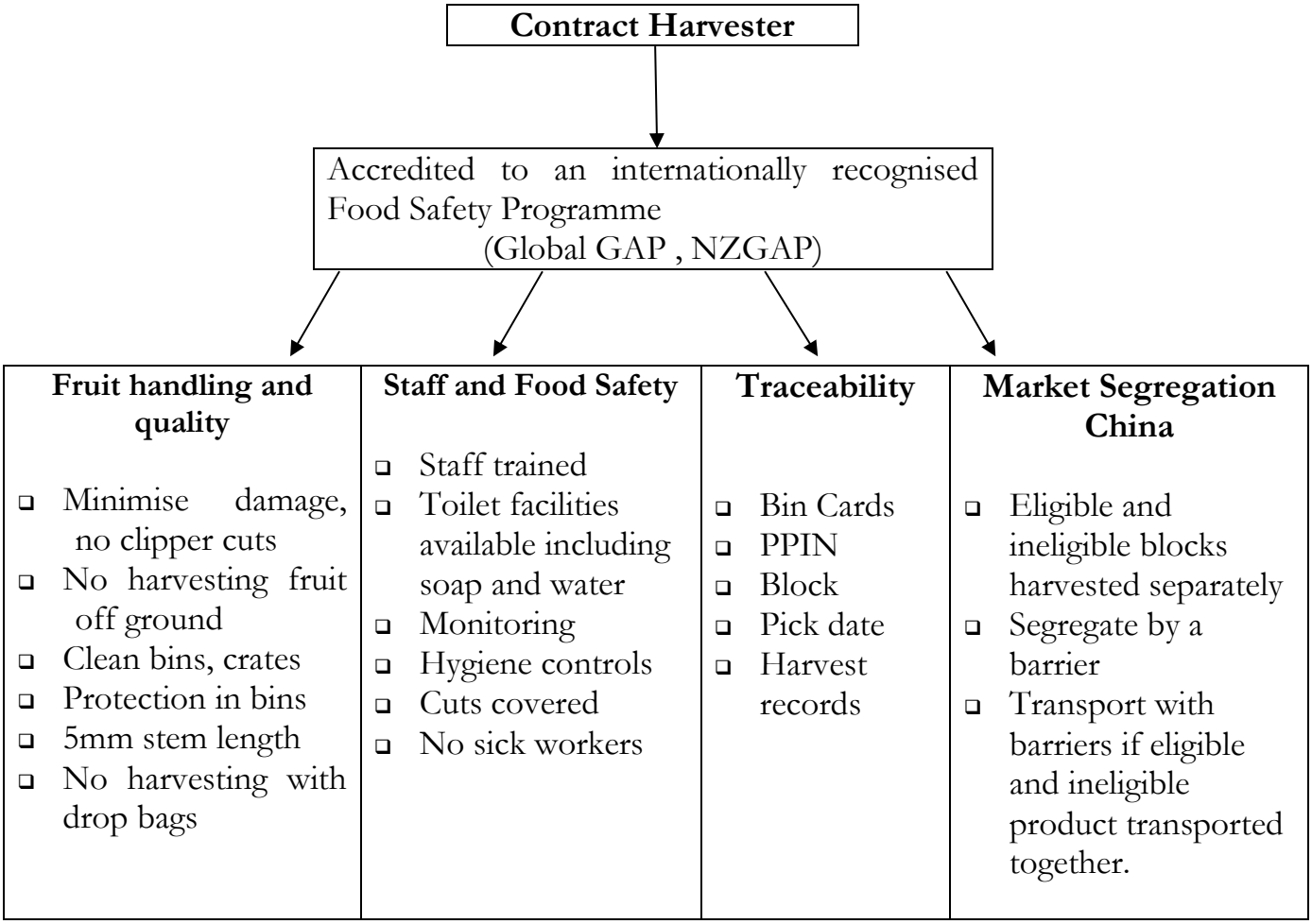
4.7 Harvest Records

EMS Requirement

4.7.1 Grower Harvesters and/or Contract Harvesters must maintain adequate documentation of harvesting activities. This includes on-orchard daily logs showing:

- Staff details
- Tally sheets including daily picking volumes
- The picking locations (PPINs and Blocks)
- Trucking documentation

4.8 Flow Diagram of Harvest Responsibilities for Export



Note: Contract Harvesters working on any kiwifruit orchards that supply Zespri require a separate Compliance Assessment Verification (CAV). To get a CAV, kiwifruit contractors must be inspected annually by a Zespri-approved inspector and this audit and verification is not transferable to other crops

5.0 NON-COMPLIANT PRODUCT PROCEDURE AND RESPONSIBILITIES

EMS Requirement

5.1.1 The Contract Harvester must have a documented plan outlining how any non-compliant (ineligible) product will be kept separate from compliant (eligible) product.

5.1.2 Non-compliant product must be clearly labelled as such.

5.1.3 Product for China must be clearly marked "China Compliant" on the bin cards as supplied by the Packer and segregated from any other non-compliant product.

5.1.4 Harvester must notify the Packer, in writing within 24 hours, if they become aware of any issue affecting the food safety of picked product (e.g. a worker with a communicable disease).

5.1.5 **Failure to Comply**

In the event of a biosecurity breach or where alleged failure to follow the requirements of the EMS or non-compliance with a Food Safety Programme or Quality Manual obligations is identified, NZ Avocado will:

- Investigate the alleged breach as outlined in NZ Avocado EMS Breach Procedure.
- If the breach is confirmed the following actions as outlined in **Section 6.2 of the EMS** may be considered by NZ Avocado:
  - Instruct the Grower to cease harvesting for export
  - Instruct the Packer to cease packing the fruit of the defaulting Grower for export.
  - Instruct the Exporter not to export the fruit of the defaulting Grower and notify the RPG.
- Subject to the procedures set out in the EMS and a decision from HEA, NZ Avocado shall be entitled to decline any application for registration in any subsequent export season which is made to it by a Grower, Packer or Exporter who has previously failed or refused to comply with the requirements of the EMS.

6.0 APPENDIX 1: CONTRACT HARVESTER FOOD SAFETY PLAN CHECKLIST

A contract harvester should have a documented food safety system in operation that at a minimum should contain the following in reference to **Section 2** of this document:

Fruit handling

- Physical damage minimized
- Clean equipment
- Fruit must not be harvested from the ground at any time
- Clean (uncontaminated) bins
- No drop bags used during harvest of avocado fruit (Fruit Quality)

Staff hygiene

- Adequate toilet & hand washing facilities available
- Transmittable disease management
- Fruit contaminated with blood to be removed and the source of the blood identified and managed
- Disposable gloves suitable for food use and a contrasting colour used where staff have open wounds

Traceability

- Each bin is identified with PPIN, block, pick date & market compliance (where applicable)
- System in place to demonstrate compliance to receiving Packer

Segregation for market access

- Block and PPIN segregation of compliant and non-compliant product for China
- China market segregation of compliant fruit from con-compliant fruit in place at all times

Training

- Appropriate training provided as required
- All training should be recorded (including records of, and protection from infectious disease) and presented on request

Auditable documentation

- On orchard daily logs showing:
  - Staffing
  - Daily picking volumes and
  - The picking locations (PPINs and blocks where applicable)

Actions to be taken for non-compliant product.

- Non-compliant product segregated from compliant product and clearly labelled

PART 5

PACKER RESPONSIBILITIES

Table of Contents

PACKER RESPONSIBILITIES SUMMARY

Packer responsibilities include:

- Annual Packer registration with the NZ Avocado Industry Limited (NZ Avocado)
- Procedure to ensure all Grower suppliers are registered with NZ Avocado.
- Annual registration for China, Thailand and meeting other market registration requirements.
- **Supply representative copies of Grower contracts** to NZ Avocado for verification as required under the EMS.
- **Registration** responsibilities, including only packing and supplying fruit from registered Growers that comply with food safety requirements.
- **Time-chain and cool-chain,** including ethylene monitoring.
- **Actions prior to packing,** including spray diary check, maturity testing, food safety, fruit receivals and traceability, phytosanitary treatments, temperature management and post-harvest chemical application.
- **Export Grade Standard** requirements**.**
- **Quality control**, including interface with phytosanitary requirements, sampling, inspection techniques, recording (inspection sheets), decision criteria, action procedures, reject analysis, weight monitoring and filing.
- **Packaging/branding/palletising**, including fruit labeling, date coding and pallet assembly.
- **Handling after packing,** including time-chain and cool-chain management and loadouts.
- **Reporting requirements** as required by the EMS.
- **Collect library tray information,** as per protocol and disseminate as relevant to Grower and Exporter.
- **Audits,** including co-operation with the auditor and actions in the event of non-compliance.

In all of these industry defined responsibilities, the Packer is encouraged to maintain a common-sense interface with:

- Applicable phytosanitary requirements and
- Exporter imperatives.

1.0 REGISTRATION AND COMPLIANCE RESPONSIBILITIES

1.1 Packer Registration

EMS Requirement

1.1.1 Packers are required to register with NZ Avocado - see details on the industry website: https://industry.nzavocado.co.nz/packer-registration/

1.1.2 Current registration fees can be viewed on the NZ Avocado website under https://industry.nzavocado.co.nz/about-us/fees/

1.2 Packer Compliance Requirements

Each Packer will be required to:

1.2.1 Ensure there is a separate registration for each individual Grower PPIN.

1.2.2 Only pack avocados for export where they have been supplied by a registered Grower and are for supply to a registered Exporter. A copy of the registration of each Grower is to be obtained prior to any packing of the relevant line and held on file.

1.2.3 Have a contract with the Growers as detailed in the **EMS Clauses 4.5.4, 4.5.6 and 4.5.7**

1.2.4 Verify the Growers' spray diary prior to clearance to pick using the electronic spray diary.

1.2.5 Obtain evidence that each Grower has accreditation to an independent third party audited, internationally recognized Food Safety Programme and have the records on file. Electronic copies are accepted.

1.2.6 Obtain evidence from the Contract Harvester of accreditation to an independent third party audited, internationally recognized Food Safety Programme used for harvest.

1.2.7 Comply with the Quality Management Programme of NZ Avocado, as described in this Quality Manual.

1.2.8 Comply with the requirements of independently audited, recognized third party Food Safety Programme.

1.2.9 **Where applicable,** ensure that at least one packhouse representative from each of the following categories attends a pre-season training workshop: Grower Liaison, Packhouse Management/Operations Manager, Quality Manager or Senior QC, Grading Staff.

The purpose of this is to ensure all changes are reported across the facility.

1.2.10 Comply with the Light Brown Apple Moth treatment requirements for fruit destined for the USA.

1.2.11 Be registered with the FDA if supplying product to the USA.

1.2.12 Be registered with MPI if packing of avocados for supply to Thailand

1.2.13 Be registered with MPI if packing of avocados for supply to China

1.2.14 Comply with all ICPR or OAP registration, packing, packaging and labelling requirements and water blasting requirements for markets offering market access under these conditions.

1.3 Failure to Comply

EMS Requirement

In the event of a biosecurity breach or where there is an alleged failure to follow the requirements the following is identified:

- The EMS
- Accredited Food Safety Programme
- Quality Manual

NZ Avocado will:

1.3.1 Investigate the alleged breach as outlined in the **EMS Clause 6.0**

1.3.2 If the breach is confirmed, following the actions outlined in the **EMS Clause 6.2**, NZ Avocado is entitled to:

- Instruct the Grower to cease harvesting for export
- Instruct the Packer to cease packing the fruit of the defaulting Grower for export.
- Notify the RPG and HEA and instruct the Exporter not to export the fruit of the defaulting Grower.

1.3.3 Subject to the procedures set out in the EMS, and a decision from HEA, NZ Avocado is entitled to decline any application for registration in any subsequent export season by a Grower, Packer or Exporter who has previously failed or refused to comply with a the requirements of the EMS or non-compliance with a Food Safety Programme or Quality Manual obligations.

2.0 TIME-CHAIN AND COOL-CHAIN REQUIREMENTS

A summary of the general and minimum industry guidelines for both time-chain and cool-chain requirements can be found in **Appendix 1.**

Note: Day zero equals the day of picking

2.1 Pick to Pack Times and Cool Chain Requirements

EMS Requirement

Every effort will be made to deliver fruit to the packhouse on the day of picking. In all cases fruit is to be:

2.1.1 Delivered to the packhouse within 24 hours of harvest.

2.1.2 Packed within 48 hours of harvest.

2.1.3 Placed into cool store within 12 hours of packing.

2.1.4 Flesh temperatures will be cooled to between 4.0ºC and 7.0ºC within 72 hours of harvest or 24 hours of packing whichever is the lesser. **See Section 10.2** for flesh temperatures specifications before and after 30 November.

2.2 Procedures for Breach of the 48 Hours Pick to Pack Times

EMS Requirement

2.2.1 If under **exceptional** circumstances (i.e. plant breakdown, power cuts, weather) the 48 hours pick to pack time is exceeded by no more than 24 hours then the following procedures are to be followed by the packhouse manager:

2.2.2 **The Grower, the Exporter and NZ Avocado** are to be notified in writing, through the dispensation process, if the fruit has exceeded the 48 hours pick to pack times. Follow the dispensation process on the website or email: dispensations@nzavocado.co.nz and include the following information:

- PPINS:
- No of bins:
- Pick Date:
- Pack Date:
- Storage conditions:
- Reason for dispensation:
- Confirmation that affected Grower(s) notified in writing:
- Name of Exporter and confirmation Exporter included in the dispensation application:

2.2.3 When planning pick to pack outside the EMS requirements, dispensation must be sought from NZ Avocado prior to the event NOT after the event has occurred. Final bin numbers by PPIN must be confirmed once the harvest is complete.

2.2.4 In the event of identifying a non-compliance as detailed in 2.2.1 or that has been identified through audit, the non-compliance is to be reported to NZ Avocado office immediately (within the hour of being identified) via the dispensations process (see Section 13.6)

2.2.5 Receipt of notification will be issued by NZ Avocado, and will be kept on file for audit purposes.

2.2.6 The Grower's Exporter(s) are to be notified and they are to monitor the crop through the shipping and selling chain to avoid any outturn problems. If any problems occur the Exporter is to inform NZ Avocado.

2.2.7 Failure to notify the Grower, the Exporter and NZ Avocado where the pick to pack EMS requirement has been breached constitutes a major non-compliance.

2.2.8 Product that exceeds 48 hours from harvest will be clearly flagged in the inventory system and a visual indicator card, no smaller in size than A4, attached to the face of the pallet, marked "Mixed Age" identifying it as a mixed age pallet.

Mixed age pallet is defined as either:

- A pallet containing fruit which exceeded the pick to pack time, or
- A pallet containing compliant fruit packed more than four days apart.

Best Practice

2.3 Storage Prior to Packing

Commence cooling to less than 15°C.

NB: prior to packing, fruit should be held just above the dew point (i.e. at 10-14°C).

Please see Section 10.12 for Coolstore ethylene control

2.4 Fruit Age (Pick to Load out Times)

NB: Day zero equals the day of picking

EMS Requirement

All avocados packed for export will comply with the fruit age specifications for the specific market and shipping methods as follows:

2.4.1 All markets other than Australia or USA

Container Shipping

- 6 days to container loading, **or**
- 7 days to scheduled sailing

Reefer Shipping

- 8 days to scheduled sailing

Air Freight

- 14 days to scheduled flying

2.4.2 Australia

Container Shipping

Timeframe (Harvest date)	Container loading	Scheduled Sailing
Beginning of harvest to 31 December:	9 days to container loading **OR**	11 days to scheduled sailing
1 January to 31 January.	7 days to container loading **OR**	9 days to scheduled sailing
1 February to end of harvest	5 days to container loading **OR**	7 days to scheduled sailing

- The relevant time frame is determined from the time of picking,
- Fruit age to market will be a consideration when considering any dispensation

Air Freight

- 14 days to scheduled flying

2.4.3 USA

Container Shipping

- 6 days to container loading, **OR**
- 9 days to scheduled sailing

Reefer Shipping

- 8 days to scheduled sailing

Air Freight

- 14 days to scheduled flying

Non-compliant product will not be loaded unless a dispensation has been obtained by the Exporter and a copy supplied to the Packer.

Breach of the fruit age requirements constitutes a major non-compliance.

Delivery to Metroport 3 days prior to scheduled sailing from Tauranga constitutes time of scheduled sailing for Metroport.

Best Practice

2.4.4 The Packer should:

- Plan handling of product so effective cool-chain is achieved, irrespective of packhouse location or on-site facilities.
- Ensure all avocados received for packing, and leaving the packhouse for export, are in premium condition and likely to arrive in the marketplace in the same condition.

3.0 FOOD SAFETY - PACKER REQUIREMENTS

The objective of any compliance to an accredited Food Safety Programme is to provide consumers of New Zealand avocados, both locally and internationally, with fruit that is free of significant health hazards and has residues of only approved products at or below the allowable MRL.

Please refer to Part 9 of this Quality Manual for generic Food Safety requirements. applicable to Growers, Contract Harvesters, Packers and Exporters.

Please refer to your Exporter for additional Customer and market requirements.

3.1 Compliance

EMS Requirement

3.1.1 Under the New Zealand Food Act 2014, those working with food products are required to be registered with MPI and have accreditation to an independent third party audited, recognised Food Safety Programme for both local market and export packing.

3.1.2 Packers must be able to provide evidence of accreditation to an independent third party audited, recognised Food Safety Programme or other Global Food Safety International Standards for avocados such as GlobalGAP, NZGAP, BRC, SQF1000.

3.2 Documented Quality Management and Food Safety System

EMS Requirement

3.2.1 The Packer will be responsible for ensuring that their production processes and the product produced complies with the requirements of their accredited independent third party audited, recognised Food Safety Programme and to additional food safety requirements in NZ Avocado Quality Manual.

3.2.2 The Packer will maintain a documented system that meets the requirements of their certified food safety system including:

- Who will be responsible for the maintenance of the Packer Food Safety system
- How each of the requirements of this Food Safety Programme will be met.

This documented programme will be readily available for inspection and audit and will identify a designated person responsible for the maintenance of the Packer systems.

3.2.3 The Packer will assign individuals to take responsibility for key tasks. At a minimum this will include:

- Product security
    - Grower registration documentation
    - Contract Harvester registration documentation
    - Agrichemical spray diaries
    - Fertiliser diaries (foliar applications)
    - Food safety compliance (Grower, Harvester and Packer)
- Records maintenance
    - Fruit receivals
    - Inventory control
    - Consignment tracking
- Packhouse compliance
    - Hygiene
    - Spray diary verification
    - Corrective action following non-compliances
    - Product recall
- Staff training

3.2.4 The documented Food Safety Programme will describe how any lines not complying with the food safety requirements are to be identified and held separate. Non-complying lines:

- Will not become mixed with field bins or packs containing fruit that complies with food safety requirements.
- Field bins or packed product (on pallets) of non-complying product will be identified and held in separate rows with clear markings to show that the product is non-complying.

3.2.5 The Packer will ensure that there is a system in place to process and/or verify the required documentation from Growers and Harvesters.

- Grower food safety certificate of accreditation
- Contract Harvester food safety certificate of accreditation
- Grower spray diary and foliar fertiliser diary records (at frequencies as specified elsewhere in this Quality Manual).

3.2.6 The Packer will verify that each spray diary received:

- Has been fully completed
- Confirms compliance with the Food Safety Programme
- Is filed and made available for audit

3.2.7 The Packer will ensure that any packhouse staff assigned a key task under **Section 3.2.2,** either have the relevant knowledge and skills to fulfill the task or have been given sufficient training and/or appropriate supervision to ensure compliance with the requirements of this programme.

3.2.8 A record of the training provided will be maintained. The Packer will also ensure that any supplying Contract Harvesters have a training programme in place to ensure Harvesters comply with the relevant requirements.

3.2.9 The Packer will implement actions in the event of any non-compliance being identified (see Section 13.6).

3.3 Food Safety Audit and Declarations

EMS Requirement

3.3.1 **The Packer will be available for audit to verify that the Packer has complied with NZ Avocado Food Safety requirements and the Packer's documented system.**

3.3.2 **A copy of each Declaration of Food Safety will be maintained on file by the Packer.**

3.4 Fruit Handling

EMS Requirement

3.4.1 All fruit will be handled as described in this Quality Manual for export avocados.

3.4.2 Physical damage at any point is to be minimised. Cuticle damage may expose the fruit to pathogens and other contaminants.

3.4.3 Bins will be maintained in such a condition that physical damage is minimised.

3.4.4 Bins used for holding and transporting fruit (whether empty or full) will be handled in such a manner that contamination does not occur.

3.5 Traceability

EMS Requirement

3.5.1 The Packer will maintain records and traceability systems to ensure the identity of each supplier is maintained through all phases of the packing and coolstorage process.

3.5.2 The Packer's systems and records will be to a standard not less than that specified in this Quality Manual for export avocados.

3.5.3 Individual packs of fruit will contain only fruit picked from the property indicated by the PPIN. Partially full trays or boxes of fruit at the end of a packing run will NOT be topped up with fruit from any other PPIN

3.5.4 At the end of each pack run for a PPIN the grading and packing lines will be cleared of all remaining fruit before packing a new PPIN commences.

3.6 China requirements - Harvest Traceability, Handling Bins and Segregation

EMS Requirement

3.6.1 Confirm on arrival that every bin received has the correct unique production site identifier (PPIN).

3.6.2 Confirm the supplying production sites are eligible for export under this programme by checking the production site register on the MPI website.

3.6.3 Confirm bins are clearly marked to identify eligibility for China with the words "Eligible for China" clearly marked on the bin cards and not covering any other information. Stickers can be used for this purpose.

3.6.4 Ensure that inventory records on product identification and traceability from the packhouse are maintained and available for compliance checking by the IVA.

3.6.5 Fruit intended for China must be segregated or separated with a physical barrier from fruit that is not eligible for China at all times.

3.6.6 Where there are eligible and ineligible production sites on the same property (PPIN), the Packer will ensure that bins of eligible fruit intended for China are segregated, or separated with a physical barrier from ineligible fruit during transport to the packhouse and when stored and packed at the packhouse.

3.6.7 A segregation of 1 metre is considered adequate at ambient temperature.

3.6.8 Ensure that packed product for China is clearly identified with the correct unique production site identifier (PPIN) and unique packhouse facility identifier. Any packed product that is not correctly identified (e.g. missing a unique production site identifier or unique packhouse facility identifier from the label) is not eligible for this programme.

3.7 Packhouse Hygiene

EMS Requirement

3.7.1 Procedures and maintenance of records must be in place to comply with the Packer's third party certification standard.

3.7.2 Packers are required to maintain hygiene at the documented level of their Food Safety Programme and this is recorded and checked and dated. Actions to maintain hygiene will be recorded in an appropriate hygiene log by the delegated person responsible for this.

3.7.3 Prior to grading at the commencement of the season and, following the packing of any line not complying with a Food Safety Programme:

- All contact surfaces will be cleaned, using a sanitising agent. This will include the cleaning of all belts, brushes and sizing cups. Particular care will be taken to remove all bird or vermin droppings.
- All non-complying avocados (and their bins/packaging) will be removed from the grading/packing area.
- The cleaning process is to be repeated weekly.

3.7.4 Appropriate notices will be maintained reminding staff of hygiene requirements, which will include:

- Staff working in the packing area will wash their hands with soap and water on leaving a toilet and after tea breaks.
- The packhouse will be designated as a non-smoking area.
- No domestic animals are permitted in the packhouse.

3.7.5 A pest management programme to combat vermin and bird ingress will be in place and documented (i.e. a site plan showing the positions of bait stations). The programme will ensure that baits cannot contaminate any fruit.

3.7.6 All waste products will be removed from the packhouse and storage areas daily.

3.8 Packaging suitability

EMS Requirement

3.8.1 All packaging will be new, maintained in clean condition and be free from organic material or other potential carriers of quarantine pests.

3.8.2 Prior to use, packaging will be checked to verify it will not damage the packed avocados and to ensure that it is not contaminated, damaged or deteriorated.

3.9 Branding and Identification

EMS Requirement

3.9.1 The label end (or card) of each pack will be indelibly identified with:

- Distributor or Packer identification
- Variety (e.g. Hass)
- Grade
- PPIN number
- Count
- Produce of New Zealand
- Packhouse (NZ Avocado) number
- Date code (picking date)
- Pallet card number.

3.10 Storage of Product

EMS Requirement

3.10.1 Storage will be in compliance with time-chain and cool-chain requirements as specified in this Quality Manual.

3.10.2 Inventory control will be maintained to prevent substitution or inappropriate stock rotation.

3.10.3 Stock should be protected from contamination during storage (e.g. from water/gas leaks or vermin). Any stock that becomes contaminated will be disposed of.

3.10.4 Chemical storage will be physically separated from the packhouse. Packing and cool storage facilities will be maintained free of:

- Materials or chemicals that may contaminate fruit or packaging materials (e.g. workshop chemicals).
- Chemical leakage as a result of machinery breakdown.

3.11 Transport of Product

EMS Requirement

3.11.1 All product transported will be carried in an environment protected sufficiently to prevent contamination and to maintain the cool-chain.

3.11.2 The Packer will be responsible for verifying delivery in compliance with these requirements to:

- Either the ship (for export)
- Or to freight forwarder or some other consolidation point as specified by the Exporter or Distributor.

3.12 Water Quality Management

EMS Requirement

3.12.1 The Packer will ensure that the water used in any operations involving direct fruit contact is of potable quality.

3.12.2 Packhouses operating on other than reticulated supply from a municipal authority will send water samples for testing on an annual basis to an MPI approved laboratory for detection of faecal coliforms. Initial testing will commence immediately prior to the start of the packing season with the results available prior to first pack. The level of ***E. coli*** **will be less than 1 Colony Forming Units (CFU)** in a 100 ml sample.

3.12.3 If the level of *E. coli* **exceeds 1 CFU** in a 100 ml sample, then the water will be treated or an alternative source found and water quality identified as a Critical Control Point and suitable monitoring and control measures implemented.

3.12.4 Waterblaster water quality verification trial as detailed in **Section 16 Appendix 3** and lead by NZ Avocado is to be reviewed and recommendations put to Packers ahead of any further work.

3.13 Microbial

Best Practice

Fruit samples for microbiological testing will be collected from pack houses during the harvest season. Samples will be screened for the presence of major food pathogens. The current screening programme is exploratory and only intended to verify that avocados are actually low risk. Organisms included in the screen are: Escherichia coli, Escherichia coli 0157:H7, Listeria monocytogenes, Salmonella sp.

3.14 Product Withdrawal and Recall Responsibilities and Procedures

EMS Requirement

3.14.1 Any Packer, Exporter or Local Market Handler identifying a breach of the Food Safety Programme in relation to the following, will immediately notify NZ Avocado in writing:

- Use of unregistered pesticides.
- Breach of the pre-harvest interval.
- Agrichemical and heavy metal residues in excess of the allowable MRL's. and MLs
- Communicable disease.

This notification will clearly identify the Grower PPIN, the Packer, the pick and pack date, pallet numbers, transport operators and destinations of affected product.

Failure to **immediately** notify NZ Avocado (within the hour of the breach being identified) will constitute a major non-compliance.

3.14.2 In the event of a requirement for a product recall, NZ Avocado will liaise with the Packer/Exporter/Local Market Handler to either recall the product or redirect the

product to a market where the product is in compliance. Any costs associated with recall or redirection of the product will be borne by the Exporter/local market handler.

3.14.3 NZ Avocado will immediately notify the Ministry for Primary Industries (MPI). Together with the Ministry, NZ Avocado will determine whether the circumstances dictate that the interests of the consumer are best served by a withdrawal of the affected product from the market or if a full product recall should be implemented.

3.14.4 Depending upon the outcome of **3.12.2,** the Packer, Exporter and/or Local Market Handler will trace the affected product as far through the distribution chain as possible. This will generally be to the final point of sale. The retailer will be informed of the nature of the breach and instructed to remove all unsold product from display areas. Any remaining stocks of product should be returned to the Exporter/local market handler for disposal.

3.14.5 In the event of a Mock Recall exercise NZ Avocado must be notified as part of the procedure.

3.15 Summary of Packer Responsibilities

PACKER

Accredited to an internationally recognised independent third party audited, Food Safety Programme or other Global Food Safety International Standards for avocados such as GlobalGAP, NZGAP, BRC.

Product Security

System to verify

- ❑ Grower Food Safety
- ❑ Grower Spray Diaries
- ❑ Grower Fertiliser Diaries (foliar applications)
- ❑ Harvester Food Safety
- ❑ **AvoGreen® Compliance for China**

Traceability

- ❑ Records and systems to maintain identity of each line

Hygiene

- ❑ Staff
- ❑ Cleaning
- ❑ Signage
- ❑ Bird and pest control
- ❑ Waste products

Post-harvest treatments

- ☐ Commissioned waterblaster
  - o Operated at the commissioned specifications
- ☐ Chemical treatments
  - o Use rate
  - o Use recorded

Food Safety Documentation

- ❑ To accompany consignment to Exporter/Distributor.

4.0 ACTIONS PRIOR TO PICKING AND PACKING

4.1 Maturity (Dry Matter) Assessment

Dry Matter testing is the method required by NZ Avocado for assessing avocado maturity. **See Part 8, Export Maturity Standards**, for a detailed explanation of the testing procedure.

EMS Requirement

4.1.1 Before fruit of any variety is harvested for the first time, from any PPIN, the Packer will obtain a maturity clearance to pick from the independent verifier appointed by NZ Avocado. This maturity clearance test will show that the fruit meets industry minimum standards for export. The maturity clearance will be held on file for audit.

4.1.2 The maturity clearance only applies to those blocks included in the maturity clearance area.

4.1.3 **Maturity Clearance Area (MCA)**

- A maturity clearance area is defined as an area that is to be cleared by a single maturity test. This area may consist of more than one block. The blocks within the maturity areas must be clearly defined.
- Each maturity clearance area must be clearly identified by name and location.
- All maturity areas will be registered prior to collection and an orchard map will be obtained from the Grower/Packer clearly indicating the boundaries of the MCA to be sampled. The documentation will include the % of tree age where known. Planting dates are to be used for tree age identification.
- Maps and maturity areas are to be registered with the Independent Testing Organisation (ITO).

4.1.4 A maturity clearance to pick will be obtained from the Independent Testing Organisation (ITO), until such time as notified by NZ Avocado (see **3.14.5** below). This clearance relates specifically to maturity requirements only and does not otherwise indicate suitability of fruit for export.

4.1.5 **Dispensations for maturity test.**

There are two different types of dispensation issued by NZ Avocado:

- Regional dispensation – exempting requirements for Independent Testing Organisation (ITO) clearance issued by region or distinct area within a region. There is the requirement for Packers to perform in house maturity tests prior to first harvest. i.e. Waihi - Athenree having dispensation and requiring an in house test prior to first harvest, everywhere else still having to go up for clearance through the ITO.
- A blanket clearance for regions exempting both the requirement for independent verification for clearance and the test prior to the first harvest.

4.1.6 Packers are required to forward to NZ Avocado any copies of the in-house maturity test results obtained while the regional requirement for independent clearance in place. This information will be taken into account in deciding when the requirement to test prior to first harvest is lifted to the status of blanket clearance.

4.1.7 The Packer will only pack fruit from registered PPINs that have met the industry maturity specifications. The Packer will retain test records for NZ Avocado audit purposes.

4.1.8 Harvesting from the orchard may proceed where each of the following criteria are met in any test:

- 18 out of the 20 fruit sampled achieve at least 20.8% dry matter content, and;
- The average dry matter content across the 20 fruit is at least:
  - 24% for Hass
  - 23% for Reed

4.1.9 Marginal maturity clearances may be issued at NZ Avocado's discretion.

4.1.10 The Packer will be liable for the cost of the failed maturity tests and will be invoiced by NZ Avocado.

4.1.11 Maturity tests not completed or minimum dry matter standard not met on any line exported or intended to be exported constitutes a major non-**compliance (see Section 13.6).**

4.2 Spray Diary Management and Verification

EMS Requirement

4.2.1 The Grower electronic spray diary is a **critical** legal document, which is covered by the Export Marketing Strategy (EMS). The terms and conditions of NZ Avocado electronic spray diary are EMS requirements. Please complete carefully.

4.2.2 Spray diary checks and verifications are a critical control point (CCP) under the Food Safety Programme. Appropriate verification procedures will be in operation. The Packer will verify that any line intended for export has been cleared to pick and pack. **Picking can only commence after the Packer has verified the diary**. No fruit will be exported with residues in excess of industry standards.

4.2.3 Timing of Spray Diary Entries

Spray diaries will be kept up to date with spray details being entered into the diary within 14 days of the spray application. This is to assist the Packer and Exporter in assessing fruit suitability for market and picking dates. This is a requirement of the China OAP.

This requirement must be included in the Grower/Exporter/Packer contracts.

Prior to picking and packing any fruit for export each Packer will complete an electronic spray diary verification of each line intended for export using the web-based electronic spray diary. **The use of paper spray diaries is not acceptable.**

4.2.4 Electronic verification of the spray diary also applies to organic orchards or orchards where no sprays have been applied during the season. To complete this verification:

- Check if any residue tests have been completed for PPIN
- Check the diary is up to date
- Select the markets the product is cleared for

- Complete the verification process.

4.2.5 If the Grower is using an agent (such as Packhouse staff) to complete or declare the diary on their behalf – the agent must have evidence, by way of an email or a hard copy, on file, that the information provided is accurate.

4.2.6 The electronic spray diary automatically reports to the Packer:

- Clear to pick dates per block and for each of the key markets according to the chemicals' pre-harvest interval by market.
- Any residue test required where a chemical has either been applied in excess of 25% of the recommended rates, or when a particular market has not specified an MRL and no pre-harvest interval has been set.

4.2.7 Actual harvest date will be in strict compliance with the "clear to pick" dates specified on the electronic spray diary report. Where a residue test is required, the results will be entered in to the residue test facility of the spray diary. NZ Avocado receives a copy of all industry residue tests directly from the laboratory to enable it to process an assessment and undertake residue monitoring.

4.2.8 Residue test results are to be loaded and assessed, BEFORE the verification process is completed by the Packer and before a clearance to pick can be issued.

NB: Failure to observe the clearance to pick dates or to conduct a residue test where required constitutes a major non-compliance (see Section 13.6).

4.2.9 Validity of the spray diary verification.

Once verified by the Packer the diary remains valid for a period of 14 days from the stated intended harvest date. If the Grower applies any sprays during this period to those blocks from which fruit is still being harvested, then another intended harvest entry must be created and the diary must be verified again.

4.3 Actions when Non Compliance Identified

EMS Requirement

4.3.1 A major non-compliance will be issued for **packed export product** where:

- The applicator does not hold a valid Growsafe® certificate.
- The clear to pick dates specified on the electronic spray diary are not observed,
- Fruit is harvested:
  - in advance of the clear to pick dates
  - before verification
  - after the expiry of the validation period
- A required residue test prior to packing indicated on the electronic spray diary has not been completed.
- Non registered chemicals have been used without a dispensation from NZ Avocado.

4.3.2 **Non-Compliance procedure for failing to verify spray diaries prior to commencing harvest.**

If the Packer identifies non-compliance during the verification process the following procedure will be followed:

- NZ Avocado will be notified and provided with all documentation relating to the non-compliance so that NZ Avocado can determine a plan of action.
- Where fruit is in a non-compliance situation the fruit will not be exported until a risk assessment, which could include a residue test has been conducted and the results are below the importing country MRL requirements.
- **For countries where MRLs have not been set or "None set" it is the Exporter's responsibility to meet the requirements of both their importer and the country's import requirements.**

NB: Independent auditors on behalf of NZ Avocado will draw samples from the packline for random residue testing by an accredited laboratory. These verify whether or not the system is functioning as required.

4.3.3 Inadequate spray diary checks and/or failure to notify NZ Avocado **will be treated as major non-compliance (see Section 13.6).**

4.3.4 **Non-Compliance procedure for verification of spray diaries where diary has not been verified prior to picking.**

In the event that fruit arrives at the packhouse where the spray diary has not been verified by the Packer **prior** to picking, the following procedure is to be observed. **Failure** to follow this procedure **will constitute a major non-compliance**.

- Notify NZ Avocado immediately **(within the hour)** the non-compliance is identified, providing details of the Grower (PPIN), pick date, volume of product, intended market, intended shipping date, the Harvester and the circumstances leading to the non-compliance.
- The line is to be placed on hold and isolated pending a decision from NZ Avocado.
- Where the risk is deemed by NZ Avocado to be minimal a warning will be issued to the Grower and the Packer, and a dispensation may be given to pack. Otherwise a residue test will be required prior to clearing the fruit.
- Where there is a second occurrence for an individual Grower (PPIN) a residue test will be required for that line and any further instances involving that PPIN.
- In the event that a Packer has three (3) or more non-compliances involving different PPINs of fruit arriving at the packhouse without prior verification of the diary, then a residue test will be required for each additional harvest verification prior to clearing the fruit for export.

4.4 Pre-harvest Intervals and Maximum Residue Limits

EMS Requirement

4.4.1 **Pre-harvest intervals for local and export markets.**

Pre-harvest intervals are for guidance only and are based on the best available information, including residue decay curves. Observance of the pre-harvest interval does **not** guarantee non-detectable residues. **Specific chemicals of concern are chlorpyrifos, taufluvalinate and pirimiphos methyl** as detectable residues may be present even when the pre-harvest interval has been observed. It is recommended that residue tests be carried out on any lines of fruit where any of these three chemicals have been applied.

NB: When requesting a residue test, ensure that the appropriate test method is specified to detect the relevant chemical. (e.g. abamectin, spinosad, will be tested using the LCMS method (see Part 3, Section 3.0).

4.4.2 **Pre-harvest Interval "Not Set".**

For some products it has not been possible to determine a PHI that will provide fruit with no detectable residues. Those products with no MRL and a "not set" pre-harvest interval (e.g. carbaryl, tebufenozide and acephate), applied after flowering and intended for the USA market will require a residue test. **It is the Grower's responsibility to ensure that there are no detectable residues on the fruit by way of an appropriate residue test.**

4.4.3 **Markets where no MRLs have been set.**

Where no MRL has been set and there is no PHI but the product has an equivalent MRL or PHI for New Zealand, then the corresponding PHI should be applied. This applies to markets other than New Zealand, Australia, USA, Japan, EU and Canada. Where there is no equivalent MRL or a PHI has not been set, then a residue test will be required to demonstrate compliance.

4.5 Dispensations, Residue Testing and Residue Sampling Training

EMS Requirement

4.5.1 Dispensations.

Written dispensation for use of non-registered chemicals may be granted by NZ Avocado under exceptional circumstances. Any conditions pertaining to this dispensation will be met, and a copy of the dispensation supplied by the Grower along with the spray diary. Under exceptional circumstances, written dispensation may also be granted to harvest within the pre-harvest interval for markets other than NZ or Australia, **only on condition** that a residue test is done demonstrating compliance with the relevant MRL.

The Grower, the Exporter and NZ Avocado are to be notified in writing, through the dispensation process

4.5.2 **Accredited laboratories for residue testing**

Independent laboratories must be ISO 17025 accredited for the relevant testing methods (e.g. GCMS, LCMS) or equivalent, for testing of agrichemical residues, microbial organisms and heavy metals.

4.5.3 **Training for residue sampling collection**

All staff, undertaking collection of samples for residue testing must be trained under NZ Avocado Protocol for Residue Sampling for avocado residue testing (**see Section 17.0, Appendix 4**) and undertake a refresher at the beginning of each season. Packers are to have a record of the training of all staff that collect fruit samples for residue testing.

Best Practice

4.5.4 Residue Testing for Japan.

It is recommended that all fruit destined for Japan be cleared by an appropriate residue test (GCMS or LCMS or combined) **PRIOR** to harvest.

4.6 Registered Chemicals for use in Avocados

Information on the list of chemicals registered for use in avocados, the active ingredients, application rates and the pre-harvest interval and MRL can be found in the **Quality Manual, Part 3.**

4.7 Clearance to Pick

EMS Requirement

4.7.1 Administration

The following will occur in order to give a clearance to pick:

- Only fruit from registered Growers will be exported.
- Spray diary Grower declaration and Packer verification will be completed.

4.7.2 Pre-harvest Quarantine Monitoring for China

- A pre-harvest quarantine monitor is required within 28 days prior to harvest.

4.7.3 Pre-harvest Quarantine Monitoring – unsprayed crops

- A pre-harvest quarantine monitor is required within 28 days of harvest.

4.7.4 Residue Testing and Unsprayed Crops

If a Grower does not apply any sprays to their crop and this is supported by a spray diary declaration, the following shall apply:

- To export fruit from an unsprayed crop the Grower must be registered with an AvoGreen® Operator or be a licensed AvoGreen® Owner-operator compliant to the AvoGreen® programme. This is to support the requirement for a pre-harvest quarantine monitor in **Part 2, Grower Section 3.3.2.**
- A residue test is required on all unsprayed crops unless the Grower holds registered organic certification. This supports the industry assurance programme to confirm residue status for export.

4.7.5 AvoGreen® compliance for China

- All Growers registered to export fruit to China will be assessed monthly for compliance against the market access requirements of the OAP, China. This assessment will confirm that Growers have taken action when a threshold has been exceeded when monitoring pests of concern to China.

4.7.6 AvoGreen® compliance – all other markets

- All export fruit will be AvoGreen® compliant as defined in the AvoGreen® manual under the AvoGreen® standard. All PPINs are to be linked to a licensed AvoGreen® Operator or a licensed AvoGreen® Owner-operator. This will be verified by NZ Avocado when the Grower registers for export.

4.8 Fruit Receivals

EMS Requirement

The Packer will ensure that all bins or field cases received are:

4.8.1 Identified with the PPIN **and block numbers** of the correct registered Grower.

4.8.2 Supplied by a Grower accredited to an independently audited, recognized third party Food Safety Programme. The Packer will keep evidence of accreditation on file.

4.8.3 Harvested by a Harvest Contractor with evidence of accreditation to an independent third party audited, internationally recognized Food Safety Programme.

4.8.4 Accompanied by transport documentation.

4.8.5 Received within time-chain guidelines **(see Section 2.0 and Section 14.0, Appendix 1).**

4.8.6 Identified by harvest date, (e.g. where a Grower "pick" extends over more than one day, it will be necessary to identify the "pick date" of each bin or lot of bins).

NB. This is necessary to verify the earliest harvest date of each line (or sub line).

4.8.7 Held awaiting processing in cool store, or in a cool, shady position.

4.8.8 **Segregated according to eligibility under the OAP China.**

5.0 POST-HARVEST WATER TREATMENTS

5.1 Fungicides

EMS Requirement

5.1.1 Product **designated for Australia** (other than organic) may be treated with prochloraz (Sportak®). This can be applied either as a drench or with an in-line sprayer. Prochloraz should be applied as close as possible to harvest (i.e. within 24 hours).

5.1.2 **On no account is fruit to be treated with prochloraz if being packed in a packhouse that also packs kiwifruit or where destined for:**

- USA
- Thailand
- Canada
- Japan
- Korea
- Taiwan
- India

Best Practice

5.1.3 Procedures for post-harvest application of prochloraz

Recommended best practice for application of prochloraz is by dipping fruit as close as possible to the time of harvest. The longer the interval between harvest and application, the less effective the treatment. A 48-hour delay in the application of prochloraz significantly **reduces the control of stem end rots** (Everett et al 1998).

- Dipping fruit for a minimum of 30 seconds, in a concentration of 250 ppm of prochloraz. This can be achieved by mixing 55mls Sportak® 45 EC in 100 litres water.
- To reduce the dangers of stripping or contamination, it is recommended:
  - No more than 1 tonne of fruit to be drenched with 100 litres of solution.
  - A new solution is made up for each day of packing.

The least preferred option is in-line application due to the time delay between harvest and treatment and Health and Safety issues. Care will be taken to ensure adequate ventilation. Fruit should be dry to the touch before handling or staff provided with appropriate gloves.

- Spray in-line at a rate of 55mls Sportak® 45 EC in 100 litres water. Fruit should be sprayed for 1 minute. Ensure spray equipment is adjusted to cover the fruit. Do not re-use the spray solution.
- When mixing Prochloraz do not add the concentrate into a full tank. Add the required amount to the partly full spray tank and maintain thorough agitation when the tank is being filled.

- Ensure adequate ventilation when using Prochloraz. Where possible the in-line applicator should be physically segregated from the main packing area. Packer staff should wear gloves when handling Prochloraz treated fruit.

Efforts must be made to prevent:

- **Contamination** where the solution contains dust, debris, etc. and the active ingredient is absorbed into these.
- **Stripping** where the concentration of the active ingredient in solution decreases due to product remaining on the fruit or due to inactivation by organic matter.

If so, the solution becomes less effective and may be contaminated by non-target or resistant pathogens.

Disposal of used Prochloraz solution

- Prochloraz is readily absorbed onto organic matter and is degraded by biological activity and by sunlight. Dispose of spent solution in a disposal pit specifically marked and set up for the purpose. The addition of activated carbon, soil, and manure or humus sludge will assist the degradation.

Best Practice

5.2 Sanitisers

- Harvestcide, with a manufacturer's automatic dosing system is recommended as best practice water treatment for both fungal spores and bacteria.
- Geosil can be used as an alternative if there is a documented system for monitoring water quality.

6.0 PHYTOSANITARY WATERBLASTER TREATMENT REQUIREMENTS

All fruit packed for export to China and the USA must use waterblasters to China OAP and USA operating performance criteria. Packers may be required to operate their waterblasters to the higher specifications for all or other markets at short notice either on an individual, regional or national basis should circumstances dictate.

6.1 Market Requirements

EMS Requirement

6.1.1 **China and USA and Australia**

Any fruit destined for China or the USA must be subjected to a waterblaster treatment in accordance with the specifications, commissioning procedure, performance criteria and operating procedures detailed in **Section 6.2 to 6.4.**

6.1.2 **All other markets including Thailand**

All fruit destined for all other markets including Thailand must be subjected to a waterblaster treatment in accordance with the specifications, commissioning procedure, performance criteria and operating procedures as for All Other Markets as detailed in **Section 6.2 to 6.4.**

6.2 Water Blaster Specifications (All Markets)

EMS Requirement

6.2.1 Installation **and season start up** requirements

- The waterblaster is to consist of a fixed assembly and water blasting is to occur prior to grading.
- In cases where the water blaster is not integrated into the grader and the water blasting occurs as a separate process, there is to be a documented system to clearly identify water blasted fruit from non-water blasted fruit.
- The waterblaster is to have a mechanism for ensuring that fruit are rotated under the nozzles such that each fruit will complete at least one full rotation while under the nozzle swaths.
- The waterblaster is to have a mechanism (singulation) for ensuring each individual fruit is water blasted.
- The waterblaster is to be capable of delivering uniform pressure across each of the nozzles.
- The waterblaster is to have a mechanism for regulating and measuring delivery water pressures.
- The waterblaster is to have a sufficient number of nozzles for the number of lanes or width of riser/elevator. This is dependent on the mechanism for treating individual fruit.
- The waterblaster is to deliver a minimum water volume of at least **2L/min/nozzle.**

- With the exception of non-recirculated water supplies, the water blaster is to incorporate a mechanism for addition of a post-harvest sanitiser and for maintaining the recommended rate. Rate checking and maintenance may be performed manually.
- The waterblaster is to have effective filtration systems to remove sediment and small particulates which will cause quicker nozzle and pump wear.
- The main pump is to have sufficient capacity to maintain the required pressure across all nozzles. There is to be an automatic shut-off mechanism if operating pressure (psi) drops below the minimum commissioned level as recorded on the commissioning certificate, or otherwise a warning mechanism **must** activate.
- Any nozzle type can be used in any configuration, provided the performance criteria are met. The use of ceramic nozzles is recommended.

6.3 Performance Criteria

EMS Requirement

6.3.1 Under the conditions of the China OAP and USA, waterblaster performance criteria is to be **verified annually** by an IVA and whenever there is a major change to the componentry of the waterblaster.

6.3.2 For all other markets the waterblaster performance criteria is to be **verified every five years** by an independently accredited third party auditor (IATPA) and **whenever there is a major change to the componentry of the waterblaster.**

6.3.3 The IVA and the IATPA is to issue a certificate that states the commissioning performance criteria.

6.3.4 The original certificate is to be filed by the packhouse and a copy kept in the vicinity of the waterblaster for reference.

6.3.5 **Performance criterial for China and USA** is to be verified against the following criteria:

- Equal to or greater than 95 % removal of all pollen, copper residues, birdlime and other foreign matter.
- Equal to or greater than 95% removal of any leaf roller egg rafts.
- Zero tolerance for any physical damage to the fruit.
- 100% of fruit is water blasted (Singulation).
- Each individual fruit is achieving a complete rotation.

6.3.6 **Performance criteria All Other Markets including Thailand**

- Equal to or greater than 75 % removal of all pollen, copper residues, birdlime and other foreign matter.
- Equal to or greater than 75% removal of any leaf roller egg rafts.
- Zero tolerance for any physical damage to the fruit.
- 100% of fruit is water blasted (Singulation).
- Each individual fruit is achieving a complete rotation.

6.3.7 The waterblaster is to be run to performance parameters certified at commissioning, which demonstrates that the performance criteria have been achieved for all markets. The commissioning procedure is at the Packer's expense.

6.4 Generic Operating Verification Procedures

EMS Requirement

Procedures: Verification of post-harvest phytosanitary treatments

Responsibility: Avocado packhouse phytosanitary treatment technician

Purpose: To verify the performance of the in-line water blasting treatment of avocados operates to the commissioned criteria of the individual waterblaster, for fruit destined for all markets. This is a means of maintaining fruit free from Light Brown Apple Moth (LBAM) for the USA market, or for phytosanitary treatment of fruit under the OAP China and for all other markets.

6.4.1 **Prior to commencement of packing fruit each day**

The packhouse will have a documented process to confirm **and record** that the following efficacy parameters are checked and operating to the approved specification. Records are to include the date, time, findings and name of staff member undertaking the checks.

- Nozzle spray pattern verified at low pressure prior to the beginning of packing and before recommencement of packing after each break.
- Record commissioned drive speed (Rod speed or Hertz) is being achieved.
- Record pressure and confirm it is being maintained within the parameters on the commissioning certificate.
- Singulation is happening at all times.
- Complete rotation of fruit is being achieved.
- Record time of filter inspection and condition and cleaning times to ensure filters are clean.

If any of above are not meeting the commissioned specification, corrective action is to be carried out and documented prior to the start of packing

6.4.2 **Timing of checks and action if non-compliant**

Unless otherwise specified the checks outlined in **6.4.1** above are to be carried out and recorded at the following intervals during packing:

- **Prior to start of packing for the day and at start up after a break**
- Every 30 minutes from commencing packing after start up and after each break.
- Record date and time all checks are completed.
- Record the name of the person completing the checks.
- If any problems are detected:
  - Stop the waterblasting treatment process immediately.
  - Place the packed product since the last verification check on hold.
  - Identify the cause of the problem and ensure corrective action is implemented before re-starting the water blasting treatment.
  - Begin the verification process again.

- Confirm with the QC the status of the product placed on hold (e.g. re-work or classify non-compliant for market).

6.4.3 Calibration of gauges

- All primary gauges used to monitor the performance efficacy of the waterblaster are to be calibrated **at least annually**.
- A calibration register will be maintained, recording the date the calibrations were undertaken and the specifications of the calibrations for internal and external audit purposes.

6.4.4 Filters

- The packhouse is to have a documented process for checking and recording of maintaining the filters.
- Filters and screens are to be clean prior to commencement of packing each day and checked whenever there is a differential change in pressure.

6.4.5 Nozzles

- The packhouse is to have a documented process for checking nozzle spray pattern at low volume including recording the date and time of checks.
- The waterblaster is to deliver a minimum water volume of at least **2L/min/nozzle.**
- Nozzles are to be replaced where spray pattern or volume is non-conforming or performance of the nozzles is reduced.

6.4.6 Quality control

- QC inspection staff will immediately report the presence and record the time of detection of any of the following detected on the fruit during the QC checks:
  - Pollen
  - Copper deposits
  - Fruit having the appearance of not being water blasted
  - Pest detections
- **Should any of the above be found:**
  - The packhouse manager is to be advised **IMMEDIATELY** of the potential problem.
  - Packing should cease and the current fruit throughput is to be segregated until the cause of the detection(s) has been identified, confirmed and corrected
  - The waterblaster setting and performance are to be investigated, as detailed in **6.4.2** above, to confirm this is not the source of the problem.
  - **Record the date & time and results of each of each of the verification checks undertaken, in the QC recording system.**
- **If an egg raft or suspect Lepidoptera larvae is found:**
  - The line is to be placed on hold immediately
  - The waterblaster operation is to be closed down completely
  - An investigation is to be initiated to identify the likely cause of the detection

- The affected line is to be either reworked or is **identified as non-confirming to market requirements**
- Corrective actions are to be identified, recorded and verified as having been undertaken prior to re-starting the waterblasting process
- The waterblaster verification process is to be repeated.

6.5 Non-Compliance Procedure for all markets

EMS Requirement

Any product which is packed while the waterblaster is not operating to specification has an increased risk of phytosanitary failure. The relevant parties (Grower, Exporter and NZ Avocado) are to be notified in writing and appropriate corrective action taken. Measures to minimize the risk of an interception include:

- Checking spray diaries and AvoGreen® monitoring records to assess risk.
- Pre-harvest sprays.
- Post-harvest treatment with pyrethrum.
- Prepacking bin inspections.
- Increased QC sampling.
- Scrubbing of fruit.
- Flag pallets in inventory system and note PPIN, volumes and pack date.

6.6 Procedure for Commissioning of Waterblasters

The procedures and contact details for setting up and conducting an in-house test and commissioning of a waterblaster can be found in **Appendix 5, 5A, 5B, 5C**

7.0 EXPORT GRADE STANDARDS

7.1 Introduction, Standard Supply and Terms Used

EMS Requirement

7.1.1 It is a condition of the license of each Exporter that they may only export avocados that meet the minimum export grade standards described here.

7.1.2 The grade standards described here are those of NZ Avocado and do not include requirements for phytosanitary certification. However, it is best practice for Packer quality control procedures associated with grade standards and phytosanitary certification to be done together.

7.1.3 The grade standard is specified by describing the allowances for various types of defects. It may be that a certain size of defect is allowed, or it may be there is no allowance at all. All defects are classified as either major or minor.

7.1.4 **Standard Supply Class 1 for Export**

The EMS states that only fruit meeting the Class 1 grade and quality standards is to be exported except as detailed in **Section 7.1.5, 7.1.6 and 7.1.7 below**.

7.1.5 **Class 2 Supply for Food Service (other than USA) under the EMS Clause 2.4.1.1**

- The EMS allows for Class 2 avocados to be exported **and distributed** directly into food service.
- Class 2 size specifications are **set out in Section 8.16 of this document.**
- Grade Standards Class 2 – Other than USA can be found in **Section 7.3.**
- The EAN label is to be **ORANGE** in colour to clearly distinguish it from Class 1.

7.1.6 **Standard Supply Non-Class 1 fruit exported for processing**

Non-Class 1 avocados that are exported to Australia for processing under the **EMS Clause 2.4.1.2** will meet the following criteria:

- Fruit will meet all requirements of the EMS, Quality Manual, AvoGreen® and NZ Avocado electronic spray diary.
- Meet the grade standard set out in **Section 7.5.**
- The EAN label is to be **ORANGE** in colour to clearly distinguish it from Class 1 and have PRC recorded as the Grade.

7.1.7 **Class 2 Supply to the USA under the EMS Clause 3.1.10**.

- The standards for Class 2 fruit to the USA are set out in **Section 7.4**.
- Class 1 size specifications are **set out in Section 8.16 of this document.**

7.1.8 Class 1, Class 2 and Process grade specifications can be found in Section 7.2 to 7.5. In any sample there is a tolerance for packing error and the tolerance is less for the more severe types of grade defects, as follows:

Defect Category	Tolerance
Major	**2% AQL* (accept at 2 fail at 3)**
Minor	**4% AQL (accept at 4 fail at 5)**
Cumulative	**5% AQL (accept at 5 fail at 6)**

7.2 Grade Standard - Class 1

EMS Requirement

7.2.1 Allowances for Major Defects (**with a 2% AQL tolerance**) – Class 1

Defect Type	Allowance	Description or Comment
Cuts & punctures	Nil	Any unhealed crack, cut, puncture or insect or pest damage that penetrates into and/or exposes flesh.
Clipper cuts - penetrating flesh - not penetrating flesh	Nil Allowable	Unhealed surface cuts around the stem button that penetrate into the flesh. Peel may or may not be damaged. Small unhealed surface cuts around the stem button that do not penetrate into the flesh. Peel may or may not be removed.
Soft fruit (at packing)	Nil	Fruit that is soft to the touch.
Spray deposits - Copper spray - Other spray deposits	Surface "bloom" or small trace around stem pedicle or base of fruit Nil	Fruit may be harvested with spray deposits providing these can be removed during the packing process.
Surface deposits	A small trace of dust around the stem pedicle is allowable	Grease, bird droppings or other foreign matter. Fruit may be harvested with surface deposits providing these can be removed during the packing process.
Pollen	A small trace allowable	Yellow surface deposit usually found at the basal end of the fruit. Fruit may be harvested with pollen deposits providing these can be removed during the packing process.
Anthracnose	Nil	Brown to blackish spots with no underlying green colour on fruit surface. Spots have defined edges (not jagged) and are slightly sunken. In cases of severe/advanced infection, pinky-white spores may be present on spots.
Ridging Height	No ridge will be more than 2mm high.	Ridging is easily damaged in the handling process and contributes to rot development after packing. A protuberance ceases to be a protuberance and becomes a ridge when it exceeds 10mm in any one lateral plane.
Protuberance	No protuberance will be more than 3mm high.	A small, singular, pimple-like structure on the peel of the fruit. It does not include bumps that are the result of nutritional malformation. A protuberance ceases to be a protuberance and becomes a ridge when it exceeds 10mm in any one lateral plane.

Defect Type	Allowance	Description or Comment
Bruising	Less than 0.25cm² 	A bruise is an area of damaged peel resulting from pressure. This includes flattened and compressed areas. Bruising is normally dark coloured but may not be if the damage is recent. Any bruise of less than 0.25cm² is allowed.
Colour - Matt black - Red - Yellow	Allowable if less than 0.5cm² 	Yellow, red, black due to sun exposure – this may be general or very localized.
- Blue black	Allowable where colour has a green background and/or where lenticels are green.	Blue black due to maturity.
- Reddish Brown - Yellow/Green	Allowable where colour has a green background.	
Sunburn Lesion	Nil	Black/brown sunken lesion caused by sun exposure.
Stems missing	Nil	Stems totally missing. These allow for possible pathogen entry and may indicate windfall fruit.

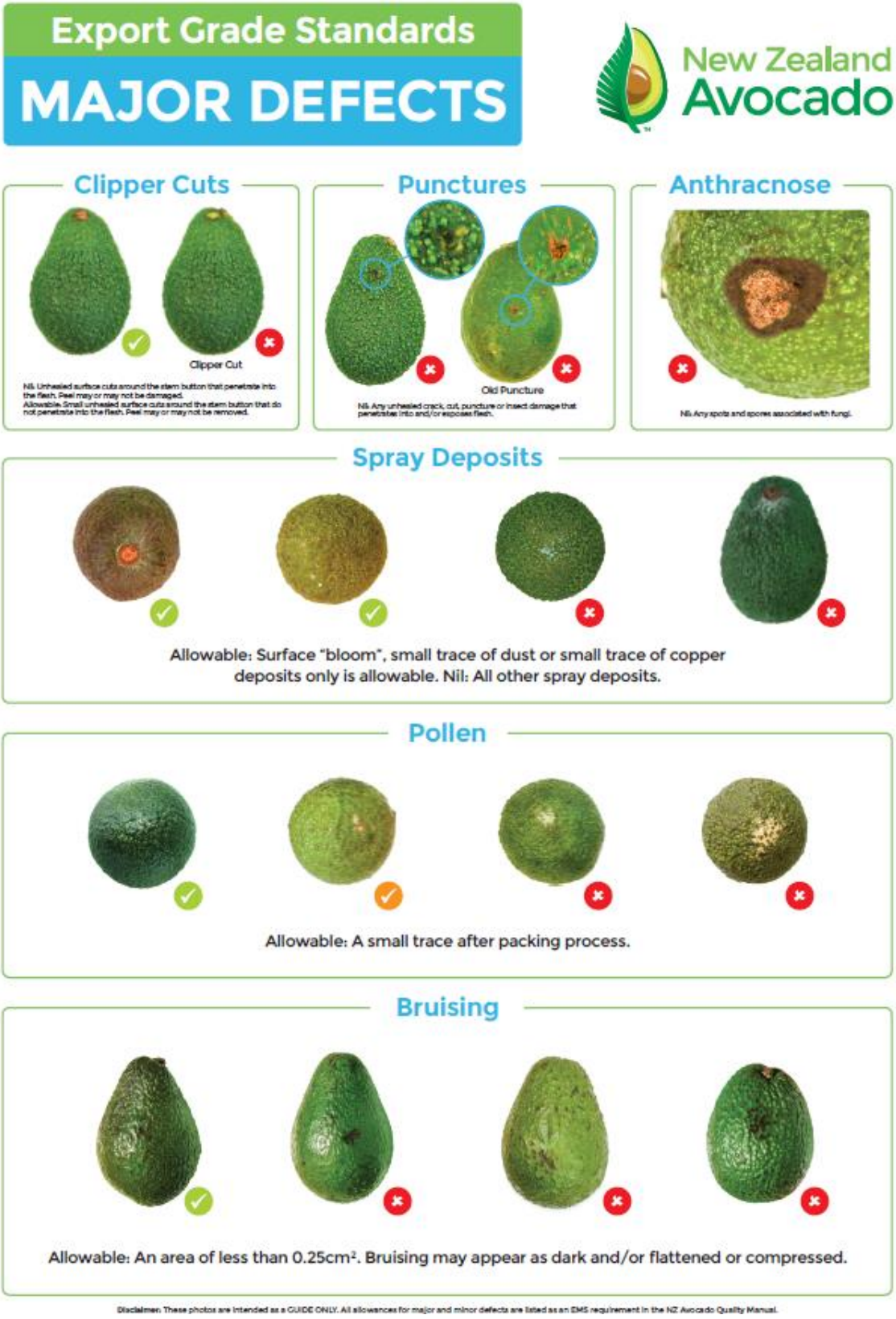
*AQL (Acceptable Quality Limits) calculated % on 100 pieces of fruit (**see Section 7.1.8**).

References:

1. Pak H.A, Bettesworth D., Dawes H.M, The role of surface ridging and protrubrances on avocado fruit in the development of ripe rots. NZAGA Annual Research Report Volume 1 2001

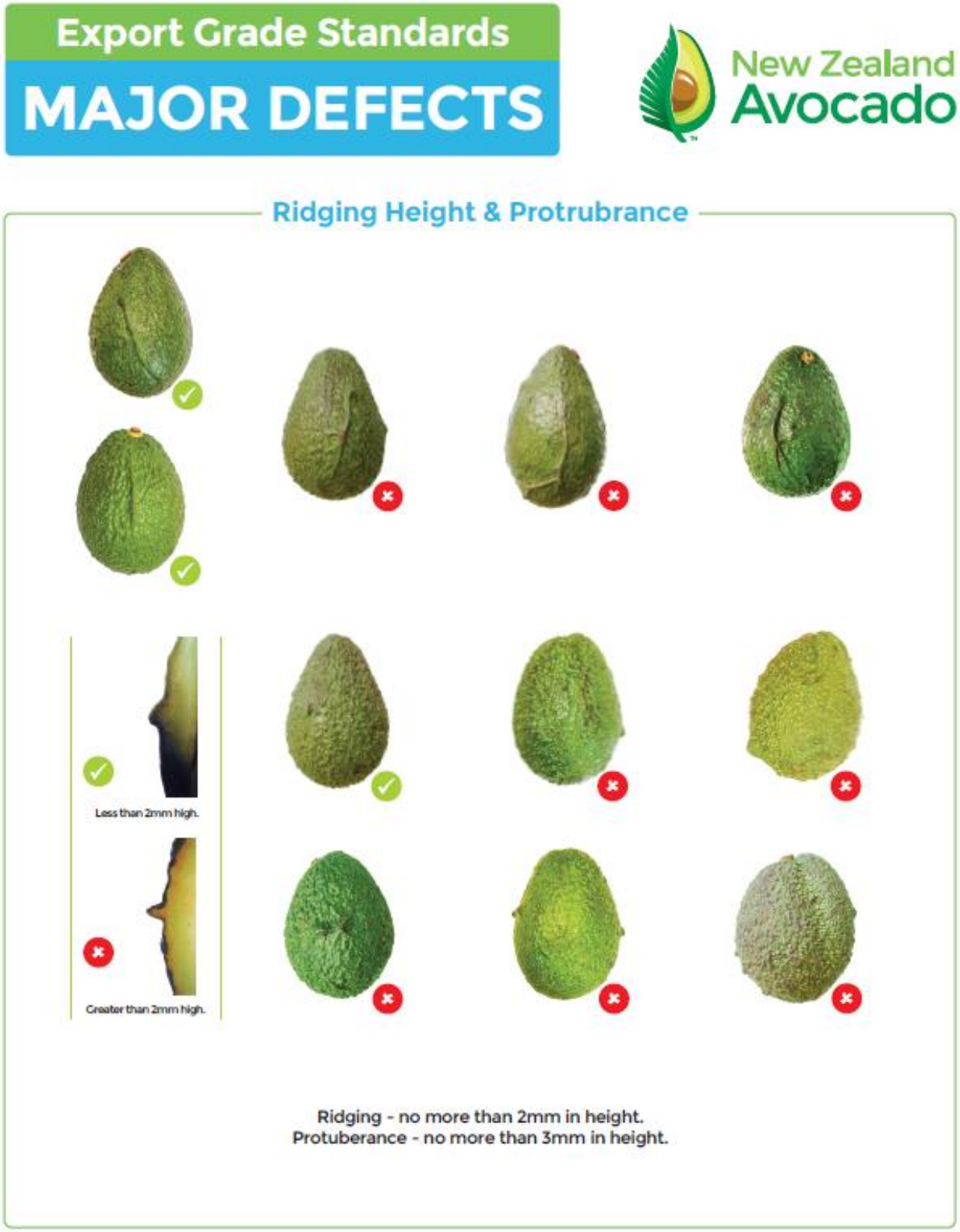
MAJOR COSMETIC DEFECTS

Please refer to the posters supplied to each packhouse



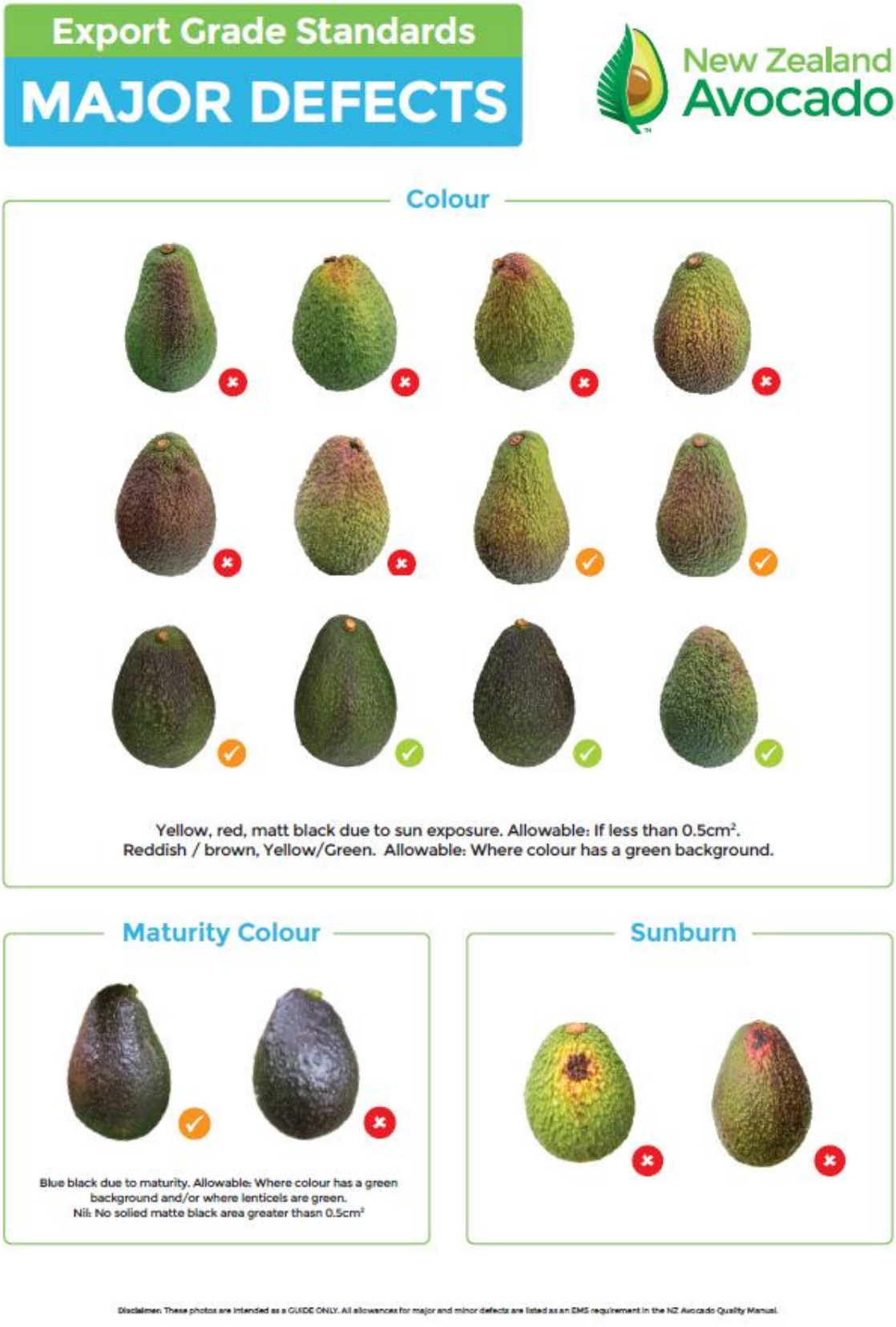
MAJOR COSMETIC DEFECTS

Please refer to the posters supplied to each packhouse



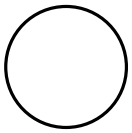
MAJOR COSMETIC DEFECTS

Please refer to the posters supplied to each packhouse



EMS Requirement

7.2.2 Allowances for Minor Defects (with a 4% AQL tolerance) – Class 1

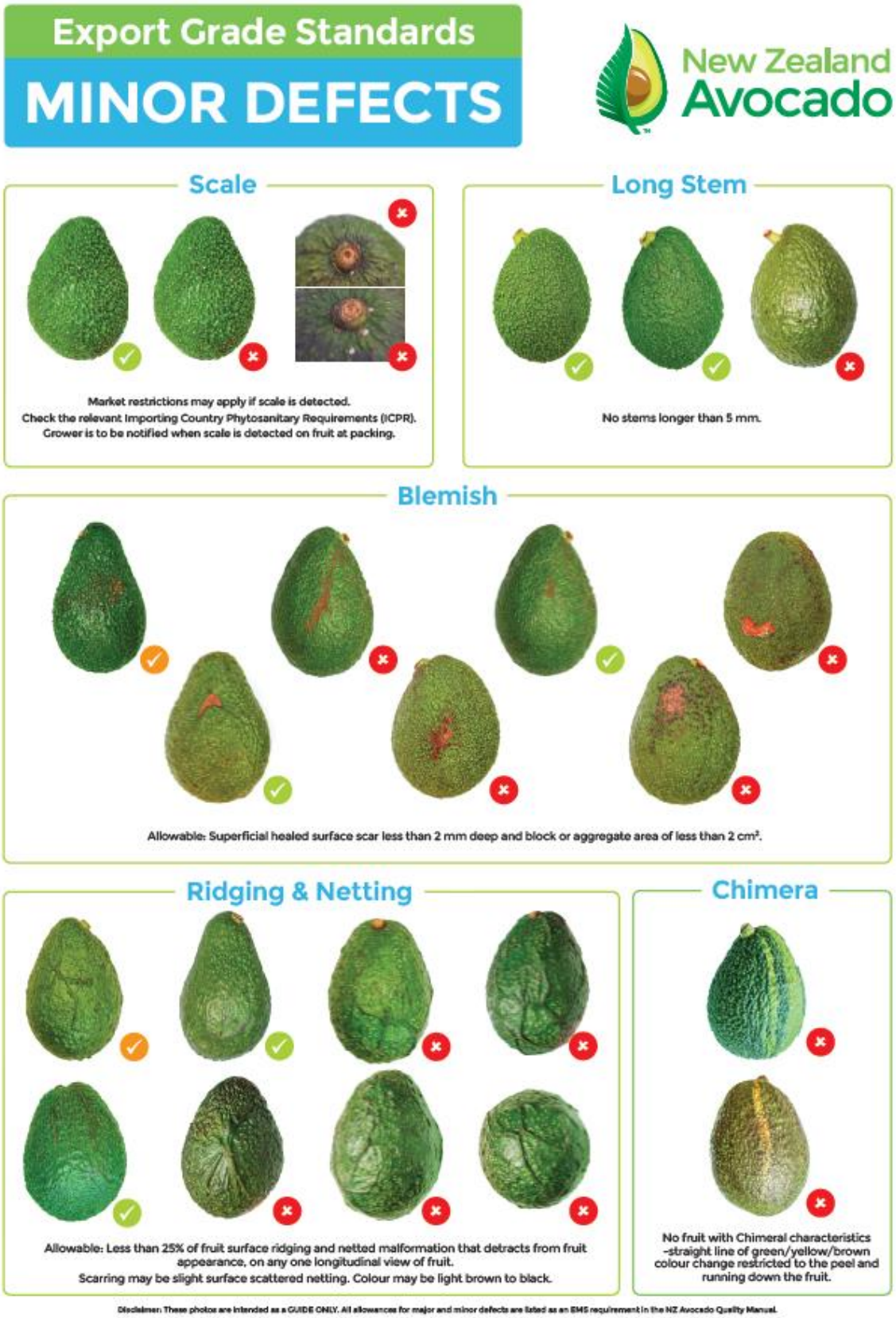
Defect Type	Allowance	Description or Comment
Scale	Allowed are: Up to 4 scale on any view of fruit. Scale around the button	Colour may vary from oatmeal to dark brown. Juvenile scales less than 1mm are not counted. Scale may be a phytosanitary issue in some markets. Check with your certifying authority.
Blemish including thrips damage	$2cm^2$ (block or aggregate area)  Total blemish area may not exceed $2cm^2$	Superficial healed surface scar less than 2mm deep. Colour may be light brown to black. Scarring may be slight to solid blocks of scarred peel resulting from fruit rub, wind damage or superficial insect feeding damage. Any blemish deeper than 2mm is out of grade, regardless of size
Lenticel damage	Less than 25% of fruit surface may be affected in any one longitudinal view of fruit.	Fresh lenticel damage is excluded from the blemish allowance. Lenticel damage is the result of physical damage to the outer layer of peel on the nodules (but no exposure of flesh) resulting in localized damage restricted to the nodule. Lenticel damage includes any visible damage to the nodule, and is likely to fall under one of the following descriptions: • Superficial damage to the nodules, which are sunken and have turned black and glossy. • The tops of nodules have been damaged, removed or cut. Generally visible as superficial, corky-coloured wound. .
Peel handling damage	Less than 25% of fruit surface may be affected in any one longitudinal view of fruit.  Block area of $0.25cm^2$ is permitted	A dark grey diffuse area spreading beyond individual nodules. Any individual affected area of peel handling damage must not exceed 0.25 cm^2.
Misshapen	Slight malformation providing it does not detract from the appearance of the fruit.	Malformation of fruit not consistent with variety. Includes extreme neckiness, totally round fruit, autumn fruit set and double embryo formation.
Long stems	Nil	Stems longer than 5mm.

Defect Type	Allowance	Description or Comment
Mixed sizing	No more than 10% of the fruit to be below the count size individual minimum weight.	Fruit that does not correctly meet the count size requirements of the package that it is contained in.
Chimeral Fruit	Nil	Genetic abnormality. A straight line of green/yellow/brown colour change restricted to the peel and running down the fruit.
Variety	Nil	Will be typical of the variety being packed. Only one variety is to be packed per tray/consignment and is to be correctly identified on the label.
Ridging and Netted Area	Less than 25% of fruit surface may be ridged on any one longitudinal view of fruit.	Surface ridging and netted malformation of fruit peel that detracts from fruit appearance. Scarring may be slight surface scattered netting. Colour may be light brown to black.

*AQL (Acceptable Quality Limits) calculated % on 100 pieces of fruit (**see Section 7.1.8**).

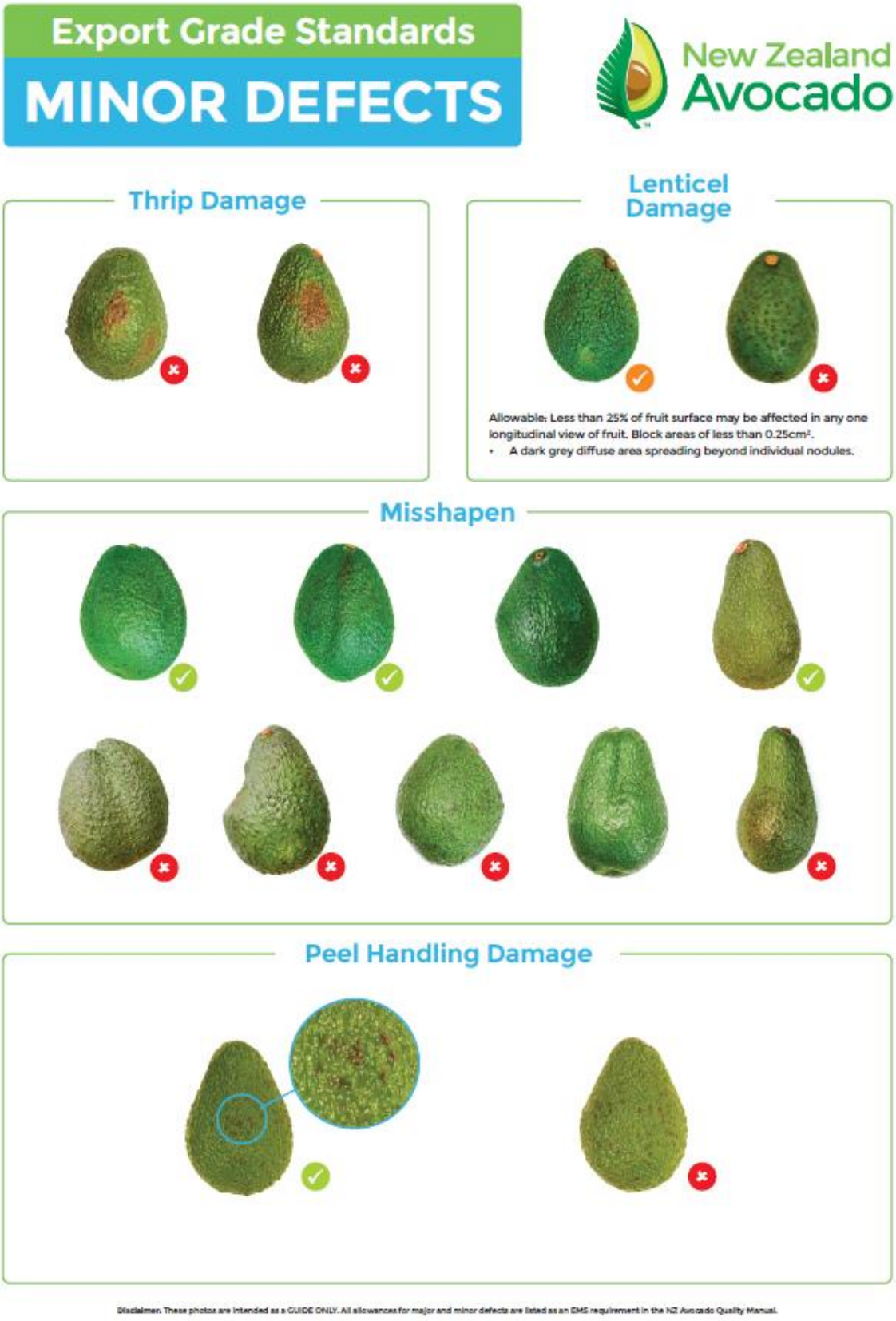
MINOR COSMETIC DEFECTS

Please refer to the posters supplied to each packhouse



MINOR COSMETIC DEFECTS

Please refer to the posters supplied to each packhouse



7.3 Grade Standard - Class 2 – other than the USA

EMS Requirement

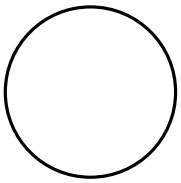
7.3.1 Allowances for Major Defects (with a 2% AQL tolerance) – Class 2

Defect Type	Allowance	Description or Comment
Cuts & punctures	Nil	Any unhealed crack, cut, puncture or insect damage that penetrates into and/or exposes flesh.
Clipper cuts - penetrating flesh - not penetrating flesh	Nil Allowable	Unhealed surface cuts around the stem button that penetrate into the flesh. Peel may or may not be damaged. Small unhealed surface cuts around the stem button that do not penetrate into the flesh. Peel may or may not be removed.
Soft fruit	Nil	Fruit that is soft to the touch.
Spray deposits - Copper spray - Other spray deposits	Surface "bloom" or small trace around stem pedicle or base of fruit Nil	Fruit may be harvested with spray deposits providing these can be removed during the packing process.
Surface deposits	A small trace of dust around the stem pedicle is allowable.	Grease, bird droppings or other foreign matter. Fruit may be harvested with surface deposits providing these can be removed during packing process.
Pollen	A small trace allowable	Yellow surface deposit usually found at the basal end of the fruit. Fruit may be harvested with pollen deposits providing these can be removed during the packing process.
Anthracnose	Nil	Brown to blackish spots with no underlying green colour on fruit surface. Spots have defined edges (not jagged) and are slightly sunken. In cases of severe/advanced infection, pinky-white spores may be present on spots.
Ridging Height	No ridge will be more than 3mm high.	Ridging is easily damaged in the handling process and contributes to rot development after packing.
Protuberance	No protuberance will be more than 3mm high.	A small, singular, pimple-like structure on the peel of the fruit. It does not include bumps that are the result of nutritional malformation. A protuberance ceases to be a protuberance and becomes a ridge when it exceeds 10mm in any one lateral plane.
Bruising	Less than 0.25cm² 	A bruise is an area of damaged peel resulting from pressure. This includes flattened and compressed areas. Bruising is normally dark coloured but may not be if

Defect Type	Allowance	Description or Comment
		the damage is recent. Any bruise of less than 0.25cm² is allowed.
Colour - Matt black - Red - Yellow	Allowable if less than 0.5cm²	Yellow, red, black due to sun exposure – this may be general or very localized.
- Blue black	Allowable where colour has a green background and/or where lenticels are green.	Blue black due to maturity
- Reddish/Brown - Yellow/Green	Allowable where colour has a green background.	
Sunburn Lesion	Nil	Black/brown sunken lesion caused by sun exposure.
Stems missing	Nil	Stems totally missing. These allow for possible pathogen entry and may indicate windfall fruit.

*AQL (Acceptable Quality Limits) calculated % on 100 pieces of fruit (**see Section 7.1.8**).

7.3.2 Allowances for Minor Defects (with a 4% AQL tolerance) – Class 2

Defect Type	Allowance	Description or Comment
Scale	Allowed are: - Up to 4 scale on any view of fruit. - Scale around the button	Colour may vary from oatmeal to dark brown. Juvenile scales less than 1 mm are not counted. Scale may be a phytosanitary issue in some markets. Check with your certifying authority.
Blemish	4 cm^2 block or aggregate area  Total blemish area may not exceed 4 cm^2	Superficial healed surface scar less than 2 mm deep. Colour may be light brown to black. Scarring may be slight surface scattered netting to solid blocks of scarred peel resulting from fruit rub, wind damage or superficial insect feeding damage. Any blemish deeper than 2mm is out of grade, regardless of size. Fresh lenticel damage is excluded from the blemish allowance and is defined as abrasion damage to individual nodules.
Lenticel damage	Less than 50% of fruit surface may be affected in any one longitudinal view of fruit.	Fresh lenticel damage is excluded from the blemish allowance. Lenticel damage is the result of physical damage to the outer layer of peel on the nodules (but no exposure of flesh) resulting in localized damage restricted to the nodule. Lenticel damage includes any visible damage to the nodule, and is likely to fall under one of the following descriptions: • Superficial damage to the nodules which are sunken and have turned black and glossy. • The tops of nodules have been damaged, removed or cut. Generally visible as superficial, corky-coloured wound.
Peel handling damage	Less than 50% of fruit surface may be affected in any one longitudinal view of fruit.	A dark grey diffuse area spreading beyond individual nodules.

	Block area of 0.25cm² is permitted ◯	Any individual affected area of peel handling damage will not exceed 0.25 cm².
Misshapen	Slight malformation providing it does not detract from the appearance of the fruit.	Malformation of fruit not consistent with variety. Includes extreme neckiness, totally round fruit, autumn fruit set and double embryo formation.
Long stems	Nil	Stems longer than 5 mm.
Mixed sizing	No more than 10% of the fruit to be below the count size individual minimum weight.	Fruit that does not correctly meet the count size requirements of the package that it is contained in.
Chimeral Fruit	Nil	Genetic abnormality. A straight line of green/yellow/brown colour change restricted to the peel and running down the fruit.
Variety	Nil	Will be typical of the variety being packed. Only one variety is to be packed per tray/consignment and is to be correctly identified on the label.
Ridging and Netted Area	Less than 50% of fruit surface may be ridged on any one longitudinal view of fruit.	Surface ridging and netted malformation of fruit peel that detracts from fruit appearance and is not consistent with variety. Scarring may be slight surface scattered netting. Colour may be light brown to black.

*AQL (Acceptable Quality Limits) calculated % on 100 pieces of fruit (**see Section 7.1.8**).

7.4 Grade Standard - Class 2 USA only

EMS Requirement

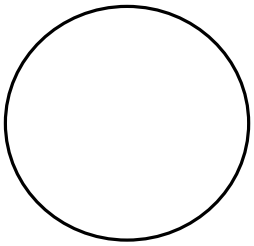
7.4.1 Allowances for Major Defects (with a 2% AQL tolerance) - USA Class 2

Defect Type	Allowance	Description or Comment
Cuts & punctures	Nil	Any unhealed crack, cut, puncture or insect damage that penetrates into and/or exposes flesh.
Clipper cuts - penetrating flesh - not penetrating flesh	Nil Allowable	Unhealed surface cuts around the stem button that penetrate into the flesh. Peel may or may not be damaged. Small unhealed surface cuts around the stem buttons that don't penetrate into the flesh. Peel may or may not be removed.
Soft fruit	Nil	Fruit that is soft to the touch.
Spray deposits - Copper spray - Other spray deposits	Surface "bloom" or small trace around stem pedicle or base of fruit Nil	Fruit may be harvested with spray deposits providing these can be removed during the packing process.
Surface deposits	A small trace of dust around the stem pedicle is allowable.	Grease, bird droppings or other foreign matter. Fruit may be harvested with surface deposits providing these can be removed during packing process.
Pollen	A small trace allowable	Yellow surface deposit usually found at the base of the fruit. Fruit may be harvested with pollen deposits providing these can be removed during the packing process.
Anthracnose	Nil	Brown to blackish spots with no underlying green colour on fruit surface. Spots have defined edges (not jagged) and are slightly sunken. In cases of severe/advanced infection, pinky-white spores may be present on spots.
Ridging Height	No ridge will be more than 3mm high.	Ridging is easily damaged in the handling process and contributes to rot development after packing.
Protuberance	No protuberance will be more than 3mm high.	A small, singular, pimple-like structure on the peel of the fruit. It does not include bumps that are the result of nutritional malformation. A protuberance ceases to be a protuberance and becomes a ridge when it exceeds 10mm in any one lateral plane.
Bruising	Less than 0.25cm²	A bruise is an area of damaged peel resulting from pressure. This includes flattened and compressed areas. Bruising is normally dark coloured but **may not be if the damage is recent. Any bruise of less than 0.25cm² is allowed.**

Defect Type	Allowance	Description or Comment
Colour		
Matt black - Red - Yellow	Allowable if less than 0.5cm^2 	Yellow, red, black due to sun exposure – this may be general or very localized.
- Blue black	Allowable where colour has a green background and/or where lenticels are green.	Blue black due to maturity.
- Reddish/Brown - Yellow/Green	Allowable where colour has a green background.	
Sunburn Lesion	Nil	Black/brown sunken lesion caused by sun exposure.
Stems missing	Nil	Stems totally missing. These allow for possible pathogen entry and may indicate windfall fruit.

*AQL (Acceptable Quality Limits) calculated % on 100 pieces of fruit (**see Section 7.1.8**).

7.4.2 Allowances for Minor Defects (with a 4% AQL tolerance) – USA Class 2

Defect Type	*Allowance*	*Description or Comment*
Scale	Up to 4 scale on any view of fruit	The presence of scale is not a phytosanitary issue. *When scale has been found in the past the clearance of fruit has initially been held up until FDA have spoken to MPI and clarified. Following this access has been smooth.*
Blemish	Maximum of 8 cm^2 block or aggregate area  Total blemish area may not exceed 8 cm^2	Superficial healed surface scar less than 2 mm deep. Colour may be light brown to black. Scarring may be slight surface scattered netting to solid blocks of scarred peel resulting from fruit rub, wind damage or superficial insect feeding damage. Any blemish deeper than 2mm is out of grade, regardless of size. Fresh lenticel damage is excluded from the blemish allowance and is defined as abrasion damage to individual nodules.
Lenticel damage	Less than 50% of fruit surface may be affected in any one longitudinal view of fruit.	Fresh lenticel damage is excluded from the blemish allowance and is the physical damage of nodules to remove part of the outer layer of peel (but no exposure of flesh) and resulting in localized damage restricted to the nodule. Lenticel Damage includes any visible damage to the nodule, and is likely to fall under one of the following descriptions: • Superficial damage to the nodules which are sunken and have turned black and glossy. • The tops of nodules have been damaged, removed or cut. Generally visible as superficial, corky-coloured wound.
Peel handling damage	Less than 50% of fruit surface may be affected in any one longitudinal view of fruit.  Block area of 0.25cm^2 is permitted	A dark grey diffuse area spreading beyond individual nodules. Any individual affected area of peel handling damage will not exceed 0.25 cm^2.

Misshapen	Slight malformation providing it does not detract from the appearance of the fruit.	Malformation of fruit not consistent with variety. Includes extreme neckiness, totally round fruit, autumn fruit set and double embryo formation.
Long stems	Nil	Stems longer than 6 mm.
Missing Stems	Nil	All fruit will have stem buttons
Mixed sizing	No more than 10% of the fruit to be below the count size individual minimum weight.	Fruit that does not correctly meet the count size requirements of the package that it is contained in.
Chimeral Fruit	Nil	Genetic abnormality. A straight line of green/yellow/brown colour change restricted to the peel and running down the fruit.
Variety	Nil	Will be typical of the variety being packed. Only one variety is to be packed per tray/consignment and is to be correctly identified on the label.
Ridging and Netted Area	Less than 50% of fruit surface may be ridged on any one longitudinal view of fruit.	Surface ridging and netted malformation of fruit peel that detracts from fruit appearance. Scarring may be slight surface scattered netting. Colour may be light brown to black.

*AQL (Acceptable Quality Limits) calculated % on 100 pieces of fruit (**see Section 7.1.8**).

7.5 Grade Standard - Class 3

EMS Requirement

7.5.1 Allowances for Major Defects (with a 4% AQL tolerance) Class 3

Defect Type	Allowance	Description or Comment
Cuts & punctures	Nil	Any unhealed crack, cut, puncture or insect damage that penetrates into and/or exposes flesh.
Clipper cuts - penetrating flesh - not penetrating flesh	Nil Allowable	Unhealed surface cuts around the stem button that penetrate into the flesh. Peel may or may not be damaged. Small unhealed surface cuts around the stem button that do not penetrate into the flesh. Peel may or may not be removed.
Soft fruit	Nil	Fruit that is soft to the touch.
Spray deposits - Copper spray - Other spray deposits	Surface "bloom" or small trace around stem pedicle or base of fruit Nil	Fruit may be harvested with spray deposits providing these can be removed during the packing process.
Surface deposits	A small trace of dust around the stem pedicle is allowable.	Grease, bird droppings or other foreign matter. Fruit may be harvested with surface deposits providing these can be removed during packing process.
Pollen	A small trace allowable	Yellow surface deposit usually found at the basal end of the fruit. Fruit may be harvested with pollen deposits providing these can be removed during the packing process.
Anthracnose	Nil	Brown to blackish spots with no underlying green colour on fruit surface. Spots have defined edges (not jagged) and are slightly sunken. In cases of severe/advanced infection, pinky-white spores may be present on spots.
Ridging Height	No ridge will be more than 5mm high.	Ridging is easily damaged in the handling process and contributes to rot development after packing.
Protuberance	No protuberance will be more than 5mm high.	A small, singular, pimple-like structure on the peel of the fruit. It does not include bumps that are the result of nutritional malformation. A protuberance ceases to be a protuberance and becomes a ridge when it exceeds 10mm in any one lateral plane.
Bruising	Less than 0.25cm² 	A bruise is an area of damaged peel resulting from pressure. This includes flattened and compressed areas. Bruising is normally dark coloured but may not be if

Defect Type	Allowance	Description or Comment
		the damage is recent. Any bruise of less than 0.25cm² is allowed.
Colour - Matt black - Red - Yellow - Blue black - Reddish/Brown - Yellow/Green	 Allowable if less than 0.5cm² 10% 20% Allowable where colour has a green background and/or where lenticels are green. Allowable where colour has a green background.	 Yellow, red, black due to sun exposure – this may be general or very localized. Blue black due to maturity
Sunburn Lesion	Nil	Black/brown sunken lesion caused by sun exposure.
Stems missing	Nil	Stems totally missing. These allow for possible pathogen entry and may indicate windfall fruit.

*AQL (Acceptable Quality Limits) calculated % on 100 pieces of fruit (**see Section 7.1.8**).

7.5.2 Allowances for Minor Defects (with a 4% AQL tolerance) – Class 3

Defect Type	Allowance	Description or Comment
Scale	Allowed are: - Up to 4 scale on any view of fruit. - Scale around the button	Colour may vary from oatmeal to dark brown. Juvenile scales less than 1 mm are not counted. **Scale may be a phytosanitary issue in some markets. Check with your certifying authority**.
Blemish	**< 50% of the surface area of the fruit in any one view** **Block area and aggregate area** **Scattered peel damage joined together**	Superficial healed surface scar less than 2 mm deep. Colour may be light brown to black. Scarring may be slight surface scattered netting to solid blocks of scarred peel resulting from fruit rub, wind damage or superficial insect feeding damage. Any blemish deeper than 2mm is out of grade, regardless of size. Fresh lenticel damage is excluded from the blemish allowance and is defined as abrasion damage to individual nodules.
Lenticel damage	Less than 50% of fruit surface may be affected in any one longitudinal view of fruit	Fresh lenticel damage is excluded from the blemish allowance. Lenticel damage is the result of physical damage to the outer layer of peel on the nodules (but no exposure of flesh) resulting in localized damage restricted to the nodule. Lenticel damage includes any visible damage to the nodule, and is likely to fall under one of the following descriptions: • Superficial damage to the nodules which are sunken and have turned black and glossy. • The tops of nodules have been damaged, removed or cut. Generally visible as superficial, corky-coloured wound.
Peel handling damage	Less than 50% of fruit surface may be affected in	A dark grey diffuse area spreading beyond individual nodules.

	any one longitudinal view of fruit. Block area of 0.25cm² is permitted	Any individual affected area of peel handling damage will not exceed 0.25 cm².
Misshapen	Moderately well formed	
Long stems	<10%	Stems longer than 5 mm.
Mixed sizing	No more than 10% of the fruit to be below the count size individual minimum weight.	Fruit that does not correctly meet the count size requirements of the package that it is contained in.
Chimeral Fruit	<10%	Genetic abnormality. A straight line of green/yellow/brown colour change restricted to the peel and running down the fruit.
Variety	Nil	Will be typical of the variety being packed. Only one variety is to be packed per tray/consignment and is to be correctly identified on the label.
Ridging and Netted Area	Less than 90% of fruit surface may be ridged on any one longitudinal view of fruit.	Surface ridging and netted malformation of fruit peel that detracts from fruit appearance and is not consistent with variety. Scarring may be slight surface scattered netting. Colour may be light brown to black.

*AQL (Acceptable Quality Limits) calculated % on 100 pieces of fruit (**see Section 7.1.8**).

7.6 Grade Standard - Class 4

- **Processing in New Zealand only**
- **See Part 10: New Zealand Market Guidelines, Section 10**

8.0 QUALITY CONTROL

Where the Quality Controller (for export grade standards) is also completing the inspection for phytosanitary purposes, it will be sensible to integrate the two tasks (i.e. using the same fruit samples and inspection frequency and recording the two types of defects on one record sheet). Acceptability decisions will be made separately for each defect type. An example of a quality control record sheet can be found in **Section 23, Appendix 6.**

8.1 Responsibilities of Packhouse Manager

EMS Requirement

The packhouse manager or delegated staff member will:

8.1.1 Ensure that the Packer complies with the relevant sections of the EMS.

8.1.2 Notify NZ Avocado contracted auditor of the intended start and end dates for the season (to allow scheduling of audits) with at least 1 week's advance notice.

8.1.3 Notify NZ Avocado contracted auditor on a weekly basis by Monday 10:00am of the days they intend to pack. A form is provided by the industry auditor for this purpose. This notification must include 'indicative' PPINS and potential markets to facilitate collection of residue samples.

8.1.4 If there is a change to the notified intention to pack, NZ Avocado contracted auditor should be notified as soon as possible. Failure to notify the change constitutes a minor non-compliance.

8.1.5 If any auditor arrives to do an un-announced audit and finds that the shed is not packing after being advised that they were then the cost of the auditor's travel will be charged directly to the shed.

8.1.6 Make a copy of the reject analysis sheet available to the Grower **within 7 days (see Section 8.11.2).**

8.1.7 Be familiar with all quality management procedures as outlined in this manual.

8.1.8 Maintain close liaison with those responsible for harvesting the fruit of each Grower supplier, to verify that harvesting is being done properly (e.g. stem clipping, handling, on-orchard protection of fruit and transport to the packhouse).

8.1.9 Verify that all fruit following arrival at the packhouse is handled in accordance with this manual so as to optimise fruit quality in the marketplace.

8.1.10 Verify the adequacy of facilities required to perform QC functions.

8.1.11 Ensure sufficient numbers of QC staff available.

8.1.12 Ensure a reject analysis is carried out for each line.

8.1.13 Provide weekly harvest data to NZ Avocado as detailed in the EMS.

8.1.14 Maintain close liaison with those responsible for daily waterblaster compliance checks to verify that the waterblaster is operating correctly and report to the packhouse manager any fruit that has:

- Pollen
- Copper deposits
- The appearance of not being water blasted

- Pest detections

8.1.15 Ensure a documented training programme and record of any training has been implemented for graders.

8.2 Responsibilities of Quality Controller (QC)

EMS Requirement

The Quality Controller (QC) will:

8.2.1 Be familiar with all quality management procedures as outlined in this manual.

8.2.2 Perform regular QC sampling, inspections, recordings and necessary actions, in **accordance any ICPR, OAP and Quality Manual requirements.**

8.2.3 Be responsible for ensuring that all staff have undertaken an annual grade standards grade assessment competency verification. This is mandatory from 2020-21 season.

8.3 Internal Audit of NZ Avocado EMS Requirements

EMS Requirement

8.3.1 Packers will complete internal audits to verify compliance to the EMS requirements. These internal audits will be verified as part of NZ Avocado EMS audit programme.

8.3.2 Minimum internal audit must be completed as follows:

- Prior to commencement of packing at season start up.
- Waterblaster checks daily and as scheduled in Section 22.0 Appendix 5D.
- Packhouse and Coolstore – fortnightly.

8.4 Eyesight Test Requirement

EMS Requirement

All avocado QC's will have adequate eyesight as defined below:

8.4.1 The ability to perceive colour differences and discern fruit markings. The standard test is the Ishihara colour vision test.

8.4.2 The ability to sustain focusing over an extended period with clarity vision.

8.4.3 The ability to see fine details at near distances.

8.4.4 A valid eyesight test result will be on file for each QC.

8.5 Sampling Procedure

EMS Requirement

8.5.1 Samples will be taken to ensure compliance with grade standard requirements and the phytosanitary market access requirements.

8.5.2 A minimum of 100 fruit per hour of packing will be inspected for industry grade standards. A **minimum** of 200 fruit per PPIN per day will be inspected.

8.5.3 Samples should be taken from a range of count sizes **and be representative of all of the export Classes being packed across the Grower** line.

8.5.4 Samples will be drawn at intervals of not more than 1 hour (of working time) through each pack day. The first sample will be taken within 15 minutes of commencement of either:

- a day's packing.
- or the start of a new Grower line.

8.5.5 Pallets should be marked with the position from where the sample came. Should a problem occur, then it can be isolated.

8.5.6 It is recommended that MPI accredited sheds use the same sampling procedure described in their documented operator system.

8.6 Inspection Technique

EMS Requirement

8.6.1 Inspect as if for phytosanitary purposes.

8.6.2 Check that branding for each package sampled is correct (i.e. clearly labelled*) with the requirements detailed in **Section 9.3**.
* "Labelled" throughout this manual is used as a generic term to cover both stamping or use of preprinted adhesive labels.

8.7 Recording

EMS Requirement

8.7.1 The details are to be recorded in the same way as for phytosanitary inspections – see example of inspection record **Section 23, Appendix 6**.

8.7.2 Record the findings for each tray in a separate column and total the number of the fruit sampled (i.e. either 100 fruit plus, or the same as for phytosanitary inspections).

8.7.3 Record defects (major, minor) in the correct categories.

8.7.4 Total and record the defects following inspection of each sample.

8.7.5 Add and record the total of major defects to total of minor defects and enter into cumulative defects row.

8.7.6 Apply and record the decision criteria for each defect category

8.7.7 Record any necessary actions taken. These comments will be important for the Packhouse Manager as well as for NZ Avocado audits.

8.7.8 If the QC inspection records sheet is not complete it is considered a major non-compliance.

8.8 Completed Inspection Record Sheet Checklist

The inspection records should cover the following elements:

- All header details were completed (e.g. date, packhouse, etc).
- Packing started at 8.30am and the first sample was drawn within 15 minutes (i.e. at 8.45am).
- The sample size exceeded 100 fruit.
- Subsequent samples were drawn at intervals of not more than 1 hour.
- The number of defects in each category was totaled and recorded at the bottom of each category. The cumulative totals were also recorded.
- Relevant comments were recorded clearly.

8.9 Decision Criteria

EMS Requirement

For each sample lot of 100 fruit, the following accept/reject criteria will apply to all defects:

Sample Size	Major defects — 2% AQL Accept	Major defects — 2% AQL Reject	Minor defects — 4% AQL Accept	Minor defects — 4% AQL Reject	Cumulative — 5% AQL Accept	Cumulative — 5% AQL Reject
100	2	3	4	5	5	6

NOTE: In the event of a retrospective audit where a line has failed due to grade but has passed the in-line inspection, the finding of the retrospective audit will prevail.

8.10 Action Procedures

EMS Requirement

Following the accept/reject decision for each line, follow procedures the same as for phytosanitary inspections. These will be similar to or better than the following:

Action 1

Does the total number of defects for the sample exceed the acceptance number?

- **No** — for each defect category (major, minor or cumulative), then continue the normal sampling routine.
- **Yes** — for any defect category **go to Action 2.**

Action 2

Inform the packhouse manager of the sample failure.

Together segregate and identify as non-export all product packed since last clear inspection. Stop export packing and **go to Action 3**.

Action 3

Product found below quality specification will remain segregated until it is determined what will be done with it (e.g. repack or New Zealand marketin

Action 4

Take corrective action that will prevent a reoccurrence. Recommence packing and resample 15 minutes later. Does this inspection fail?

- **No** — Re-commence a normal sampling routine.
- **Yes** — Return to **Action 2**. If the problem continues, conclude that the defect level is too high to be graded. Go to **Action 5**.

Action 5

Inform Packhouse Manager of situation and together decide to segregate total line from export. Inform Grower of decision, and supply records/samples collected to support the decision.

After the issue of a non-compliance and following corrective action, record all actions taken.

8.11 Reject Analysis

EMS Requirement

8.11.1 To assist Growers to identify fruit quality problems and to assess the effectiveness of grading staff, at least one reject fruit analysis will be completed for each Grower line. **Sample fruit for reject analysis should be sampled immediately after Class 1 grading.** A minimum total sample size should be at least 50 fruit. However, larger sample sizes will improve the accuracy of analyses. This can be achieved by taking more frequent, smaller samples.

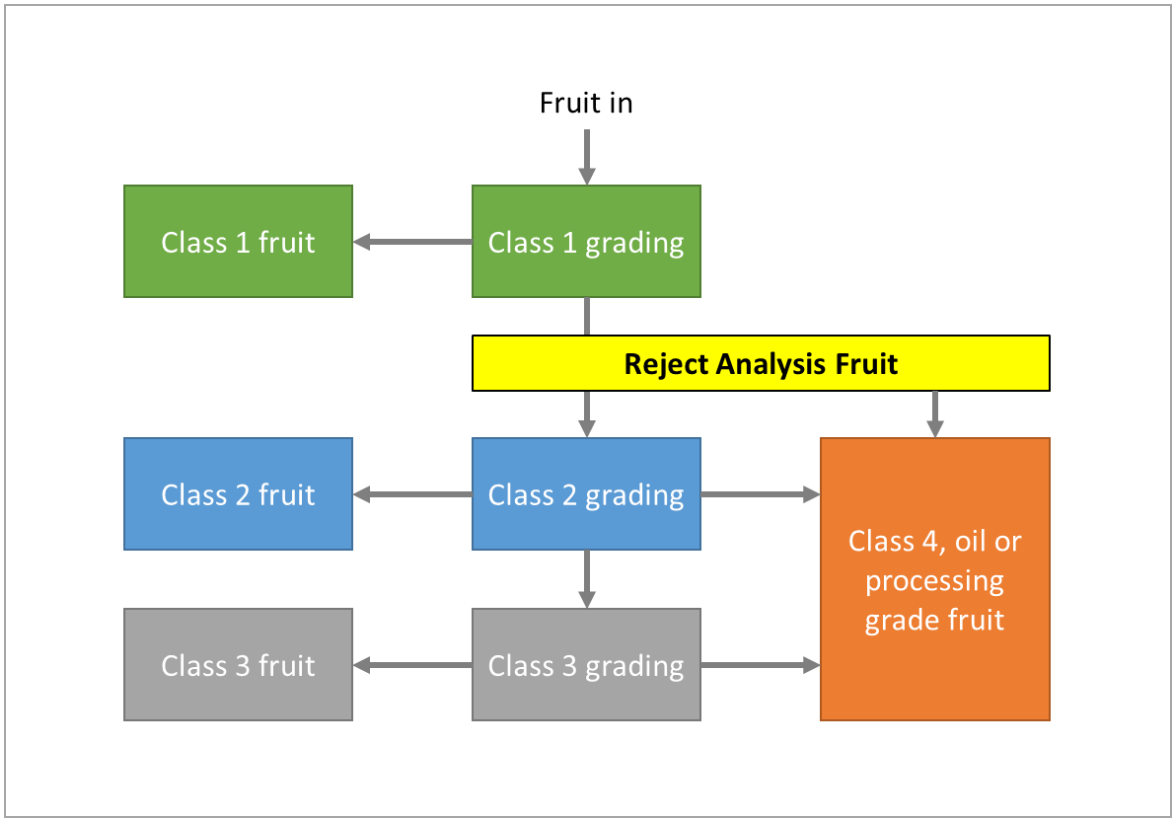
8.11.2 A copy of the reject analysis sheet will be made available to the Grower **within 7 days** and to the Exporter on request. See layout of a recommended reject fruit analysis record sheet in **Section 24, Appendix 7. This is a minor non-compliance.**

8.11.3 At a minimum the report will include the information contained on the recommended record sheet. Major and minor defects need not be distinguished. Blemish is to be segregated into windrub, leafroller and thrip damage.

8.11.4 The presence of scale and any other pest found during the reject analysis or by the QC at packing is to be recorded and actioned and notified in writing to the Grower.

Guidance

Reject analysis should be completed on fruit immediately post Class 1 grading and include all Classes of fruit below Class 1 – see following diagram.



8.12 Pack /Tray Weight Monitoring – USA only

EMS Requirement

8.12.1 A minimum of 2 single layer trays from each count size will be weighed at the time of QC sampling and then once per hour, with weights recorded on the avocado weight monitoring record sheet. Copies of these sheets should be filed with the QC inspection record sheets.

8.12.2 Minimum net fruit weights (all sizes) for each package will be:

- USA single layer trays 5.65 kg
- USA 25 lb double layer lug 11.3 kg

8.12.3 No more than one pack in 20 will be outside the minimum specified pack weight.

8.12.4 See recommended weight monitoring record sheet below.

Avocado Weight Monitoring Record Sheet – USA only

Pack type(s)	Enter counts/sizes packed								QC: Weigh 2 packages per size per hour Time of weighing
	Show net weights above								

Comments/actions:

QC signature: ……

8.13 Individual Fruit Weight - USA Market

EMS Requirement

8.13.1 Individual fruit weights will be monitored within 2 hours of commencing packing.

8.13.2 One tray of each count size will be weighed and then the individual fruit within each of these trays weighed. Results will be recorded on the fruit weight monitoring form.

8.13.3 No more than 10% of the fruit in an individual tray are to be below the count size individual minimum see **Section 8.16**. If tolerance is exceeded, then the documented corrective action within the Packers quality system will be implemented. Corrective actions will also be taken for the non-complying product that has already been packed.

8.13.4 If pack weight monitoring indicates that weights are acceptable then no further monitoring of individual fruit weights is required for that day.

8.13.5 Where pack weights are unacceptable then individual fruit weights will be monitored hourly until compliance is achieved.

8.13.6 For the largest count size packed, tray weights will be acceptable provided all fruit meet the minimum weight band requirement.

Guidance

Both individual fruit weights and individual tray weights are required to be monitored for the USA as there is Californian State Law that governs the weight of fruit in that state that results in legal compliance to state law.

Only individual weights of fruit are required to monitored for all other markets where weight is not set in law

8.14 Individual Fruit Weight – Non USA Market

EMS Requirement

8.14.1 Individual fruit weights will be monitored twice daily (morning and afternoon) commencing within 1 hour of packing.

8.14.2 One tray of each count size will be selected and then the individual fruit within each of these trays weighed. Results will be recorded on the fruit weight monitoring form.

8.14.3 No more than 10% of the fruit are to be below the count size individual minimum see **Section 8.16**. Where the tolerance for individual fruit weights is exceeded, then for the non-compliant count sizes the documented, corrective action within the Packers quality system will be implemented, and frequency of monitoring increased to 4 times daily. Corrective actions will also be taken for the non-complying product that has already been packed.

8.15 Bulk Pack Count Monitoring

EMS Requirement

Bulk pack count numbers will be monitored twice daily (morning and afternoon) commencing within 1 hour of packing.

8.16 Weight Bands

EMS Requirement

All Markets except USA Markets - Minimum Fruit Weight

Standard Counts	*Weight Range*
14 Count	368 +
16 Count	325 gm – 367 gm
18 Count	290 gm - 324 gm
20 Count	257 gm - 289 gm
23 Count	229 gm - 256 gm
24 Count	208 gm - 256 gm
25 Count	208 gm - 228 gm
28 Count	184 gm - 207 gm
30 Count	162 gm - 207 gm
32 Count	162 gm - 183 gm
35 and 36 Count	142 gm - 161 gm
Non Standard Supply	
42 Count	123 gm – 141 gm via Dispensation only

USA 11.3 kg (Double Pack) - Minimum Fruit Weight

Standard Counts	*Weight Range*
14-28 Count	378 gm +
16-32 Count	333 gm – 377 gm
18-36 Count	298 gm - 332 gm
20-40 Count	258 gm - 297 gm
24-48 Count	211 gm - 257 gm
30-60 Count	162 gm - 210 gm
36-72 Count	145 gm – 161 gm

Individual fruit weights can be over the upper weight band but not under the minimum, subject to the tolerance as specified in **Sections 8.12, 8.13, 8.14, and 8.15.**

Count sizes for the standard single layer tray are based on a net weight of 5.5kgs.

8.17 Library Trays

EMS Requirement

8.17.1 Library trays are the only opportunity for Growers to receive direct feedback on their fruit quality. Library trays also provide a source of retention sample and will be collected for each Grower (PPIN) packing fruit for export.

8.17.2 A library tray will consist of a sample of at least 20 fruit **of 20 count.**

8.17.3 Packers will take responsibility for ensuring library trays are collected and labelled correctly.

8.17.4 The actual collection, assessment and dissemination may be centralised for several packhouses, or handled by a third party provider.

8.17.5 Failure to collect library trays from a Grower line at the required frequency constitutes **a major non-compliance.**

8.17.6 Where there has been a residue find, library trays are to be held until such a time as the issue has been solved and approval is given to destroy the library tray fruit.

8.17.7 **Library Tray Sampling**

- The intention of the library trays is that they will be representative of the line. Fruit for the library trays will be drawn over a period of time, rather than from a single tray.
- Samples will be drawn from packed trays, and from count size 20 and will be representative of that line.
- A sample will comprise a minimum of 1 standard single layer tray of 20 fruit per line.
- Samples will not be taken from reject fruit.
- A line is defined as a continuous pack for an individual PPIN, which may extend over more than 1 day.

8.17.8 **Library Tray Frequency**

- One tray should be collected at every picking round per PPIN, or one tray every 60 days for PPINS where the property is picked either continuously or with breaks within a 60-day period. Collection commences August 1.

8.17.9 **Library Tray Storage**

- Library trays will be placed **immediately** into cool storage and flesh temperature maintained at 4.0ºC and 7.0ºC for a period of 28 days from picking.
- If library trays are being held at the Packer facilities until collection by NZ Avocado Independent Assessment Contractor (IAC), they will be held in the cool store, as above, under the same conditions the export fruit is held after packing, until the collector arrives. They are not to be held at reception awaiting collection.
- Since library trays will be stored for long periods, any fruit that begins to ripen early will be a source of ethylene. The cool store containing the library trays will be regularly vented and ethylene levels monitored fortnightly and recorded in a log. Ethylene levels as low as 0.1 ppm may be detrimental to fruit quality. **Where more than one cool store is**

available, place the library trays with packed fruit. If ethylene levels exceed 0.1 ppm, the cool store will immediately be vented and NZ Avocado notified.

- Ethylene control will meet minimum industry procedures **(see Section 10.12)**.

8.17.10 **Grower Reports of Library Trays**

It is vital to get information back to the Grower so they can make whatever adjustments are necessary to improve fruit quality. Growers will receive their Library Tray reports on their fruit quality by email providing information on the major quality problems as affecting their fruit.

The report will be emailed throughout the season and NZ Avocado will review the data across the season.

8.17.11 **Exporter Reports of Library Trays**

Packers will ensure that the Exporter name is entered on the library tray label. This will allow the Exporter to access the library tray reports and data should they require.

8.17.12 **Audit**

All records pertaining to the collection, holding and assessment of library trays will be made available for audit purposes. The conduct of the fruit assessments may also be subject to audit.

Best Practice

8.17.13 It is desirable to include shed averages in the report so that the Grower has an indication as to their fruit quality relative to other Growers. Industry averages will also be made available to Packers and disseminated to Growers using appropriate means. Inviting Growers along when their trays are being examined provides the most graphic feedback possible.

8.18 Record maintenance

EMS Requirement

Copies of all quality control records are to be maintained and made available for the audits of both the IVA and those auditing on behalf of NZ Avocado (to assess compliance with the EMS), for a period of at least 2 years from the end of each season.

8.19 Internal Audit Non-compliance corrective action

EMS Requirement

8.19.1 Refer to **Section 13.6:** Actions in the Event of Non Compliance Internal and External Audits.

9.0 BRANDING/PALLETISING

9.1 Fruit Labelling

EMS Requirement

Export avocados will be individually labelled:

9.1.1 With a label approved for use on fruit (i.e. with a non-toxic adhesive).

9.1.2 Excepting count size equivalents **28 to 42,** packed in bulk, which do not require fruit labelling.

9.1.3 An exemption to this requirement may be requested from NZ Avocado where the fruit is likely to be repackaged.

9.1.4 Up to 20% of fruit may be unlabelled before corrective action is required. Exporting significant quantities (more than 20%) of unlabelled fruit without a dispensation constitutes a minor non-compliance.

Best Practice

9.1.5 With a label of suitable size so it remains on the fruit in bulk packs. Shape, size and graphics to be at the Exporter's discretion.

9.1.6 Either by machine or by hand. If by hand, the label should be applied to the middle of the fruit.

9.2 Acceptable Package Types

See Part 7: Packaging of the Quality Manual

9.3 Package Labelling Specifications

EMS Requirement

9.3.1 Each package will be labeled clearly with a minimum of 6 mm lettering (except where indicated) stating:

- Avocado
- Registered Exporter identification or generic brand
- Contact address of Exporter (3 mm)
- Variety (e.g. Hass)
- Grade (e.g. Class 1)
- PPIN
- Size and count (where different)
- Produce of New Zealand (3 mm)

9.3.2 The following will also be indelibly labelled on each package's label end.

- Packhouse (NZ Avocado) number
- Date code (picking date)
- Registered Exporter identification or generic brand

- Pallet card number

Note: When part pallets are being forwarded to other packhouses or freight forwarders, individual cartons will be labeled with either a pallet number or identifier for traceability, such that product can be traced back to the originating packhouse.

9.3.3 **Individual Cartons for Export to Thailand**

If produce is shipped to the Kingdom of Thailand (Thailand) as individual cartons, "EXPORT TO THAILAND" (written as stated) must appear on each carton.

If produce is shipped to Thailand as pallets of cartons, "EXPORT TO THAILAND" (written as stated) will only need to appear on each side of the pallet.

Guidance: It is recommended best practice to label EAN labels on all TRAYS/ CARTONS for Thailand to give flexibility around compliance for air freight consignments where pallets may need to be deconstructed and hand packed into airfreight cans.

9.3.4 **Individual Cartons for Export to China**

- **Each carton must be marked in English with:**
  - Fruit type
  - Exporting country
  - Production place (region) – see **Appendix 8**
    - Northland
    - Auckland
    - Waikato
    - Bay of Plenty
    - Gisborne
    - Hawkes Bay
    - Taranaki
  - Production site registration number (PPIN)
  - Packhouse and its registration number.
- **Each carton must be marked in Chinese (Mandarin) with "输往中华人民共和国" (for export to the People's Republic of China).**
- **The pallet card for each exporting pallet must contain the statement "Inspected and passed for export to the People's Republic of China".**

9.3.5 Non- Class 1 fruit to food service or processing

- The EAN Label must be **ORANGE** in colour to clearly distinguish it from Class 1.
- Labels for processing must have PCR recorded as the Grade.

9.3.6 Any labelling will also comply with the following requirements:

- Only labels from NZ Avocado Exporters' will be used and these will be applied to the label end (at least) of each package.

- Handwriting on packages is not acceptable. All branding will be either printed or stamped and a minimum of 6 mm high.
- Any trays carrying the AvoGreen® logo will contain fruit that originate from growers complying with all AvoGreen® requirements.

9.4 Date Coding

EMS Requirement

9.4.1 Date coding will show the picking date and is the means by which the age of the fruit is identified. Therefore, it is a vital tool in time-chain management and "outturn" monitoring overseas. It will be regularly monitored by auditors on behalf of NZ Avocado to verify date coding is presented accurately on all packages.

9.4.2 When running lines of two consecutive pick days together, packhouses are entitled to put the **oldest** pick date on the labelling/packaging.

9.4.3 Actual date may be used in place of pick code or both may be displayed. Where actual date is used it will be displayed in the dd/mm/yy format. Where customer required format is different an indicator will be used to indicate a different date format (e.g. USA - mm/dd/yy).

9.4.4 The date code will show a letter to denote the month and 2 numerals for the day of the month, with the letter preceding the numerals

Example:

Month	Month code	Day of month	Day code
July	A	1	01
August	B	5	05
September	C	10	10
October	D	15	15
November	E		
December	F		
January	G		
February	H	Final code example.	
March	I	21 November	=E21
April	J	15 December	=F15
May	K	2 January	=G02
June	L		

9.5 Palletisation

EMS Requirement

9.5.1 Each pallet will have a pallet card firmly attached to the pallet. This will contain the following information:

- Exporter
- Packhouse
- Grower PPIN
- Pick date
- Pack date
- Product
- Class of product
- Variety
- Number of units
- Count size
- Pack type
- Pick to pack flag (if exceeded)
- Pallet number (which will be unique)
- Pallet identifier (where applicable and separate from pallet number)
- Mixed age pallets will have a visual indicator card attached to the face of the pallet **(see Section 2.2.6)**

9.5.2 Refer **Part 7 Section 3.0:** Palletisation specifications. All completed pallets will contain:

- The packs.
- A pallet base that matches the pack type (i.e. with no overlap or overhang).
- A pallet cap (cardboard). Dust covers will be used if required.
- 4 vertical V-boards positioned to secure half of the bottom bearers of each pallet. Specifications for V-boards are found in **Part 7 Section 4.2**.
- Heavy-duty strapping or Tama X-Span N'dicator Wrap:
  - Refer to **Part 7 Section 4.3** for Strapping and Strap Sealing specifications.
  - Refer to **Part 7 Section 3.0** for number and positioning of straps.
  - Refer to **Part 7 Section 4.4** for specification for the use of Tama X-Span N'dicator Wrap.
- Where manufacturers supply and recommend use of solid card *interlocking strips*, these will be used. Care should be taken to ensure these are placed in appropriate positions as the pallet is being built up. **Refer Part 7 Section 3.0.**
- Pallets and any wood used in the palletisation will be treated (kiln dried or fumigated). Check with Exporter for specific requirements. All wooden components will meet the international ISPM 15 standard.

9.5.3 All pallets including part pallets will have bottom straps at the top of the pallet base over V-boards to stop V-board splay. V-boards should not be at ground level.

Pallets will be stable and unlikely to collapse. Unstable pallets are defined as those that display any of the following:

- Are on a lean such that they are unable to be transported or placed into a container.
- Collapsing boxes in lower portion of pallet that are or are likely to damage fruit and /or collapse the pallet.
- Pallet base severely damaged or unstable (i.e. rocks).
- Excessively loose straps or wrapping material.

9.5.4 **Pallets for Export to Thailand**

If produce is shipped to the Kingdom of Thailand (Thailand) as individual cartons, "EXPORT TO THAILAND" (written as stated) must appear on each carton.

If produce is shipped to Thailand as pallets of cartons, "EXPORT TO THAILAND" (written as stated) will only need to appear on each side of the pallet.

Guidance: It is recommended best practice to label EAN labels on all TRAYS/ CARTONS for Thailand to give flexibility around compliance for air freight consignments where pallets may need to be deconstructed and hand packed into airfreight cans.

Best Practice

9.5.5 For details of pallet strapping sequence **refer to Part 7, Section 3.0**

9.5.6 When mixed pallets (containing both trays and bulk packs) are being assembled, it is recommended all packages are from the same manufacturer (to ensure package footprints are compatible).

9.5.7 The use of cargo netting, plastic wrapping or anything else that restricts ventilation is considered poor practice.

9.6 Repalletisation Procedure

EMS Requirement

Repalletisation of Product

9.6.1 Traceability will be maintained to the source pallet card number/pallet identifier.

9.6.2 Where pallets are consolidated with product from one or more originating pallets the following procedures will be followed:

- The pallet cards from the originating pallets can be photocopied and attached to the consolidated pallet along with its original pallet card or
- Create new pallet card
  - Consolidate product onto pallet base as per pallet assembly.
  - Create new pallet card.
  - Ensure all cartons are stamped or labelled with new pallet card Identifier.

10.0 COOL-CHAIN TEMPERATURES PRIOR TO LOADOUT

A summary of the general and minimum industry guidelines for both time-chain and cool-chain requirements can be found in **Appendix 1**

10.1 Cool store Air Temperatures

EMS Requirement

10.1.1 All packed fruit will be placed in a cool store within 12 hours of packing.

10.1.2 Time of placement into cool store by pallet ID will be recorded.

10.1.3 Cool store air temperatures are to be monitored on a daily basis, so long as fruit are held in the cool store.

10.1.4 Temperatures may be monitored either automatically or with a thermometer to an accuracy of ± 0.3°C.

10.1.5 The temperature recordings will be kept for audit purposes for a period of two years.

10.1.6 Where there is a cooling plant malfunction of greater than 12 hours' duration, provided flesh temperatures remain within specification then only the Exporter needs to be notified. If flesh temperatures are out of specification then the non-compliance procedure for flesh temperature detailed in **Section 10.7 and Section 13.6** is to be followed.

10.2 Fruit Flesh Temperature

EMS Requirement

10.2.1 Flesh temperatures of fruit in cool store are to be monitored and recorded on a daily basis as per industry guidelines, using either a manual or an automatic monitoring system.

10.2.2 Flesh temperatures will be cooled to between 4.0 and 7.0 °C within 72 hours of picking, or 24 hours of packing. For part pallets refer below.

10.2.3 Up to 30 November, flesh temperatures will be held at between 4.0 and 7.0 °C.

10.2.4 After 1 December to end of season, flesh temperatures will be held between 4.0 and 6.5°C. See industry guidelines in Appendix 1.

10.2.5 Monitoring should commence within 24 hours of the fruit being packed, or 12 hours of fruit being placed in cool storage.

10.2.6 The onus is on the Packer to demonstrate compliance using either automatic or manual monitoring. Regardless of method the temperature recordings will be kept for audit purposes. Audits will be conducted on flesh temperatures.

10.3 Part Pallets

EMS Requirement

10.3.1 Part Pallets

Any incomplete pallets at the end of the pack day will be held in cool storage overnight. Pallets may be removed from the cool store for a maximum of four hours for topping up on one occasion only. Part pallets will comply with the "mixed age" requirements under **Section 2.2.6.**

Best Practice

10.3.2 Part pallets should be palletized within the confines of the cool store area. Part pallets should not be outside the cool store for more than 2 hours. Achieving flesh temperature requirements within the required time may be difficult in part pallets.

10.3.3 The time part pallets are out of the cool store should be monitored and recorded.

10.4 Manual Monitoring

EMS Requirement

10.4.1 A minimum of 4 pallets will be checked per cool store at least once per day.

10.4.2 For each pallet, probe 1 fruit in a single tray or carton with a thermometer accurate to $\pm$ 0.3°C.

10.4.3 The same fruit may be monitored on a daily basis.

10.4.4 The probed fruit be clearly identified (e.g. label carton with fruit position).

10.4.5 Pallets will be selected to verify both static flesh temperatures and cool-chain requirements

10.5 Automatic Monitoring

EMS Requirement

10.5.1 Temperature monitoring equipment will be capable of reading and recording in increments of 0.1°C with an accuracy of + 0.3°C at least at hourly intervals.

10.5.2 If automatic monitoring equipment malfunctions, manual monitoring will be implemented until the system is restored (see malfunction procedure below).

10.5.3 An alarm system will be installed to detect unacceptably high and low temperatures.

10.5.4 In the event of low temperatures that may result in low temperature injury to the fruit, the alarm system will deactivate the refrigeration system.

10.5.5 Static flesh temperatures during coolstorage will be verified. Flesh temperatures will be probed manually (at least 4 fruit) twice weekly to verify the system is working. This can be done using either palletized fruit or slave fruit (individual fruit not palletized).

10.5.6 Verification is required to demonstrate that the cool-chain has been complied with (flesh temperatures reduced to required limit within 24 hours of packing). At least 4 palletized fruit (non-slave fruit) will be manually probed. Where fruit has been packed on only 1 or 2 days for that week then manual probing will be performed

once per week. Where fruit has been packed on 3 or more days for that week, then manual probing will be performed twice weekly.

10.6 Malfunction Procedure for Automatic Monitoring

EMS Requirement

10.6.1 Where there is a failure of the automatic monitoring equipment but the cool store remains operational, then:

- If duration of breakdown less than 24 hours no notification required.
- If duration of breakdown exceeds 24 hours, then both the Exporter and NZ Avocado will be notified.

10.7 Non-compliance Procedure for Flesh Temperature

EMS Requirement

10.7.1 If flesh temperatures exceed 7.0°C (6.5ºC after 1 December) in more than 2 pallets after 24 hours of being placed in cool storage, then flesh temperatures will be reduced to specification within a further 24 hours.

10.7.2 All corrective actions and temperature measurements will be documented.

10.7.3 Both the Exporter and NZ Avocado **(Industry Systems Manager)** must be notified immediately **(within the hour of being identified)** that flesh temperature requirements have been exceeded.

NOTE: Failure to notify the Exporter and NZ Avocado or to follow the non-compliance procedure for flesh temperature constitutes **a major non-compliance.**

10.8 Load out Flesh Temperatures

EMS Requirement

10.8.1 **Load out to Container:**

- Flesh temperatures of fruit are to be monitored and recorded prior to loadout. **The time the temperature was taken and the time of load out must be recorded.**
- Load at **between 4.0ºC and 7.0ºC** flesh temperature prior to the 30 November.
- Load at **between 4.0ºC and 6.5ºC** flesh temperature after the 1 December.
- At least one fruit from a **minimum** of 5 pallets across a homogenously stored load or up to 25% of the pallets per loadout (whichever is the greater) **must** be checked at load out and the records maintained for auditing purposes.

See a summary of the industry guidelines in **Section 14, Appendix 1.**

10.8.2 **Load out to Freightforwarder for container shipping:**

- Flesh temperatures of fruit are to be monitored and recorded prior to loadout. The time the temperature was taken and the time of load out must be recorded.
- Where fruit has been cool stored for less than 24 hours, load out at 10ºC or lower flesh temperature (except for air freight loadouts).
- Where fruit has been cool stored for 24 hours or more then load out temperatures should meet the requirements for container load outs above (except for air freight loadouts).
- At least one fruit from a **minimum** of 5 pallets across a homogenously stored load or up to 25% of the pallets per load out (whichever is the greater) **must** be checked at load out and the records maintained for auditing purposes.

10.8.3 **Load out to Airfreight and to Freightforwarder for airfreight:**

- Flesh temperatures of fruit are to be monitored and recorded prior to load out. The time the temperature was taken and the time of load out must be recorded.
- At least one fruit from a **minimum** of 5 pallets across a homogenously stored load or up to 25% of the pallets per load out (whichever is the greater) **must** be checked at load out and the records maintained for auditing purposes.

10.9 Non-compliance Procedure for Load Out Flesh Temperature

EMS Requirement

10.9.1 Where flesh temperatures at loadout exceed the above requirements (see 10.8) the following procedure will be followed:

- Pallets found exceeding the required flesh temperature at loadout, will remain in cool store until the temperature is reduced to specification.
- Where flesh temperatures at loadout are exceeded by no more than 1ºC in 2 or less pallets, load out of these pallets may proceed under the Exporter's discretion. Dispensation procedure outlined below will be followed.
- The Packer will notify the Exporter and NZ Avocado immediately (within the hour of being identified) that flesh temperature at loadout has been exceeded. This notification will include:
  - Number of pallets involved.
  - Flesh temperatures registered.
  - The Exporter will apply to NZ Avocado through the dispensation process for a dispensation including the details provided by the Packer.

Failure to notify the Exporter and NZ Avocado when product loaded out exceeds the specified flesh temperatures constitutes a major non-compliance (see Section 13.6).

Best Practice

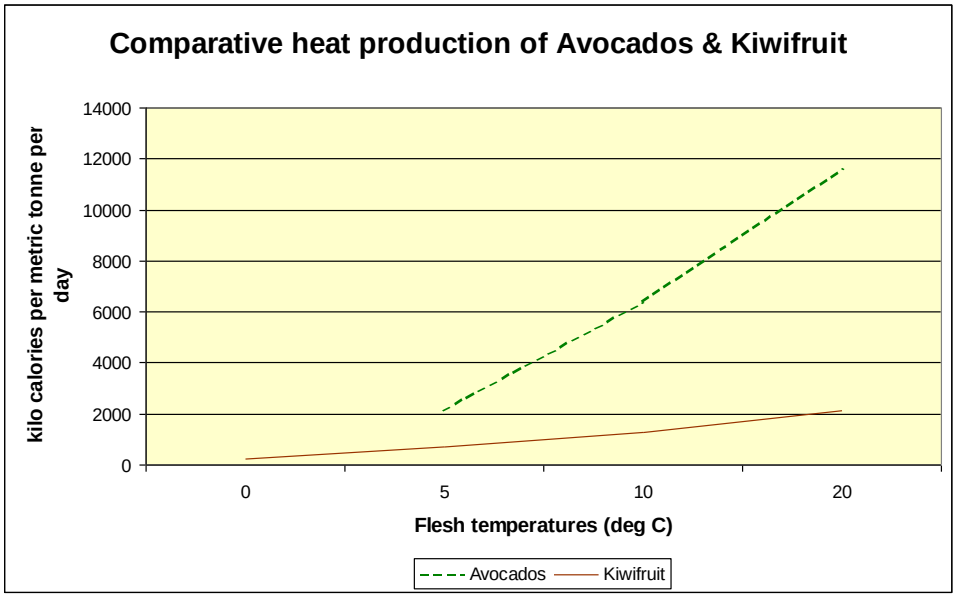
10.10 Packer Cool Chain Responsibilities

The Packer should:

- Plan handling of product so effective cool-chain is achieved, irrespective of packhouse location or on-site facilities.
- Pick to pack times should not exceed 24 hours. Where this is not possible, fruit should not be cool stored for more than 48 hours prior to packing.
- Ensure all avocados received for packing, and leaving the packhouse for export, are in premium condition and likely to arrive in the marketplace in the same condition.
- Maintain two cool rooms; being for field bin fruit (above dew point) and packed fruit (between 4.0 and 7.0°C), with a reduction over the season from 7.0°C prior to 30 November and 6.5°C after 1 December.
- Avocados should not be stored with other high ethylene producing fruit such as apples, bananas etc.
- Packer should notify the Exporter of any other product stored in an avocado cool store.
- Ensure all product is within specified time-chain and cool-chain guidelines at time of load out for truck or sea container or air load out.
- Present fruit to the Exporter only where it complies with requirements for time-chain or cool-chain.

10.11 Notes on Avocado Storage and Respiration

Avocados have characteristics that are different to many other fruits. They have a high respiration rate that demands prompt temperature management and vigorous air circulation in cool rooms. A simplified comparison to kiwifruit is interesting:



This respiration rate means that avocados held in a bulk mass (e.g. bins), or in places without air movement (e.g. a curtain-sider truck) will heat up as a result of fruit respiration. As the season progresses the rate of respiration tends to become more significant, due to higher fruit maturity and generally higher ambient temperatures. The riper the fruit and the warmer it is, the greater its respiration rate will be.

To maximise storage life of Hass avocados, fruit should be brought to between 4.0 and 7°C as quickly as possible and held there. **Fruit stored at 3°C will develop chilling injury and at 10°C or more, it will have markedly reduced storage life.** Optimally stored avocados will have a storage life of up to 28 days, but any deviation from the optimal will significantly reduce storage life.

Packing should be as soon as possible after harvest. Prior to packing it is necessary to hold fruit at between 10 and 14°C (just above the dew point) to avoid wetness at packing and consequent lenticel damage. Therefore, it is best to pack avocados promptly so they may then be reduced on down to between 4.0 and 7°C.

Care should be taken to ensure <u>all</u> cool stored avocados are exposed to cool moving air. Any air blockage means fruit temperatures will gradually rise, due to respiration heat. Flesh temperatures as high as 20°C have been measured in pockets of avocados where cooling air (6°C) has been blocked for a significant period.

Avocados will tolerate lower temperatures when fully mature. As the season progresses, there is an increased need for lower temperatures at all stages of handling. Ethylene production by the fruit also increases with ripening to more than 100 microlitres of ethylene per kg per hour at 20ºC (i.e. >100µl C_2H_4/kg per hour at 20ºC). Therefore, venting of cool store rooms may be appropriate if fruit is held for a period.

10.12 Ethylene Control

EMS Requirement

Ethylene levels in any cool store storing export avocados will not exceed 0.1 ppm.

10.12.1 Verification

- Cool stores will have documented procedures to verify that NZ Avocado specifications are met by monitoring ethylene levels and taking corrective action if necessary.
- Ethylene samples will be collected, identified, dispatched and analysed by an approved ethylene testing laboratory every 14 days after the first fruit being placed in the cool store.
- Ethylene samples will be taken prior to venting.
- Cool stores will be vented at a minimum of once per fortnight.
- Ethylene results will be recorded by:
  - Location
  - Date
  - Time

10.12.2 Non-compliance procedure for Ethylene Monitoring

- Corrective action will be taken to reduce ethylene levels in a cool room if they exceed 0.07ppm.
- Sampling will continue every 24 hours until the ethylene level is below 0.07 ppm.
- NZ Avocado (attention Industry Systems Manager), the packhouse Quality Co-ordinator and Exporter will be notified in writing within one working day if an ethylene level above 0.1 ppm is recorded and remains above 0.1 ppm for 48 hours or more.
- Failure to notify NZ Avocado and the Exporter **constitutes a major non-compliance (see Section 13.6).**

Best Practice

10.12.3 Vent cool store (15-20 min) at regular intervals (2-6 days) to prevent build-up of ethylene (keep below 0.1 ppm). It takes 4 void volumes to reduce to ethylene levels to one tenth of the starting concentration. Use a fan with a displacement of 50 m^3 /min for a 1000 m^3 room. Remember that while individual fruit will only be cool stored for short periods, the cool store itself may be continually occupied for several months. Ethylene levels must be regularly tested, and the results recorded.

10.13 Phytosanitary Space Separation

EMS Requirement

10.13.1 The Packer is required to meet all segregation and separation requirements of bins and packed product for individual market access requirements including fruit packed under an OAP.

10.13.2 The Packers must refer to the relevant OAP or specifications in their MAO document system for segregation and separation requirements.

Best Practice

10.14 Reducing the Risk of CBIS Failure Due to Contaminants

Below are some recommended best practices for reducing contaminant failures:

- Be familiar with Growers and work with those who have had difficult lines in the past, and those new to you.
- Give timely reminders so that Growers can complete all necessary preparations for harvest in good time, e.g. complete final sprays and enter into electronic spray diary. Orchard mowing and herbicide application will assist to provide clean bin standing and handling areas, and clear access to all blocks. Avoid brushing bins against overhanging branches of non-avocado trees.
- It is Best Practice to carry out a Pre-Harvest Quarantine Monitor within 14 - 28 days of the planned harvest where no other monitoring round has taken place.
- Ensure bins and crates are clean before they are used, and that all packhouse systems including waterblasters are ready to go well before they are actually needed.
- Bin holding and handling areas on orchard and at packhouse should also be clean and weed-free.
- Do not store bins, full or empty, under lights which will attract flying insects. External lighting around packhouses and cool stores should use yellow light such as from high or low pressure sodium bulbs (e.g. Osram SOX LPS, or Osram SON NAVT) rather than white light. This avoids attracting insects into the shed.
- Install air curtains or other insect screening on main entranceways to the packhouse. UV lights (zapper) or automatic insect spray dispensers are recommended but its use needs to be checked against BRC requirements. Place any UV lights such that they cannot be seen from outside the packhouse but remain visible to any insects within the shed as they strongly attract insects. Any white lights placed inside the packhouse should be similarly screened or placed so as not to be directly visible externally.
- Hold packed fruit well clear (>15 m) of reject fruit, rubbish bins and permanently wet areas, and not under lights.
- Ensure that excess and waste water, such as from washing and waterblasting, drains and does not accumulate, as contamination by adult insects, which live in water as larvae, may occur.
- Use your waterblaster as it should be operated.
- Don't try to cut corners – quarantine failure is serious and costly to both the individual and the whole industry.
- No food or cans of drink in packhouses.

11.0 LOADOUT PRACTICES

11.1 Truck Load out

EMS Requirement

At the time of load out the Packer will verify that:

11.1.1 Transport procedures otherwise comply with phytosanitary, pre-clearance requirements (if needed) and food safety requirements.

- Export fruit is separated from non-export fruit by a 100mm gap or a physical barrier between each category of product.
- A barrier will exist between pallets of pre-cleared and non-pre-cleared product or a 100mm gap left between each category of product.

Best Practice

11.1.2 At time of loading:

- Product complies with time-chain and cool-chain criteria, as in **Sections 2.0 and 10.0.**
- Pallets are in stable condition.
- Product and pallets are correctly identified in accordance with this Manual.
- All product and procedures meet commercial and phytosanitary requirements for the intended customer.

11.1.3 Conditions of transport are suitable:

- Pallets are well secured to prevent movement or damage during transit.
- Pallets are well insulated against temperature rises and/or contamination from external causes.
- The truck will deliver pallets directly, on time and to the specified destination. If it is known pallets are to be transferred or otherwise held during transit, the Packer should verify that product temperatures and security will not be adversely affected.
- Comply with relevant Ministry of Transport Code of Practice.

11.2 Sea Container Stowage

EMS Requirement

At the time of loading the Packer will verify that:

11.2.1 Pallets is in a stable condition and suitable for sea freight (**refer to Part 7: Packaging)**

Best Practice

- The Packer will ensure that the fruit age specifications can be met and allow sufficient time for transport to point of shipping (refer to **Section 14, Appendix 1).**
- Product complies with time-chain and cool-chain criteria, as in Section **2.0 and 10.0.**
- There is no loose stowed packaging on top of pallets or elsewhere.
- Product and pallets are correctly identified in accordance with this Manual.
- All product and procedures meet commercial and phytosanitary requirements (including possible pre-clearance) for the intended customer.

11.3 Container and Stowage

A guide to Best Practice for Stowing a Container can be found in Appendix 9

- The container is to be in good condition (e.g. no holes in outer skin, clean and with good rubbers on the doors).
- The temperature set-point (if visible) is to be correct (e.g., there is risk in sending a container back to the terminal, where the set-point is (say) at minus 20°C).
- Containers cannot be relied upon to draw down fruit temperatures.
- Pallets are correctly stowed, according to pallet type and Exporter specifications.
- Despatch documentation is properly completed and the truck will deliver the container to the correct terminal and on time. This will identify any possible misunderstandings.
- Transport procedures otherwise comply with phytosanitary and pre-clearance requirements (if needed).

12.0 REPORTING REQUIREMENTS

EMS Requirement

12.1.1 Packers will report the actual volumes packed for the week ending 5.00pm each Friday as per the Packer Responsibilities in the **EMS Clause 4.5.9, no later than 12.00 noon each Monday.**

12.1.2 Where a Packer packs fruit from more than one region, the Packer will submit a separate weekly report for such regions (Far North, Mid North, Bay of Plenty and Rest of New Zealand.

13.0 AUDITS OF PACKERS

13.1 Audit Process

EMS Requirement

13.1.1 A Packer will be subject to an audit process of their quality systems and records. Packers will comply with instructions from the independent auditor.

13.1.2 Packers have the right to appeal an audit finding. Any such appeal will be lodged with NZ Avocado within 48 hours of the non-compliance occurring. This will include the relevant grounds for appealing the non-compliance and mitigating circumstances.

13.1.3 The Industry Systems Manager will request a report from the auditor on the circumstances leading to the non-compliance and this will be taken into consideration along with the Packers appeal and the parties will be notified of the outcome.

13.2 External Audits

EMS Requirement

13.2.1 Audits on behalf of NZ Avocado will be performed by the contracted Independent Verification Agency (IVA):

- At each packhouse and cool store up to 3-5 times in each export packing season and,
- At other points, as considered appropriate (e.g. Freight Forwarders or ports.

13.2.2 The Packer will co-operate with the Auditor during audits or in any consequent re-establishment of compliance.

13.2.3 Audits will verify compliance with **EMS Clause 4.5.27** and identify areas of non-compliance.

13.2.4 Audit frequency for each Packer will be based on their assigned risk rating. This rating will be based on their immediate history of non-compliances. Each Packer will be notified of their risk rating at the start of the season.

13.2.5 A documented report will be given to the Packer following completion of each audit. This will identify and describe any non-compliance.

13.2.6 Any complaints regarding the outcome of the audit or the audit procedure will be submitted in writing to NZ Avocado within 48 hours of receipt of the audit report.

13.2.7 NZ Avocado will define categories of Minor and Major non-compliance. These are listed in **Section 27 Appendix 10 -** however this is not an exhaustive list.

13.2.8 Any Packer that requires an initial systems audit will have this completed **prior to the commencement of packing for export.** A minimum of 5 working days' notice prior to the intended start of export will be given to the IVA to schedule the audit.

13.3 Retrospective Audits

EMS Requirement

13.3.1 Auditors may carry out random retrospective audits of packed product. The auditor will initially audit product packed prior to arrival, either on the same day if available, or from the pack out of the previous day from the cool store. This may require breakdown of pallets chosen by the auditor at random. On occasion, this may include product removed from cool storage. Packhouse staff will comply and co-operate with the instructions of the auditor. **Failure to do so will constitute a major non-compliance.**

13.3.2 Any Grower line intended to be submitted for export that is found to be out of grade constitutes a major non-compliance. Product will be reworked and represented. This will trigger a further audit at the packhouse expense.

13.3.3 A retrospective audit will be automatically triggered if out of grade fruit is found off-shore during outturn monitoring. Other audits will be at random.

13.3.4 In the event of a retrospective audit where a line is failed due to grade but has passed the in-line inspection, the finding of the retrospective audit will prevail.

Note: Any Packer on a high risk rating will be invoiced the cost of the initial systems audit.

13.4 Actions in the Event of Non-Compliance Internal and External Audits

EMS Requirement

13.4.1 Minor non-compliances see **Section 27, Appendix 10**

- The Packer will notify the Auditor and NZ Avocado that a minor non-compliance has occurred and the nature of the non-compliance, within 24 hours.
- The Packer will be required to verify immediate compliance actions within 5 working days.
- No follow up audit will be required but the compliance actions will be verified at the next audit. Product may continue to be submitted for export in the interim.

13.4.2 Major non-compliances **Section 27, Appendix 10**

- The Packer will immediately **(within the hour of being identified)** notify the Auditor and NZA that a major non-compliance has occurred and the nature of the non-compliance.
- The Packer will notify the affected Grower(s) and Exporter immediately that a major non-compliance has occurred and the nature of the non-compliance.
- The Packer will verify compliance to the Auditor within 24 hours.
- Re-audit will occur within 3 packing days or at such other time at the discretion of the Auditor. This will verify a return to conformance. Costs for the re-audit will be at the Packer's expense.

- No product of the Packer will be submitted for export until confidence has been re-established and signed off by the Auditor. However, the Packer may continue to pack product for export.

13.4.3 Failure to Comply

In the event of a biosecurity breach or where alleged failure to follow the requirements of the EMS or non-compliance with Food Safety or Quality Manual obligations is identified NZ Avocado will:

- Investigate the alleged breach as outlined in NZ Avocado EMS Breach Procedure.
- If the breach is confirmed the following actions as outlined in the **EMS Section 6.2** may be considered by NZ Avocado:
  - Instruct the Grower to cease harvesting for export.
  - Instruct the Packer to cease packing the fruit of the defaulitng Grower for export.
  - Instruct the Exporter not to export the fruit of the defaulting Grower and notify the RPG.
- Subject to the procedures set out in the EMS and a decision from HEA, NZ Avocado will be entitled to decline any application for registration in any subsequent export season which is made to it by a Grower, Packer or Exporter who has previously failed or refused to comply with a the requirements of the EMS or non-compliance.

13.5 Audit Costs

EMS Requirement

13.5.1 Costs of up to 3 audits (at Packhouse or elsewhere) will be met by NZ Avocado.

13.5.2 Costs of any special audits, as a result of any major non-compliance, will be met by the Packer as a condition of re-establishing compliance.

13.5.3 Costs of MPI phytosanitary compliance audit time additional to regular NZ Avocado audits will be met by the Packer.

13.5.4 If any auditor arrives to do an un-announced audit and finds that the shed is not packing after being advised that they were, the cost of the auditor's travel will be charged directly to the shed.

13.5.5 When there is an extensive investigation as a result of a potential non-compliance that requires an extraordinary amount of time spent verifying information, NZ Avocado approved auditor will be able to invoice the responsible party for actual and reasonable expenses if the non-compliance or any other non-compliance identified in the process is upheld.

13.6 Major and Minor Non Compliance Checklist

See Section 27 Appendix 10

13.7 Dispute Process

EMS Requirement

In accordance with the EMS, in the event that the Packer continues to dispute a non-compliance ruling, they have a final right of appeal to a tribunal consisting of the CEO, the Packer and a CEO appointed nominee. Any submissions to this tribunal will be made in writing within 30 days of the original non-compliance. The findings of this tribunal will be final and binding on all parties.

13.8 Packer Risk Rating System

EMS Requirement

13.8.1 The number of audits scheduled for a Packer during a season will be determined by their risk rating. This rating is based on the previous season non-compliances. There are 3 risk categories as follows:

Rating	Risk Category	EMS Audits Required During The Season
3	High	5 audits per season
2	Medium	4 audits per season
1	Low	3 audits per season

13.8.2 While the number of scheduled audits is set by the risk rating, the risk rating may be revised during the season based on the findings observed at each audit (see Table below). The risk rating may be revised up or down within the season based on the audit results.

13.8.3 When a Packer on High Risk Rating receives 2 Major Non Compliances on their fifth audit and is not placed on endpoint by NZ Avocado, the Packer should have a sixth audit to reconfirm their compliance.

Rating	Non-compliances Identified	Action To Be Taken
3	One or more major non- compliances **which result in a loss of confidence** in the operators system.	Pre load-out audits to be conducted on every export shipment until no non- compliances identified for 3 consecutive shipments. Where consecutive audits are carried out these will be on separate Grower PPINs. Additional to this, a full systems audit needs to be completed prior to first export pack.
	Up to one major non-compliance where confidence in the operator's system is not impacted	No change to audit frequency
	No majors for 3 sequential audits	Move to rating 2

2	` Up to one major non-compliance	No change to audit frequency
	Two or more major non compliances	Move to rating 3
	No majors for 3 sequential audits	Move to rating 1
1	Up to one major non-compliance	No change to audit frequency
	Two or more major non- compliances	Move to rating 2

14.0 APPENDIX 1: Summary of Time-chain and Cool-chain Industry Guidelines

The following is a summary of the general and minimum industry guidelines for both time-chain and cool-chain and should be observed by all those handling Avocados prior to export.

Responsible	Activity	Time-chain from Harvest	Cool-chain	
Harvester and Packer	Picking	Should not pick if more than 5mm rain in previous 24 hours	Harvest at <30°C ambient air temperature. Hold in shade under cool conditions,	Best Practice
Packer	Fruit delivery to packhouse	Within 24 hours		EMS req
Packer	Post-harvest fungicide Application	Within 12 hours		Best Practice
Packer	Post-harvest Fungicide application	**May** be applied to fruit for Australia		EMS req
Packer	Storage prior to packing		Commence cooling to less than 15°C. Note: prior to packing, **fruit should be held just above the dew point, i.e. at 10-14°C**	Best Practice
Packer	Packed	Within 48 hours		EMS req
Packer	Into cool store	Within 12 hours of packing	Commence reducing flesh temperature to no less than 4.0°C and 7.0°C.	EMS req
Packer and Exporter	Cool storage	Within 72 hours of picking	Flesh temperature reduced to between 4.0°C and 7.0°C. Hold at temperatures between 4.0°C and 7.0°C up to 30 November. Hold at temperatures between 4.0°C and 6.5°C after 1 December to end of season.	EMS req
Packer	Load out to Freight Forwarder		**Container only** - Load at temperatures between 4.0°C and 10.0°C flesh. **Airfreight** – Temperatures taken and recorded at loadout	EMS req
LOAD OUT TO ALL MARKETS OTHER THAT AUSTRALIA OR USA				
Packer and Exporter	- Container	Loading within 6 days of harvest **OR** 7 days of scheduled sailing (as identified on pallet card).	Load at temperatures between 4.0°C and 7.0°C prior to 30 November, Load at temperatures between 4.0°C and 6.5°C after 1 December.	EMS req
Exporter	- Reefer ship	Shipment within 8 days of harvest to scheduled sailing (as identified on pallet card).		
Exporter	- Air Freight	Within 14 days of harvest (as identified on pallet card).	Temperatures taken and recorded at load out	
LOAD OUT TO USA				
Packer and Exporter	- Container	Loading within 6 days of harvest **OR** 9 days of scheduled sailing (as identified on pallet card)	Load temperatures between 4°C and 7.0°C prior to 30 November. Load at temperatures between 4.0°C and 6.5°C after 1 December.	EMS req
Exporter	- Reefer ship	Shipment within 8 days of harvest to scheduled sailing (as identified on pallet card)		
Exporter	- Air Freight	Within 14 days of harvest (as identified on pallet card)	Temperatures taken and recorded at load out	
LOAD OUT TO AUSTRALIA				
Packer and Exporter	- Container prior to 31 December	Within either 9 days of harvest to container loading **OR** 11 days of harvest to scheduled sailing.	Load at temperatures between 4.0°C and 7.0°C prior to 30 November Load at temperatures between 4.0°C and 6.5°C after 1 December	EMS req
Packer and Exporter	- Container 1 January to 31 January	Within 7 days of harvest to container loading **OR** 9 days of harvest to scheduled sailing.		
Packer and Exporter	- Container from 1 February	Within 5 days of harvest to container loading **OR** 7 days of harvest to scheduled sailing.		
Exporter	- Air Freight	Within 14 days of harvest.	Temperatures taken and recorded at load out	

15.0 APPENDIX 2: Countries Excluded from Assurance of Compliance with Importing Country MRL Requirements

Compliance to Food Safety Programme requirements in this Quality Manual does not provide any assurance of compliance with the importing countries MRL requirements for the following countries:

Indonesia

16.0 APPENDIX 3: Waterblaster Water Quality Verification

The recommendation for avocado packhouses is to undertake regular water quality testing as part of a *monitoring process for pack line water quality maintenance*. Maintaining water quality across the pack-line is both a food safety and an inoculum contamination issue for the industry.

Water quality testing for 2022-23 is to include a start-up sample taken within two weeks of season start-up no later than the 2nd EMS audit.
Samples are to be analysed for bacterial (including ecoli) and fungal contamination and will be reported as cfu/ml.

16.1 Objective

Water quality across the packing process is maintained at a level that limits the potential for cross contamination of fruit over time and meets food safety expectations.

16.2 Method

Sample frequency

Water samples will be collected by the AQ auditor at season start up and once more following that on planned systems audits for the 2022-23 season.

Costs of analysis will be $124.50 + GST per sample and invoiced by the service provider directly to each packhouse.

Sampling protocol

In-line water samples will be collected at specified intervals across a single packing day using the following method:

1. Collect 1 x 10 ml sample of water from the reservoir tank of waterblaster.
2. Place sample directly on ice.
3. 2 samples are to be collected at different interval times (time is to be noted) intervals:
    a. Session 1 (e.g. within 1 hour of packing commencement).
    b. Session 2 or at an alternative sample time prior to the auditor departing from the premises but sat least 2 hours after the first sample. Please notify NZA if this can't be achieved.
4. All samples to be chilled and couriered chilled to the laboratory at the end of the pack day.
5. AQ will deliver water sample.
6. NZ Avocado to have a copy of all of the results.

Sampling regime checklist

Packhouse name _____
Sample collector _____
Date of sample collection _____

NZ Avocado will arrange for the auditor to sample for water quality as part of the second EMS Audits.

17.0 APPENDIX 4: NZ Avocado Protocol for Residue Sampling

17.1 Objective

Residue monitoring is a critical part of the industry's systems approach to ensuring food safety. New Zealand avocado oversees a post-harvest random residue monitoring system as well as pre-harvest industry stakeholder residue monitoring.

17.2 What are MRLs and MLs

Maximum Residue Levels (MRL), in the case of heavy metals the Maximum Limits (ML) expressed as mg/kg is the maximum concentration of a pesticide or heavy metal legally permitted in or on commodities. MRLs for pesticides are established in most countries to safeguard consumer health and to promote Good Agricultural Practice (GAP) in the use of insecticides, fungicides, herbicides and other agricultural compounds. In most countries, including the New Zealand market, food that is exported must comply with the MRLs and MLs the country of destination has set. This is a condition of market access.

18.3 Sampling Instructions for Avocado Residue Testing

In order to determine whether agricultural produce complies with Maximum Residue Limits (MRLs) for agrichemical residues or Maximum Levels (MLs) for metal residues, it is necessary to provide a representative sample to the laboratory for analysis. No matter how carefully laboratory analyses are carried out, the results will be of limited value unless the sample provided is truly representative of the area of harvest or export consignment.

These guidelines aim to provide the information necessary to allow you to take a representative sample that can be sent to accredited laboratories for testing. You can then be more confident that the results obtained are a true indication of the residue status of the crop tested, and that decisions for clearance to pick and harvest are based on accurate information.

The following procedures are based on methods of sampling recommended by the Codex Alimentarius Commission and the Food and Agriculture Organisation.

17.4 Verification of Sample Requirements

- Submit separate samples to the laboratory if you are dealing with different:
    - cultivars or varieties.
    - areas of crop which have had different chemical treatments, or which have been sprayed on different days.
    - produce sourced from different growers for repacking or processing.
- Check the NZ Avocado electronic spray diary to verify that the blocks being sampled match blocks recorded in the spray diary.
- Check the spray diary to verify the date of applications and areas of homogenous sampling. That is blocks have consistently been treated with the same sprays applications.
- No more than 10 hectares should be covered in a single sample.

Example 1

Date applied	Blocks	Products (Active ingredient)
06-05-2022	01, 02, 03, 04, 05, 06, 07, 08, 09	Nordox 75WG (Cuprous oxide), Topstar - TH (Thiacloprid), Verdex 18EC (Abamectin), Excel Oil - Organic (Oils - Mineral)
15-03-2022	01, 02, 03, 04, 05, 06, 07, 08, 09	Topstar - TH (Thiacloprid), Spreadwet
16-02-2022	01, 02, 03, 04, 05, 06, 07, 08, 09	Genoxy 240SC (Methoxyfenozide), Spreadwet
20-01-2022	01, 02, 03, 04, 05, 06, 07, 08, 09	Topstar - TH (Thiacloprid)
19-12-2021	01, 02, 03, 04, 05, 06, 07, 08, 09	Genoxy 240SC (Methoxyfenozide), Verdex 18EC (Abamectin), Spreadwet

All blocks can be tested together as they have been treated the same.

Example 2

Date applied	Blocks	Products (Active ingredient)	Rate per 100L	F
14-04-2022	01, 02, 03, 04, 05, 06, 09, 10, 11, 13, 14, 15, 16, 17, 18	Dew 600 (Diazinon), AG Copp 75 (Cuprous oxide), Deluge low foam	73.85ml, 70.00g, 10.00ml	S
30-03-2022	01, 02, 03, 04, 05, 06, 09, 10, 11, 13, 14, 15, 16, 17, 18	Dew 600 (Diazinon), Deluge low foam	73.85ml, 10.00ml	S
24-02-2022	01, 02, 03, 04, 05, 06, 09, 10, 11, 13, 14, 15, 16, 17, 18	Topstar - TH (Thiacloprid), Spreadwet	17.73ml, 18.18ml	S
05-02-2022	01, 02, 03, 04, 05, 06, 09, 10, 11, 13, 14, 15, 16, 17, 18	AG Copp 75 (Cuprous oxide), Uphold - TH (Spinetoram), Spreadwet	70.00g, 40.00ml, 25.00ml	S
08-12-2021	01, 02, 03, 04, 05, 06, 09, 10, 11, 13, 14, 15, 16, 17, 18			K
07-12-2021	02, 03, 04, 05, 06, 10, 11, 13, 16, 17, 18	AG Copp 75 (Cuprous oxide), Uphold - TH (Spinetoram), Spreadwet	70.00g, 40.00ml, 25.00ml	S
10-11-2021	09, 10, 14, 15	Lokit - buffering agent	11.79ml	Y
10-11-2021	09, 10, 14, 15	Sunny (Uniconazole - P)	1.00l	

Orchard is 7 ha: One residue sample can cover this orchard due to the size of under 10ha BUT that will be dependent on the timing of the residue sample and the spray applications. Potentially two residue samples would be required for this orchard to clear due to the Sunny being applied to blocks 9,10,14,15. However if the residue testing is taking place in excess of 60 days after the Sunny application then this orchard can be covered by a single sample. *Two residue tests required from this orchard to clear all blocks as follows:*

- *Blocks 9,10,14 and 15 sampled together*
- *Blocks 1,2,3,4,5,6,11,13,16,17,18 sampled together*

Example 3

09-05-2022	01, 02, 03, 04, 05, 06	Calypso - TH (Thiacloprid), Avid (Abamectin), Kocide Opti (Copper hydroxide), Wet-sol	15.00ml, 37.50ml, 70.00g, 20.00ml
15-03-2022	06	Dew 600 (Diazinon), Kocide Opti (Copper hydroxide), Wet-sol	80.00ml, 70.00g, 25.00ml
18-01-2022	01, 02, 03, 04, 05, 06	Sparta - TH (Spinetoram), Kocide Opti (Copper hydroxide), Wet-sol	40.00ml, 70.00g, 25.00ml

Two samples must to be taken from this orchard due to the high risk application of Dew 600 on Block 6.

- *Blocks 1,2,3,4 and 5 samples together*
- *Block 6 samples separately*

17.5 Sample Collection Instructions

- New and powder free disposable gloves must be used to collect the required amount of product for each sample. Note: Hand sanitisers can be a source of residual chemical contamination.
- Place the sampled product in a new, clean, uncontaminated plastic bag or other suitable container. Do not use Supermarket bags or any other receptacle that may have previous contamination.
- Seal the bag.
- Fruit should not be cut or divided.
- Clearly label the outside of the bag with the PPIN, blocks and sample date.
- Note the blocks sampled as representative of the blocks to be cleared.

17.6 Sampling Method

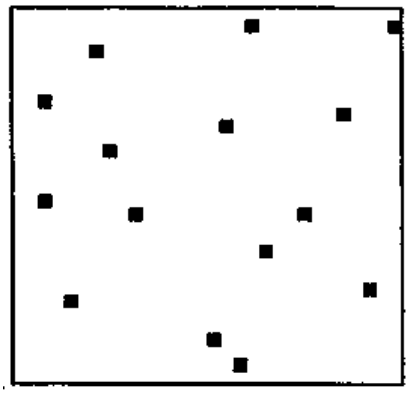
Representative samples:

Representative samples of the crop must be taken by a standardised procedure. Each fruit should have an equal chance of being chosen. Even when using the best possible sampling protocol there will be variability between different samples.

Quantity required and sampling method

- For avocados a bulk sample weight of greater than or equal to 2 kg is required. If the bulk sample weight is less than 2 kg, more fruit should be taken to yield the 2-kg minimum sample.
- A typical sample is between 10 and 15 pieces of fruit.
- You should use a random sampling approach to ensure an equal chance of any fruit being collected from trees across the entire sample area.
- In some cases, a more systematic sampling method may be needed where marked differences exist within the sample area (tree age, spray history, environmental conditions) to ensure all variables are accounted for in the sample.
- Use the block map of the orchard to help design a sampling method that will represent the entirety of the sample area.

Schematic representation of example of sampling a lot for avocado fruit sampling



note: primary samples are combined to form the bulk sample

Selection of individual fruit:

- Sample the parts of the crop that normally constitute **the marketable produce**.
- Avoid taking diseased or under-sized fruit parts at a stage when it would not normally be harvested.
- Take samples in such a way as to be reasonably representative of typical spraying and harvesting practice.
- Consideration should be given to taking samples from areas of risk where there is l**ikely to be overspray such as on corners as well as throughout the orchard block.**
- Select fruit from all segments of the tree high and low, exposed and protected by foliage.
- Take both large and small fruit where appropriate, but not so small or damaged that they would not be marketable.
- Take care not to remove surface residues during handling, packing or preparation.
- Sample and bag the required weight of samples in the field directly into a new clean bag.

17.8 Labelling and dispatch

Once the sample has been collected, complete the sample label. Ensure all sections of the label are filled in.

- The label should contain the Grower name, PPIN and blocks collected from.
- Ensure the label is firmly fixed to the sample bag.
- The sample can be placed directly into a courier bag as avocados are hard green fruit
- Complete the Sample Submission form
- Standard laboratory avocado residue request submission forms are available and should be used.
- As a guide, the following sections must be completed:
    - Business Name and Address
    - Contact Person
    - Phone Number
    - Date sample collected

- Submitted / Collected by
- Sample Details
  - Unique Sample ID (Avocado PPIN)
  - Block ID (all blocks that the sample is to cover)
- Type of Produce
- Grower Name
- Other details specific to the individual sample and residue request such as test method (GC or LC or GC LC combined, or individual active ingredient testing for) and blocks sampled as representative of the blocks to be cleared.

  - Avo 1 covers GC MS/MS only
  - Avo 2 Covers LC MS/MS only
  - Avo 3 covers both GC MS/MS + LC MS/MS

  See **Part 3 Agrichemical Information for Avocados Section 3.0** for specific test method associated with Product active ingredient.
- **Generally, it is considered best practice to complete a combined GC-LC test to provide comprehensive assurance that any residues (including from neighbouring spray drift) are able to be detected.**

- The details on the Sample Submission Form must match those on the Sample Label and the Avo diary.
- A copy of this form is to be included with each packaged sample. Place this in a small zip lock plastic bag to prevent damage by moisture and secure to the sample.
- Secure the sample container
- Keep the sample as cool as is possible prior to dispatch – do not leave in a hot car for an extended period of time.
- Courier the sample to an accredited testing laboratory as quickly as is practicable.

17.9 Collection agents

All persons collecting sample for residue analysis must:

- Be trained in the Protocol for Avocado Residue Sampling
- A record of training of the personnel collecting residues is to be maintained by the packhouse.
- Identify, declare and manage any conflict of interest in the process of sample collection (see Appendix A below).
- Have access to, or be directed by someone who has access to a record of spray applications on the orchard, in order to reference the agrichemical use to sample blocks, to inform appropriate block selection

17.10 Appendix A: Conflict of Interest

- A conflict of interest is where someone is compromised when their personal interests or obligations conflict with the responsibilities of their job or position. It means that their independence, objectivity or impartiality can be called into question.
- A conflict of interest can be:
  - Actual: where the conflict already exists
  - Potential: where the conflict is about to happen, or could happen

    - Perceived: where other people might reasonably think that a person has been compromised.
- A poorly managed 'perceived' conflict of interest can be just as damaging as a poorly managed 'actual' conflict of interest.
- A conflict of interest can also be positive or negative. You could be seen to favour or benefit someone, or be against them and disadvantage them. While conflicts of interest should be avoided wherever possible, they often happen innocently. It is how they are managed that counts.
- It is important that every sampling agent not only behaves with integrity, but also is seen to behave with integrity.
- Conflicts of interest are not wrong in themselves, but they should be properly identified and effectively and transparently managed. When a conflict of interest has been ignored, improperly acted on or influenced actions or decision-making, the conduct (not the conflict itself) can be seen as misconduct, abuse of office or even corruption.

17.11 References

- Codex Alimentarius Commission (1999) *Recommended Methods of Sampling for the Determination of Pesticide Residues for Compliance with MRLs*, CAC/GL 33-1999.
- FAO (2002) *Submission and evaluation of pesticide residues data for the estimation of maximum residue levels in food and feed. Rome:* Food and Agriculture Organisation.
- NZ Government: Quick guide to conflict of interest.
- 2019-07-24 Guidelines for Fresh Produce Food Safety.

18.0 APPENDIX 5: Procedure for Commissioning of Waterblasters

Commissioning / In-house Testing of Waterblaster Performance Standards

18.1 Background

Please refer to the commissioning requirements in **Part 5 Section 6.0** of this document.
This protocol applies when requesting fruit for infestation for commissioning the water blaster for the first time or whenever there is a major change to the componentry of the waterblaster and each year at season start up.
Ghost fruit should be used as a first step of identifying that the waterblaster is operating correctly. This allows for adjustment to be made to the waterblaster if required – and avoids the higher cost of using egg raft infested fruit when setting up and making adjustments.

18.2 NZ Avocado Responsibilities

- All bookings for egg raft infestation MUST go through NZ Avocado.
- At no time is the packhouse to contact Plant and Food Research directly.
- Bookings for fruit infestation from the packhouses will be made on a first in first served basis and will be scheduled according to Plant and Food Research capacity.
- Guidelines are for no more than 1 order for infestation of fruit per week.
- NZ Avocado will co-ordinate with, and notify Plant and Food Research and AsureQuality of the booking, and confirm the booking by forwarding a copy of the booking sheet to all parties once timing has been agreed.
- NZ Avocado will confirm the booking with the packhouse.
- NZ Avocado will monitor and remind packhouse of up and coming booking.

18.3 Packhouse Responsibilities

- Under the conditions of the China OAP and USA, waterblaster performance criteria is to be verified annually by an IVA **and** whenever there is a major change to the componentry of the waterblaster.
- For all other markets the waterblaster performance criteria is to be verified every five years by an independently accredited third party auditor (IATPA) and whenever there is a major change to the componentry of the waterblaster.
- Complete the editable word version of the fruit infestation booking form and email (do not pdf) to NZ Avocado co-ordinator.

Once NZ Avocado confirm the date and timelines for fruit infestation, the packhouse will be responsible for the following:

- Collection and courier of fruit to Plant and Food Research by the date agreed.
- Fruit must be export grade, count size 20, fruit samples and must have been recently harvested or selected from harvested fruit that is no older than 24 hours from harvest and been stored at less than 120C since harvested.
- Fruit must NOT be washed and there must be no fruit that is off the ground as this may ripen prematurely.
- Packing the samples **into lots of 20 fruit with fibre pocket packs, in single layer trays only (this is necessary so the fruit does not rub against each other once**

eggs have been laid on the fruit). Each tray must be marked with the facility name, harvest date, and intended commissioning date on each tray.

- Fruit must be couriered as soon as possible after harvest to ensure no premature ripening.
- Courier the trays of fruit to Plant and Food Research for egg raft infestation on the day notated in the booking form confirmation. This is generally a week prior to commissioning. Couriering on Friday is to be avoided.

  Courier Address is: Attention: Anne Barrington
  Plant and Food Research
  120 Mt Albert Road
  Sandringham
  Auckland 1025

- Once infestation is complete the trays of fruit will be couriered directly to AsureQuality for marking of egg rafts, if fruit is intended for commissioning, **OR** go directly back to the packhouse if the infested fruit is intended for in-house testing only.
- To prevent fruit from ripening prematurely, it is imperative that samples are kept under cool-chain conditions at all times ***apart from when infestation has been completed***. **Once fruit is infested <u>do not store</u> below 10°C degrees Celsius.**
- Payment of invoice issued directly from Plant and Food Research and AsureQuality when presented following service confirmed and completed.

18.4 Plant and Food Research Responsibilities

- Receipt of fruit for infestation.
- Infestation of fruit.
- Courier of fruit to AsureQuality (for commissioning) or back to the packhouse (for in-house testing).
- Notify AsureQuality or Packhouse of the dispatch of fruit to courier.
- Invoicing packhouse following service confirmed and completed.

18.5 AsureQuality Responsibilities

- AsureQuality will confirm availability to NZ Avocado for a commissioning run.
- AsureQuality will notify Plant and Food Research and packhouse when they receive fruit for marking.
- AsureQuality will mark the fruit to ensure that there are a minimum of 200 egg rafts per commissioning setting (2 tests), (100-105 egg rafts across a minimum of 10 fruit) WITH no more than 10 egg rafts marked on any one piece of fruit.
- A minimum of 2 pieces of fruit should be used per lane of the waterblaster.
- Invoicing packhouse at completion of job.

Note: ***An egg raft is defined as any number of touching eggs in a single group. A closely adjacent group (within 5mm) containing less than 10 eggs is considered part of the main group. An egg raft with more than 10 eggs is considered a separate egg raft.***

18.6 Procedure for procuring LBAM infested fruit for commissioning or testing and running the commissioning

Infestation fruit requirements

- A *minimum* of 100 egg rafts in total with no more than 10 egg rafts per piece of fruit are required for **each run** for waterblaster commissioning.
- A minimum of 2 pieces of fruit should be used per lane of the waterblaster.
- Passing a minimum of two runs per setting is required for compliance.

Runs per setting

- **Passing a minimum of two settings** is required to be recorded to establish a minimum and a maximum range for the water blaster to be managed within.
- If only one setting is passed, the waterblaster must run at that single setting at all times.
- To account for any failed runs, a light egg infestation or defective fruit (e.g. soft) there must be 20 pieces of fruit provided per run for infestation.

Two tests of infested fruit are required for each single setting. A total of 40 pieces of fruit should be infested (2 test runs) for each setting.

If you intend to commission a packhouse waterblaster at multiple settings, then two test runs each requiring 20 pieces of infested fruit for each of the test settings will be required – that is, a total of 40 pieces of fruit should be infested (2 test runs) per setting.

Number of settings being tested	Total number test runs required	Number of fruit allowed for infestation for each run	Total number of fruit required for infestation
2	4	20	80
3	6	20	120
4	8	20	160

Note the maximum number of fruit for infestation at one time is 160 pieces of fruit.

Running the Commissioning

AsureQuality monitors the following:

- Marked infested fruit added to buffer fruit prior to waterblaster.
- Ensure that all lanes of the machine are tested by marked infested fruit.
- Check and record the operational settings.
- Remove fruit immediately after emerging from the waterblaster or brush rollers if installed.
- Collect the fruit and allow drying at ambient temperature.
- Prepare a test report showing.
- Name of shed, date of test, sample size, number of egg rafts in sample and the operating parameters of the waterblaster.

Assessment of Results

- Assessment will be carried out within 24 hours of completion of test.
- Examine each fruit carefully using a stereo microscope, or similar good magnifying device such as 3x Magi Lamp or 10x hand lens to determine individual eggs.
- Follow the trail on each fruit closely examining each marked spot where an egg raft was originally.
- Record on test report the number of surviving egg rafts for each piece of fruit, which is any egg surviving with liquid content, even a single egg is considered an egg raft.
- Calculate the removal rate as a percentage using formula ((N-Y) /N)*100. Where N = original number of egg rafts and Y = number of surviving egg rafts.
- Apply the pass or fail assessment as per the criteria defined for each market as follows:
  - 95% removal for commissioning parameters for USA and China markets
  - 75 % egg raft removal for all other markets

Note: An egg raft is considered removed only if all the eggs have been removed OR there are a few fragments, or a piece of egg shell present, but clearly no egg remains entire. A trace of shell outlines can sometimes be found flattened onto the avocado.

Reference: Woolf A, et al: August 2013: Manual Generic avocado high-pressure washer (waterblasting) optimisation.

Key Contact Personnel

NZ Avocado	Plant and Food Contact
Industry Systems Associate NZ Avocado P O Box 13267 Tauranga 3141 Phone: 07 5716147 Email: catherine.wilks@nzavocado.co.nz **Subject line: Waterblaster commissioning**	Anne Barrington Plant and Food Research 120 Mt Albert Road Sandringham Auckland 1025 Preferred Communication - Email: Email: Anne.barrington@plantandfood.co.nz Phone: 09 9257000 ext 7193

AsureQuality Contacts		
Programme Overview	**BOP Co-ordinator**	**Whangarei and Far North**
Diane Dahlkamp Waitomo House 11 Hull Road Mt Maunganui Mobile: 021464819 Email: diane.dahlkamp@asurequality.com	Diane Dahlkamp Waitomo House 11 Hull Road Mt Maunganui Mobile: 021464819 Email: diane.dahlkamp@asurequality.com	Vololona Stroud DHL Building 6 Manu Tapu Drive Auckland Airport, Auckland 2022 Bus: 09 257 0699 Ext: 9699 Mobile: 021 986 944 Email: StroudV@asurequality.com

19.0 APPENDIX 5A: Waterblaster Commissioning BOOKING FORM

Avocado Packhouse Waterblaster Commissioning / In-house Testing

A word document copy of this is required to be completed and is available from NZ Avocado.

Facility Name:		
Region:		
Contact Person:		
Contact Number:		
Contact Email:		
Address for Invoicing/Courier:		
Reference for Invoicing (order number or name)		
Preferred ISO Week for testing (day and date)		
No of Tests (settings)Required		
No of Fruit Submitting |No of waterblaster lanes		
AQ Commissioning Contact (name and address)		

Setting 1 Test 1 Setting 1 Test 2

Country		Country	
PSI Pressure		PSI Pressure	
Hertz – Chain Drive		Hertz – Chain Drive	
Rotation Speed		Rotation Speed	

Setting 2 Test 1 Setting 2 Test 2

Country		Country	
PSI Pressure		PSI Pressure	
Hertz – Chain Drive		Hertz – Chain Drive	
Rotation Speed		Rotation Speed	

NZ Avocado Use

Date Booked with Plant and Food	
Date Fruit to be **dispatched to Plant & Food**	
In house test / Commissioning test (delete one not required)	
Copy of Booking to AsureQuality	
Date infested fruit couriered to AsureQuality	
Invoice confirmation to P&FR	

P&FR Use

Date Fruit Received	
Date Fruit dispatched AQ / Packhouse & notified	
Service Completed and Invoiced	

NB: If fruit fails to arrive to Plant and Food Research as scheduled, a new application will be required.

20.0 APPENDIX 5B: Ghost fruit application instructions

Ghost fruit can be used as a tool to assess nozzle performance and droplet coverage of fruit that has been treated (washed) through a waterblaster.
Fruit is painted with a kaolin clay and PVA mixture, dried and the fruit is then subjected to waterblasting and coverage of cleaning is assessed.

When the mixture is correctly applied, fruit will be fully white covered in the kaolin clay mixture. Follow the directions below for use.
Timing of the painting of ghost fruit is critical as it has a curing time of 24 hours. The fruit must be used between 24 and 28 hours after painting.

20.1 Method

Ingredients:
4 grams PVA glue
100 mL water
20g Kaolin Clay surround

Tools:
Scales
Shaker
Drying rack

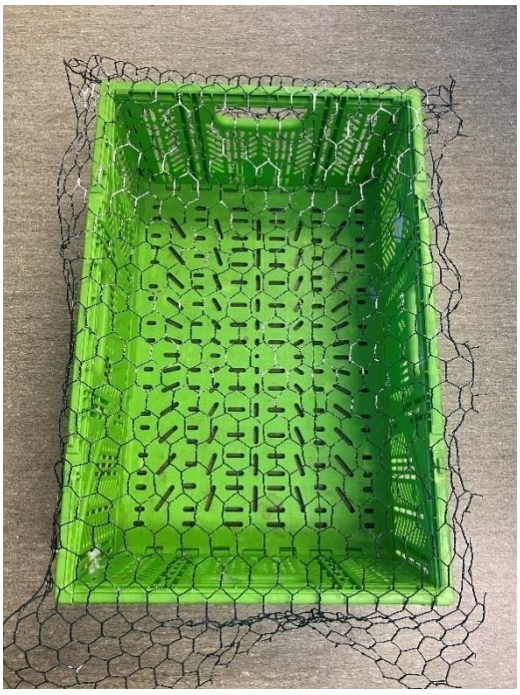
Method:
Place 100mL of water into the shaker with 4 grams of PVA glue. Shake until well combined.
Add 20 grams of surround (Kaolin Clay) and shake again until well combined.

20.2 Applying the mixture to the fruit

Apply mixture to fruit that is at room temperature, using a fine paintbrush. Make sure the application is even and fully covers the fruit. When wet the fruit may not look like it is fully covered BUT **only one coat of mixture is to be applied to the fruit.**

20.3 Drying

To avoid any pooling of the kaolin PVA mixture place each 'painted' fruit separately on wire netting to dry. Examples of wire netting include chicken wire fastened to the top of an empty crate –pictures of examples of drying set ups as follows:



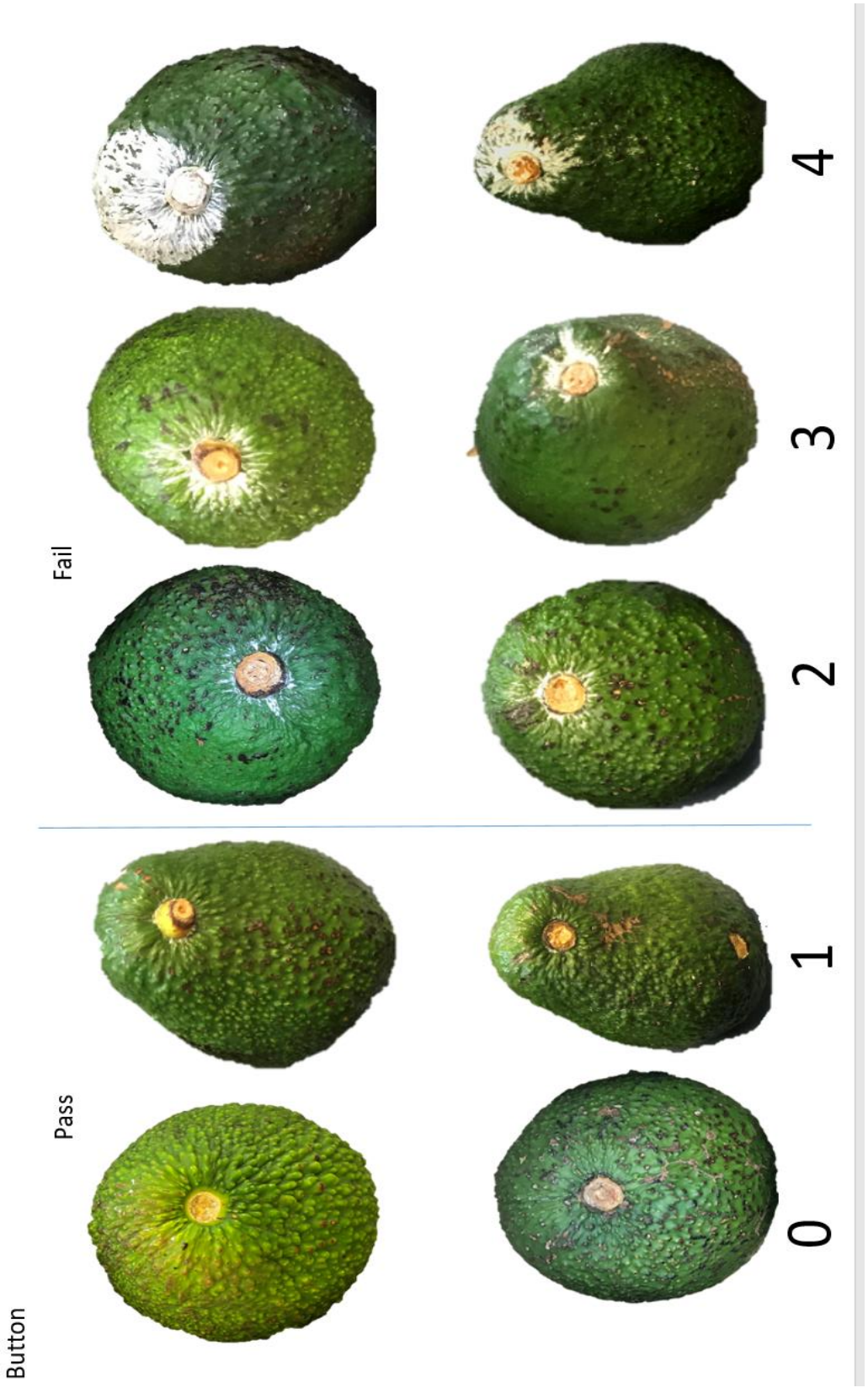
20.4 Curing

Fruit must be allowed to dry for 24 hours at ambient temperature - before being run through the waterblaster. Once fruit is touch dry (about 2 hours) it can be moved into a tray for the remainder of its curing time.

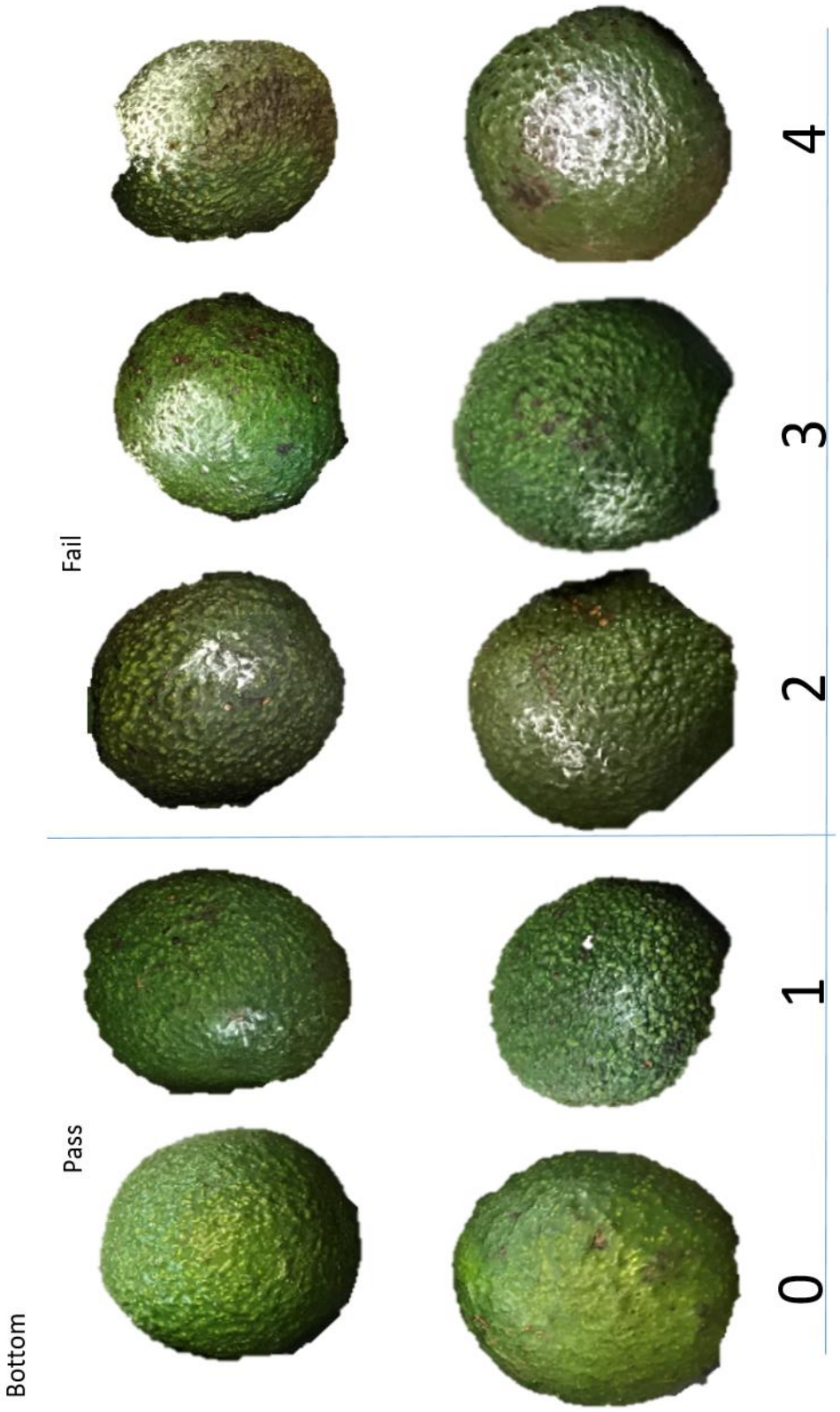
Fruit must be assessed between 24 and 28 hours after painting. If fruit is left for longer the mixture will continue to harden and may be more difficult to remove.

21.0 APPENDIX 5C: Ghost fruit assessment criteria

21.1 Button



21.1 Bottom



22.0 APPENDIX 5D: Waterblaster Set-up and Performance Verification Checklist

	Daily start up and at each break	Setup and after major repair or modification	Pre-season
Set-up			
Set up as per manufacturers guide and Plant and Food *Research Generic avocado high pressure waterblasting optimisation*		**X**	**X**
Nozzles (2L/min)		**X**	**X**
Quality Manual Part 5 Section 6.4.1			
Nozzles spray pattern verified at low pressure	**X**	**X**	**X**
Drive Speed (Rod speed or Hertz)	**X**	**X**	**X**
Pressure	**X**	**X**	**X**
Singulation	**X**	**X**	**X**
General checks			
Measure flow rate (worn or wrong nozzle)		**X**	**X**
Measure fruit rotations		**X**	**X**
Check entire fruit surface is reached by water jets (kaolin clay ghost fruit test)		**X**	**X**
Check nozzle height and distance from fruit		**X**	**X**
Water quality checks		**X**	**X**

23.0 APPENDIX 6: Avocado Quality Control Record Sheet

AVOCADO QUALITY CONTROL RECORD SHEET

Packhouse: ..... **PPIN** ..... **Date:** ..... **Page:** .....

CERTIFICATION REQUIREMENTS **LOT SIZE: 100** **Country:** .....

PPIN	**CLASS**		
Batch Number (If applicable)			
Spray Diary Checked	Yes / No	Yes / No	Yes / No
Inspection Start Time			
Sample Size			
Total			
Labelling on cartons			
Packaging Condition			
Pallet Inspection			
Actionable Pests MPL 0.5%	**Acc 0 Rej 1**	**Acc 0 Rej 1**	**Acc 0 Rej 1**
(Specify)			
Actionable Pests MPL 5%	**Acc .... Rej ....**	**Acc .... Rej ....**	**Acc .... Rej ....**
Total			
Non-Actionable Pests	**No action required**		
Line Acceptable Yes/No			
INDUSTRY REQUIREMENTS			
Major Defects AQL 2%	**Acc .... Rej ....**	**Acc .... Rej ....**	**Acc .... Rej ....**
Cuts & Punctures			
Clipper Cuts			
Soft Fruit			
Spray Deposit			
Surface Deposit			
Pollen			
Anthracnose			
Ridging height			
Protruberance			
Bruising			
Colour			
Sunburn Lesion			
Stems missing			
Total Major Defects			
Minor Defects AQL 4%	**Acc.... Rej ....**	**Acc .... Rej ....**	**Acc .... Rej ....**
Scale			
Blemish			
Lenticel damage			
Peel handling damage			
Misshapen			
Long Stems			
Mixed Sizing			
Chineral fruit			
Variety			
Ridging and Netted area			
Total Minor Defects			
Minor Defects	**Acc.... Rej ....**	**Acc.... Rej ....**	**Acc.... Rej ....**
Cummulative Defects AQL 5%	**Acc.... Rej ....**	**Acc .... Rej ....**	**Acc .... Rej ....**
Line Acceptable Yes/No			

Comments (Action Taken) _____

Signed Quality Controller: ..... Name: .....

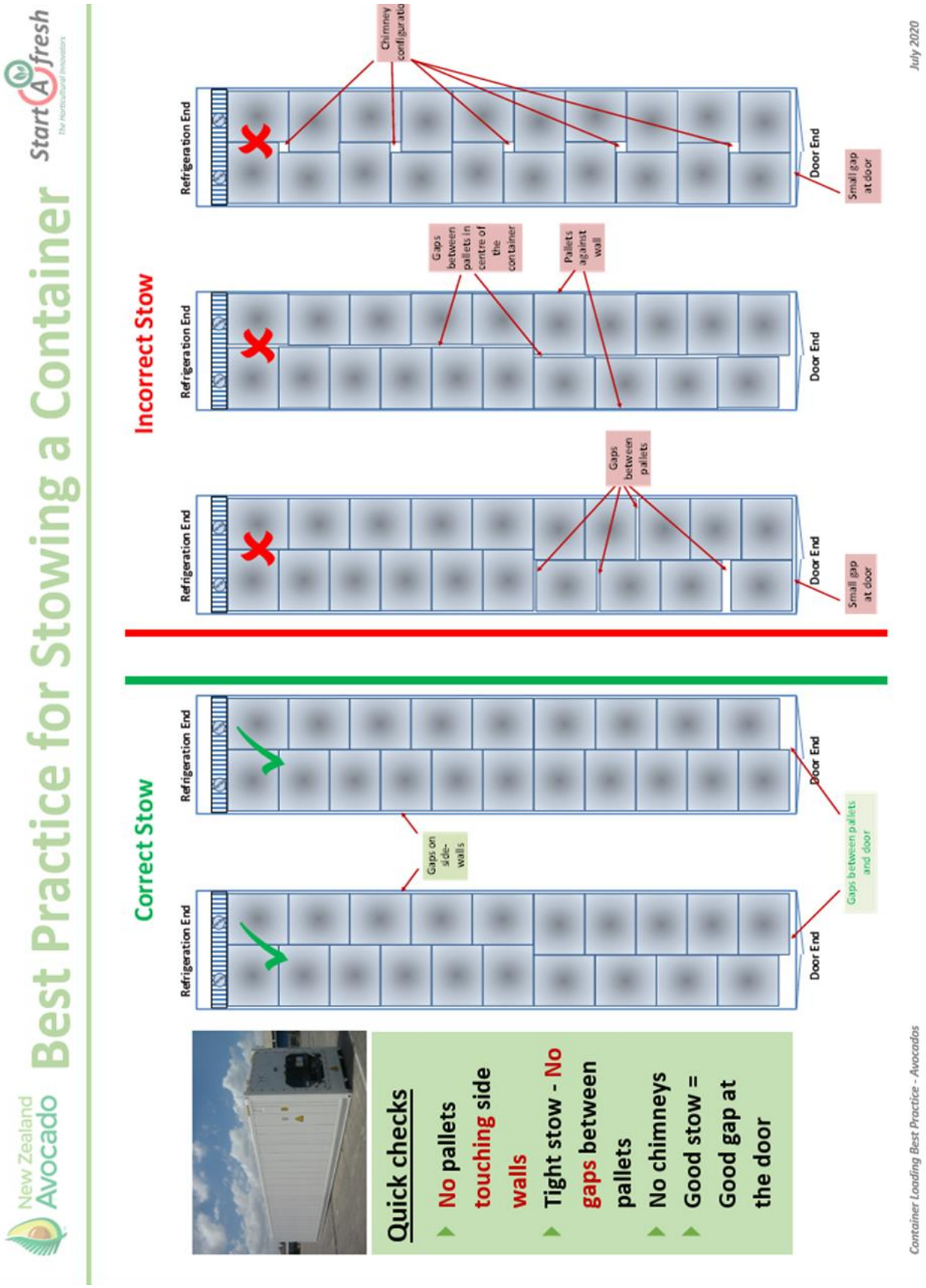
24.0 APPENDIX 7: Reject Fruit Analysis Record Sheet

Grower: .....
PPIN Number: .....
Date: .....

Time of sample					
Sample size					
ACTIONABLE PESTS					
Specify					
MAJOR DEFECTS					
Cuts and punctures					
Clipper Cuts					
Soft fruit					
Spray Deposit – Copper					
Spray Deposit – other					
Surface Deposit					
Pollen					
Anthracnose					
Sunburn lesion					
Protuberance					
Bruising					
Ridging Height					
Colour – Red					
Colour – Yellow					
Stems Missing					
MINOR DEFECTS					
Scale present					
Blemish					
- Thrips					
- Leafroller					
- Wind damage					
Peel Handling Damage					
Misshapen					
Long stems					
Mixed sizing					
Ridging Area					
Chimeral Fruit					
Variety					
Total					
Export fruit					
% Export fruit					

25.0 APPENDIX 8: NZ Avocado Growing Regions

26.0 APPENDIX 9: Best Practice for Stowing a Container



Best Practice for Stowing a Container

Start A fresh
The Horticultural Innovators

Introduction

This best practice guide is intended to provide assistance to those loading refrigerated containers with avocado pallets to ensure that the quality of fruit arriving in market is maximised. Best practice has been developed following significant laboratory and in-industry research.

How does a container work?

A container is a six-sided, insulated box that is fitted with a refrigeration unit at one end, and hinged doors at the other. The refrigeration unit provides cooling by forcing fan-driven cold air into the 'T-bar' floor and this is intended to be delivered right down the length of the container to the door. The air then rises to the roof of the container before returning across the top of the stow to the return-air duct of the refrigeration unit. Figure 1 illustrates this mode of operation, and Figure 2 shows the 'T-bar' floor section.

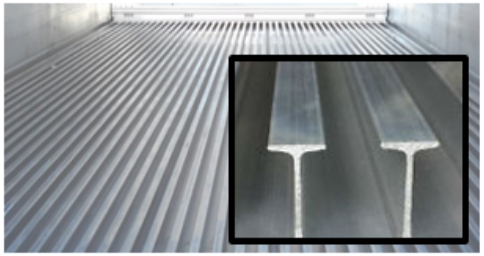


Fig 2: The 'T-bar' floor of a container used to deliver air to the door-end.

It is important to note that air is lazy and will take the path of least resistance. This means that if gaps are created near the refrigeration-end of the container, air will short-circuit and provide no cooling to pallets near the door-end of the container.

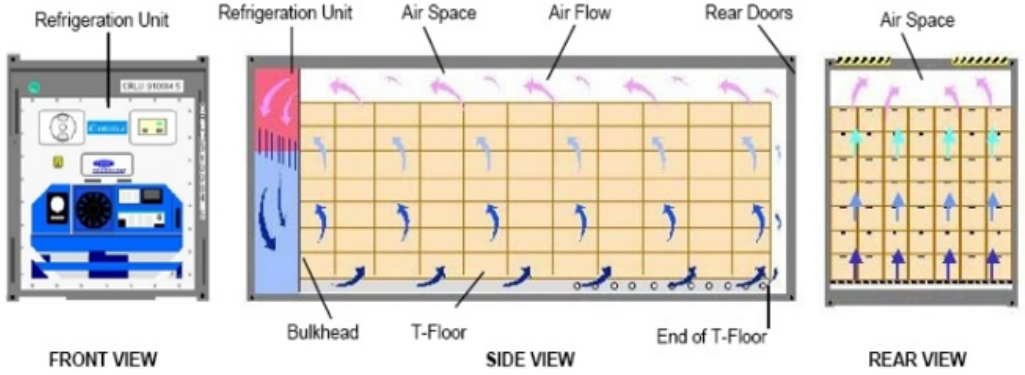


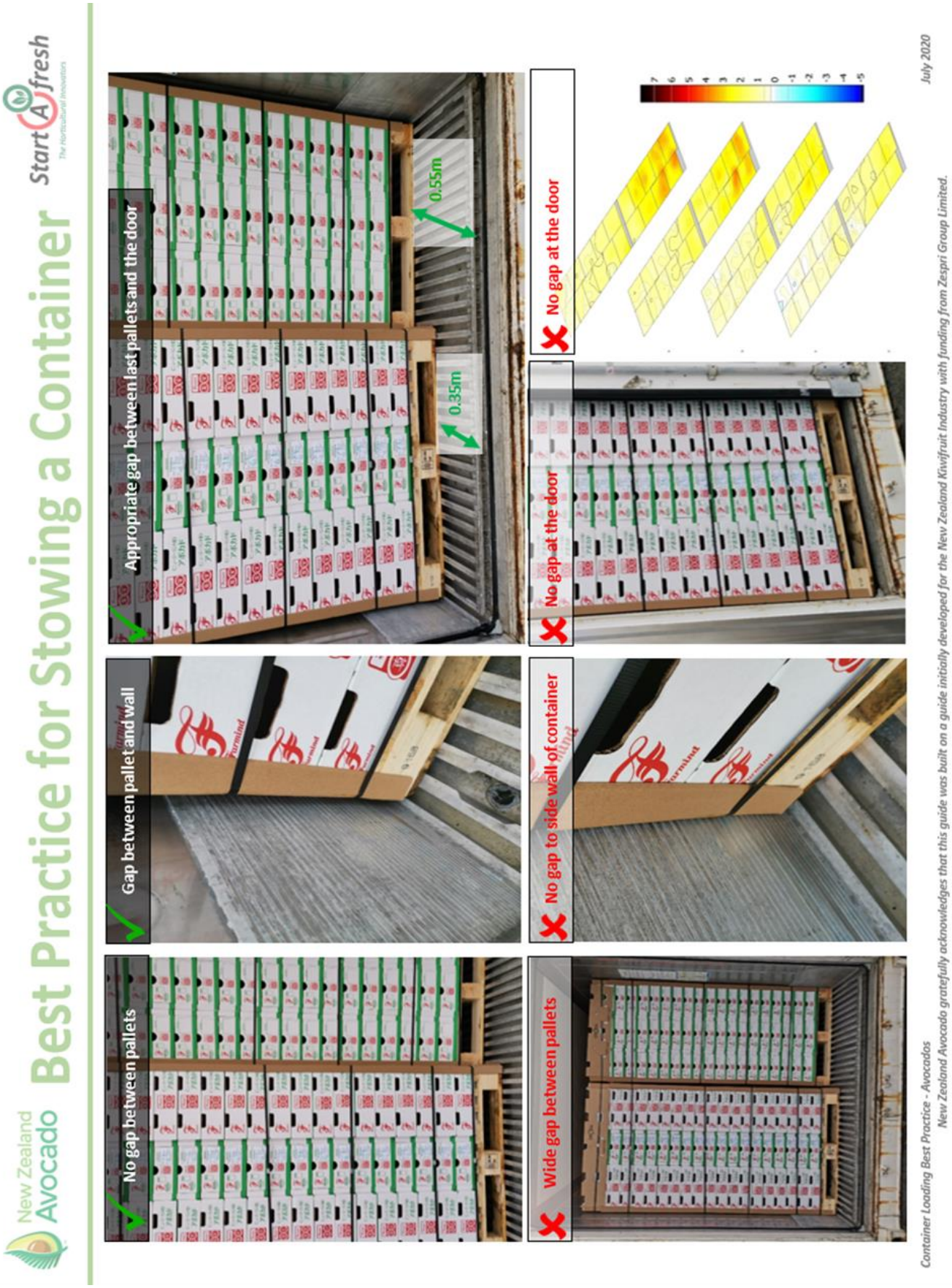
Fig 1: Basic components of the refrigerated container, and how the container operates, showing airflow pathways (image accessed from https://www.freightforwarderquoteonline.com/news/find-best-refrigerated-container-reefer-import-export/).

Stowage patterns

There are many possible ways to load a 40-foot refrigerated container with avocado pallets. The basic premise of container loading is to minimise gaps between pallets, leaving only a gap at the door end of the container. This ensures that cold air travels under all pallets down the length of the container and that a pressure field builds in the floor before air travels up, around, and through the stow to the air return plenum above the stow. The *Best Practice for Stowing a Container* poster (in this guide) shows a range of loading patterns – note that some of them are considered incorrect, as they do not assist in maximising fruit quality during transport.

Key messages

- Do not leave gaps in the stow unless they are between the last pallets and the door.
- Do not create chimneys between pallets down the length of the container as this helps air to short-circuit and results in warming of pallets near the door.
- Do not load warm pallets near the door as this results in slow cooling of these pallets and warming of pallets nearby. If warm pallets must be loaded, they are best placed near the refrigeration unit end of the container.
- Pallets should be stowed with a gap between the pallet and the side wall of the container. This gap only needs to be small but must allow air to flow between the pallet and the wall to capture heat that is entering through the wall and take it to the refrigeration unit.
- Allow gaps at the door end of the container of approximately 0.55m on one side and 0.35m on the other. If they are significantly less than this, it is likely that gaps have been left during stowage


Best Practice for Stowing a Container
New Zealand Avocado
Start Afresh
Appropriate gap between last pallets and the door
0.55m
0.35m
No gap at the door
No gap at the door
Gap between pallet and wall
No gap to side wall of container
No gap between pallets
Wide gap between pallets
July 2020
Container Loading Best Practice - Avocados
New Zealand Avocado gratefully acknowledges that this guide was built on a guide initially developed for the New Zealand Kiwifruit Industry with funding from Zespri Group Limited.

27.0 APPENDIX 10: Major and Minor Non-Compliances Checklist

Actions in the event of a non-compliance as a result of both internal and external audits can be found in Section 13.6 of this document.
Please note the following lists are not exhaustive, see also Part 1 Section 7.0

Major non-compliances

	Any individual minor non-compliance where the same has been detected in 2 consecutive audits	
	Any minor non-compliance not corrected within 5 working days.	
1.2.2	Grower registration(s) not available on file	
1.2	Packing product for export from a non-registered Grower	
1.2.3	Failure to obtain the approval of NZ Avocado for supply contracts	
1.2.3	Failure to use the approved copy of contract as supplied	
1.2.6	Food Safety Accreditation for Growers not available on file	
1.2.7	Food safety accreditation for Contract Harvesters not available on file	
2.0	Time-chain requirements breached	
2.1	Fruit delivered to the packhouse within 24hrs of harvest	
2.1.4	Flesh temps to between 4.0ºC and 7.0ºC within 72 hours	
2.2	Product packed for export more than 48 hours after harvest without following procedure	
2.2	No record of dispensation to pack outside 48hr pick to pack time	
2.2.2	Not all parties notified of dispensation	
2.2.6	Mixed age product not labelled	
2.3	Bin storage temperatures not met	
2.4	Fruit age pick to load out times not met without dispensation	
3.1.2	Packer Food Safety not met	
3.2.7	Packer assigned and trained key staff	
3.4	Traceability Fruit from more than one PPIN packed together in one tray	
3.5	China Bin labelling not compliant	
3.5	Non-compliant China product segregation not maintained	
3.7	Packaging not clean or free from organic material	
3.10	Transport documentation is not compliant	
3.12.5	Mock recall not carried out or no notification to NZ Avocado	
4.1	A line of fruit that does not meet minimum dry matter standards exported or intended to be exported	

4.1	A line of fruit exported or intended for export where no maturity test was completed	
4.1.6	Packer does not supply in-house copied of maturity testing when Regional clearance is in play	
4.2	Product packed for export (where dispensation has not been obtained) that has been sprayed with non-approved chemicals, withholding periods not observed or in excess of recommended rates	
4.2	Current spray diary not available or verified prior to packing.	
4.2.4	Spray diary verified using a paper spray diary.	
4.2.8	Clearance to pick dates not observed	
4.4.3	No residue test for product packed for markets with a Preharvest interval of "none set" or "not listed" set	
4.3.1	Applicator does not hold a valid Growsafe certificate	
4.3.3	Inadequate spray diary check made	
4.3.4	Fruit arriving at the Packhouse where the spray diary has not been verified	
4.4.6	Training and annual update of Residue sampling completed	
4.7	Field bins not identified with PPIN, Block Number or Pick Date	
5.1.2	Any fruit treated with Prochloraz for markets where not allowed	
6.1, 6.2	Commissioning of waterblaster not maintained	
6.4.2	Timing of checks in Appendix 5D not carried out	
6.0	Waterblaster not operating to performance criteria on commissioning certificate	
7.0	Minimum export grade standards not met on any line exported or intended to be exported (For corrective action refer to 8.10 Action Procedures)	
7.1.5, 7.1.6	Non class 1 fruit does not have GREEN Stickers	
8.1	Failure to notify AsureQuality of the Packer seasonal start and end dates	
8.12, 8.13, 8.14, 8.15	No evidence that packhouse is monitoring packed tray/carton weights or individual fruit weights where required.	
8.17	Packing from more than 1 PPIN in a tray or bulk pack	
8.17	Failure to collect library trays	
8.3.4	Valid eyesight test on file	
8.4	Sampling procedures not followed	
8.6	No industry standard quality control records available	
8.7	No evidence of internal audits or minimum internal audits not completed	
8.11	Tray weights not meeting specification	

8.17.5	Failure to collect Library trays	
9.0	Failure to meet packaging requirements	
9.3	Failure to meet packaging label requirements	
9.4	Incorrect use of date code	
9.5 and Part 7, Section 3.0	Packaging or pallets not meeting stability requirements	
10	Cool-chain monitoring not done or not meeting Quality Manual requirements	
10.4	Failure to meet the minimum monitoring requirements	
10.7, 10.8	Failure to meet temperature requirements and to follow the non-compliance procedure for flesh temperatures	
10.12	Failure to monitor and follow the notification procedure for exceeding ethylene levels	
11.0	Export fruit not separated and marked from non-export fruit	
13.3	Failure to provide product in accordance with retrospective audit procedure when product found out of Grade off shore	
13.3	Failure to co-operate for a "further audit" after out of grade product reworked and represented.	
13.6.2	Failure to notify affected parties of a major non-compliance and failure to comply with the re-audit period	
13.6.3	Failure to re-grade, fumigate or downgrade product found to be out of grade during an audit	

Minor Non-Compliances

1.2.10	At least one packhouse representative attends pre-season training workshops	
8.1.3	Failure to notify AsureQuality of weekly packing schedule by PPIN	
8.1.4	Failure to notify AsureQuality of any change to pre-advised packing schedule (seasonal or weekly)	
8.11	Reject analysis not completed for each Grower line	
8.11.2	A copy of the reject analysis report not made available to the Grower within 7 days	
8.11.4	Grower not notified Scale present during packing	
8.12, 8.13, 8.14, 8.15	No corrective action taken when underweight monitoring identifies fruit or trays underweight	
8.6	Quality control record inadequately completed	
9.0, 9.3	Branding illegible or not meeting specifications	

9.1	No corrective action taken when individual fruit labelling found to be deficient	
9.1.4	Significant quantities of unlabeled fruit (more than 20% of fruit) exported without a dispensation.	
9.5, Part 7: Section 3.0	Industry pallet assembly standards not met	
12.1.1	Packer not reporting export volumes or reported after 12 noon	

PART 6

EXPORTER RESPONSIBILITIES

Table of Contents

EXPORTER RESPONSIBILIES SUMMARY

Exporter responsibilities are significant, covering the product as it moves through the various stages of the export process.
Exporters will be responsible for the following:

- **Registration** with NZ Avocado and pay the Registration Fee.
- Supply representative copies of **Grower and Packer** contracts required by the EMS to NZ Avocado for approval.
- **Exporting** fruit from registered Growers only.
- **Declare** contracted supplier volumes.
- **Comply** with the Quality Management Programme.
- **Packaging** - export avocados that comply with packaging requirements.
- **Fumigations** -ensure handling during this phase meets "best practice."
- **Freight Forwarding - v**erify that operators are familiar with relevant sections of this Quality Manual and achieve "best practice."
- **Shipping - e**nsure carriers are competent and schedules are appropriate to carry avocados to the selected destination.
- **Container and outturn notification**. Each exporter shall notify NZ Avocado of any insurance pro-forma claim that is completed **(EMS Section 4.3.13)** and of any outturn or storage failure that results in distressed fruit which requires discounting.
- **Comply** with food safety requirements.
- **Importer selection** - ensure these are competent and supportive of NZ Avocado's quality objectives.
- **Fruit age and cool store** requirements are being met by Packer.
- Supply NZ Avocado with **market flow plan data** on a monthly basis.
- **Attending** an annual pre-season briefing on export obligations and technical requirements, convened by NZ Avocado in conjunction with AVEC.

EXPORTER RESPONSIBILIES

1.0 REGISTRATION RESPONSIBILITIES

EMS Requirement

Each registered Exporter shall:

1.1 Exporters are required to register with NZ Avocado see details on the industry website:

https://industry.nzavocado.co.nz/exporter-registration/

Current registration fees can be viewed on the NZ Avocado website under:

https://industry.nzavocado.co.nz/industry/fees.csn

1.2 Only export avocados where they have been supplied by a registered Grower and Packer.

1.3 Provide a representative copy of the contracts for each Grower and Packer to NZ Avocado as required by the EMS.

1.4 Comply with the Quality Management Programme of NZ Avocado, as described in this Quality Manual.

1.5 **Only export fruit that is compliant with the food safety requirements for Growers, Contract Harvesters and Packers outlined in this Quality Manual.**

2.0 DECLARATION OF CONTRACTED SUPPLIER VOLUMES

EMS Requirement

2.1 Each registered Exporter shall declare their contracted grower supplier volume to NZ Avocado by the time specified in each season. This will provide essential data on which to base the industry marketing plan.

3.0 COMPLIANCE RESPONSIBILITIES

3.1 Compliance with the EMS

EMS Requirement

3.1.1 Each registered Exporter shall comply with NZ Avocado Quality Management Programme, adhering to this Quality Manual and only export Avocados that meet the minimum export grade standards and other standards as specified in the Manual.

3.1.2 Exporters may not export product with residues in excess of industry standards. For those countries where MRL's are specified all fruit exported to those countries must meet the importing country MRL requirements. For those countries where an MRL has not been specified for a chemical then the relevant New Zealand MRL will apply for that chemical. It is the responsibility of the Exporter to be aware of the requirements of both the importing country and the importer (see Part 3 of this Quality Manual).

3.1.3 It is the Exporter's responsibility to ensure Packers have verified Grower spray diaries.

3.1.4 Exporters must ensure that all export avocados meet the maximum fruit age specifications. Exporters must comply with the food safety programme.

3.1.5 NZ Avocado auditors may visit Exporter premises and request to view export related documentation.

3.1.6 Exporters are responsible for ensuring the avocados they export arrive in the market place as a premium product and as such are accountable to ensure the Grower supplier and Packhouse comply with the EMS.

3.1.7 Failure to comply with requirements of the EMS will jeopardise an Exporter's ongoing ability to export avocados. Such failure could be prejudicial to the EMS and could result in action taken by the **Horticulture Export Authority under Sections 38 and 39 of the HEA Act.**

3.1.8 If a consignment of product is subject to residue testing on arrival then the Exporter must notify NZ Avocado within 3 working days and notify the results to NZ Avocado within 10 days of receipt.

3.1.9 Each Exporter shall notify NZ Avocado of any insurance proforma claim made **(EMS Section 4.3.13)**. The notification should include a brief description as to the cause of the failure and photographs if available. Such notification is to occur within 5 working days of completing the proforma claim.

3.1.10 Each Exporter shall notify NZ Avocado of any outturn or storage failure resulting in distressed fruit which requires discounting or other measures to achieve sales and could potentially destabilize the market **(EMS Section 4.3.13).** Such notification is to be within 5 working days of becoming aware of the incident.

3.2 Failure to comply with EMS

EMS Requirement

3.2.1 In the event of a biosecurity breach or where alleged failure to follow the requirements of:

- The EMS
- Food Safety or Quality Manual obligations

3.2.2 NZ Avocado will:

- Investigate the alleged breach as outlined in NZ Avocado EMS Breach Procedure.
- If the breach is confirmed the following actions as outlined in **Section 6.2 of the EMS**, NZ Avocado is entitled to:
  - Instruct the Grower to cease harvesting for export
  - Instruct the Packer to cease packing the fruit of the defaulting Grower for export.
  - Notify the RPG and HEA and instruct the Exporter not to export the fruit of the defaulting Grower.

3.2.3 Subject to the procedures set out in the EMS, NZ Avocado is entitled to decline any application for registration in any subsequent export season by a Grower, Packer or Exporter who has previously failed or refused to comply with the requirements of the EMS or non-compliance with Food Safety or Quality Manual obligations.

3.3 Standard supply fruit for export

EMS Requirement

3.3.1 **Standard Supply Class 1 for Export under EMS clause 2.4**

The EMS states that only fruit meeting the Class 1 grade and quality standards is to be exported except as detailed in Part 5, Section 7.1.5, 7.1.6 and 7.1.7.

3.3.2 **Class 2 Supply for Food Service (other than USA) under EMS clause 2.4.1.1**

- The EMS allows for Class 2 avocados to be exported **and distributed** directly into food service.
- Class 2 size specifications are set out in section 8.16 of this document.
- Grade Standards Class 2 – Other than USA can be found in Section 7.3
- **The EAN label is to be ORANGE in colour, to clearly distinguish it from Class 1.**

3.3.3 **Standard Supply Non-Class 1 fruit exported for processing EMS clause 2.4.1.2**

Non-Class 1 avocados that are exported to Australia for processing under the EMS clause 2.4.1.2 will meet the following criteria:

- Fruit will meet all requirements of the EMS, Quality Manual, AvoGreen® and NZ Avocado electronic spray diary.
- Meet the grade standard set out in Part 5, Section 7.5
- **The EAN Label is to be ORANGE in colour, to clearly distinguish it from Class 1 and have PRC recorded as the Grade**

3.3.4 **Class 2 Supply to the USA under the EMS clause 3.1.5.**

- The standards for Class 2 fruit to the USA are set out in Part 5, Section 7.4.
- Class 1 size specifications are **set out in section 8.16 of this document.**

4.0 FOOD SAFETY - EXPORTER REQUIREMENTS

The objective of any compliance to an accredited food safety programme is to provide consumers of New Zealand avocados, both locally and internationally, with fruit that is free of significant health hazards and may have only residues of approved products at or below the allowable MRL or ML.

Please refer to Part 9 of this Quality Manual for generic Food Safety requirements applicable to Growers, Contract Harvesters, Packers and Exporters.

4.1 Exporting and Distributing

EMS Requirement

Each Exporter/Distributor handling and/or supplying avocados bearing its name shall be responsible **(in respect of all the fruit from packs bearing that safety mark) to:**

4.1.1 Verify that all product has been supplied and handled in accordance with the Food Safety requirements of NZ Avocado.

4.1.2 Maintain good stock control and verify that the avocados are kept in timechain and cool chain conditions conducive to quality maintenance.

4.1.3 Verify that transport and storage within the distribution system are to an acceptable standard to ensure product is transported in an environment capable of:

- Maintaining cool chain requirements
- Protecting the avocados from contamination (either from contamination by other products being transported or from external contamination such as dust, mud, pests, etc).

4.1.4 Develop a written recall procedure in keeping with the requirements listed in **Section 4.2 and 4.3 below**.

4.1.5 Maintain inventory management systems for tracking of pallet numbers through the distribution system (e.g. consignment notes to include pallet numbers) such that in the event of a product recall fruit can be traced to the last point of sale.

4.1.6 In the event of a residue test showing a residue in excess of the allowable MRL's for that country, product will either be recalled, reshipped to an alternative market with which the fruit is in compliance, or destroyed. It is at the Exporters discretion after consultation with the affected Growers which option shall apply.

Best Practice

4.1.7 To ensure the transit storage environment does not expose the avocados to contamination (e.g. ethylene gas, vermin, or contamination by other transit products).

4.1.8 The Exporter/Distributor should take particular care to plan the movement of the avocados so as to minimise exposure to hazards during the distribution phase (e.g. to use direct transport connections where possible and to verify complying transshipment conditions when product is transferred from one truck, or other means of conveyance, to another).

4.2 Maximum Residue Limits and Pre-Harvest Intervals

Each country sets it MRLs (maximum residue limits) for agrichemicals and its MLs for heavy metals. Those limits vary from country to country. When exporting fruit the first MRL that has to be met is that of New Zealand as a byproduct of export packing is fruit going to the New Zealand market.

Pre-harvest Intervals are established from data from residue decay curves and the continual monitoring through the industry residue testing programme to confirm PHIs are meeting the expected MRLs.

4.3 Markets where no MRLs have been set ("None Set" or "Not Listed")

EMS Requirement

4.3.1 Where a country has not set an MRL for a pesticide under the notation **"None set",** this means that no MRLs exist for the pesticide and that detectable residues should not be present. MRLs for these will be set to nil detect (0.01mg/kg). The PHI to achieve nil detect will apply or if no PHI has been set, then a residue test will apply.

4.3.2 Where a country has no MRL for a pesticide listed **"Not Listed"** this means that no MRL exists for the pesticide, but that the presence of residues should not be of concern. In such a case if there is a corresponding pre-harvest interval for New Zealand then that PHI should be applied.

4.3.3 Under mutual recognition Trans-Tasman Mutual Recognition Act (TTMRA), the New Zealand MRL and pre-harvest interval can be used for Australia against some products.

4.3.4 Codex MRL's are normally recognised by India, Korea, Malaysia, Singapore and Thailand in the absence of a specific national MRL. New Zealand has 'country recognition' in Indonesia and Vietnam and in the absence of specific national MRL's, the New Zealand MRL and pre-harvest interval can be used.

4.4 Pre-harvest Intervals and MRLs for Export markets

EMS Requirement

Pre-harvest interval for Export Markets

4.4.1 Pre-harvest intervals for export markets are for guidance only and are based on the best available information, including residue decay curves. Observance of the PHIs for products with no maximum residue limit (MRL) set does not guarantee non-detectable residues.

4.4.2 For some products, it has not been possible to determine a PHI that will provide fruit with no detectable residues. Those products with no MRL and a PHI "not set" (e.g. carbaryl (Carbaryl), tebufenozide (Mimic)), applied after flowering may require a residue test for some markets. It is the Grower's responsibility to be aware of these requirements and to comply with any residue testing requirements of the Exporter and NZ Avocado to ensure that there are no detectable residues on the fruit.

NB: When requesting a residue test, ensure that the appropriate test method is specified to detect the relevant chemical (e.g. abamectin, spinosad, shall be tested using the LCMS method – see Section 3.0).

4.4.3 Note: Independent auditors, on behalf of NZ Avocado, will draw random fruit samples from the packing line for laboratory analysis and these will support a system of verification and assurance.

4.4.4 Information on the list of chemicals registered for use in Avocados, the application rates and the PHI and MRL can be found in Part 3 of this Quality Manual. However it is the spray applicators responsibility to be familiar with and comply with the requirements of the product label.

Best Practice

4.5 Importing Country Specific Notes

Growers are encouraged to consult with their Exporter on any specific customer residue requirements required for export.

4.5.1 **Residue Testing for Japan**

It is recommended that all fruit destined for Japan be cleared by a residue test PRIOR to harvest using the appropriate screening method (see Section 3.0) as indicated by the chemicals used in the individual spray diary.

4.5.2 **Indonesia**

New Zealand has been confirmed as included on the 'Country Recognition (CR) list' allowing products to be shipped (seafreight) direct to Jakarta port.

4.5.3 **New Caledonia**

New Caledonia is politically aligned to France, and therefore the EU MRL's apply.

4.5.4 **Pacific Islands**

South Pacific countries have less well defined (if any) residue MRL requirements. Under these circumstances, the avocado industry works on the basis that either Codex MRL's will be recognised in the first instance or if there is no Codex MRL then 'country-of-origin' (i.e. NZ) MRL's apply.

While using the best data available at the time of production of this document NZAIL disclaims liability relating to the use of this information. Always refer to the label of the product that you are using.

4.6 Reporting of residue tests

EMS Requirement

4.6.1 To comply with the requirements of the EMS, NZ Avocado requires all residue test results completed for the Exporter by a third party accredited laboratory, to be shared directly with NZ Avocado. This is to enable NZ Avocado to operate, continually monitor and review the MRLs and PHIs through the monitoring of residue profiles against the set MRL's and pre-harvest intervals, to support the industry spray diary and food safety programme.

4.7 Product Withdrawal and Recall Responsibilities and Procedures

EMS Requirement

4.7.1 Any Packer, Exporter or Local Market Handler identifying a breach of the Food Safety Programme in relation to the following, will immediately notify NZ Avocado in writing:

- Use of unregistered pesticides.
- Breach of the pre-harvest interval.
- Agrichemical and heavy metal residues in excess of the allowable MRL's. and MLs
- Communicable disease.

This notification will clearly identify the Grower PPIN, the Packer, the pick and pack date, pallet numbers, transport operators and destinations of affected product.

Failure to **immediately (within the hour of a breach has being identified)** to notify NZ Avocado will constitute a **major non-compliance.**

4.7.2 In the event of a requirement for a product recall, NZ Avocado will liaise with the Packer/Exporter/Local Market Handler to either recall the product or redirect the product to a market where the product is in compliance. Any costs associated with recall or redirection of the product will be borne by the Exporter/local market handler.

4.7.3 NZ Avocado will immediately notify the Ministry for Primary Industries (MPI). Together with the Ministry, NZ Avocado will determine whether the circumstances dictate that the interests of the consumer are best served by a withdrawal of the affected product from the market or if a full product recall should be implemented.

4.7.4 Depending upon the outcome of 4.3.2 the packer, exporter and/or local market handler will trace the affected product as far through the distribution chain as possible. This will generally be to the final point of sale. The retailer will be informed of the nature of the breach and instructed to remove all unsold product from display areas. Any remaining stocks of product should be returned to the exporter/local market handler for disposal.

4.7.5 In the event of a Mock Recall NZA must be notified as part of the procedure.

5.0 PACKAGING

5.1 Package Labelling

EMS Requirement

5.1.1 Each package will be labeled clearly with a minimum of 6 mm lettering (except where indicated) stating:

- Avocado
- Registered exporter identification or generic brand
- Contact address of exporter (3 mm)
- Variety (e.g. Hass)
- Grade (e.g. Grade 1)
- PPIN
- Size and count (where different)
- Produce of New Zealand (3 mm)

5.1.2 The following will also be indelibly labelled on each package's label end.

- Packhouse (NZ Avocado) number
- Date code (picking date)
- Registered exporter identification or generic brand
- Pallet identifier

NB: When part pallets are being forwarded to other packhouses or freight forwarders, individual cartons will be labeled with either a pallet number or identifier for traceability, such that product can be traced back to the originating packhouse.

5.1.3 Individual Cartons for Export to Thailand

Appearing on product shipped to the Kingdom of Thailand (Thailand) as individual cartons is to be the words "EXPORT TO THAILAND" (in capital letters) on each carton. Appearing on product shipped to Thailand as pallets of cartons is to be the words (in capital letters) "EXPORT TO THAILAND" on each side of the pallet.

5.1.4 **Individual Cartons for Export to China**

- Each carton must be marked in English with:
  - Fruit type
  - Exporting country
  - Production place (region)
    - Northland
    - Auckland
    - Waikato
    - Bay of Plenty
    - Gisborne
    - Hawkes Bay

- Taranaki
  - Production site registration number (PPIN)
  - Packhouse and its registration number.
- Each carton must be marked in Chinese (Mandarin) with "输往中华人民共和国" (for export to the People's Republic of China).
- The pallet card for each exporting pallet must contain the statement "Inspected and passed for export to the People's Republic of China".

5.1.5 Any labelling will also comply with the following requirements:

- Only NZ Avocado registered exporters' labels will be used and these will be applied to the label end (at least) of each package.
- Handwriting on packages is unacceptable. All branding will be either printed or stamped and a minimum of 6 mm high.
- Any trays carrying the AvoGreen® logo will contain fruit that originate from growers complying with all AvoGreen® requirements.

5.2 Date Coding

EMS Requirement

5.2.1 Date coding will show the picking date and is the means by which the age of the fruit is identified. Therefore, it is a vital tool in time-chain management and "outturn" monitoring overseas. It will be regularly monitored by auditors on behalf of NZ Avocado to verify date coding is presented accurately on all packages.

5.2.2 When running lines of two consecutive pick days together, packhouses are entitled to put the **oldest** pick date on the labelling/packaging.

5.2.3 Actual date may be used in place of pick code or both may be displayed. Where actual date is used it will be displayed in the dd/mm/yy format. Where customer required format is different an indicator will be used to indicate a different date format (e.g. USA - mm/dd/yy).

5.2.4 The date code will show a letter to denote the month and 2 numerals for the day of the month, with the letter preceding the numerals

Example:

Month	Month code	Day of month	Day code
July	A	1	01
August	B	5	05
September	C	10	10
October	D	15	15
November	E		
December	F		
January	G		
February	H	Final code example.	
March	I	21 November	=E21
April	J	15 December	=F15
May	K	2 January	=G02
June	L		

6.0 FUMIGATIONS

Best Practice

6.0.1 Methyl Bromide (MBr) fumigations must be performed by a trained operator. MBr quarantine treatments can take over 12 hours so in order to maintain fruit quality temperatures should NEVER exceed 15 0C.

6.0.2 An internationally accepted Methyl Bromide rate/temperature for the treatment of avocados is listed below:

Grams per cubic metre	Flesh temperature
48	10-15 ^{O} C

6.0.3 Venting of 2-5 hours where fresh air is forced through the stack is important to remove remaining methyl bromide that could impact fruit storage.

6.0.4 As a result of increased temperature at fumigation, treated fruit will have a shorter shelf life and may be more prone to chilling injury. It is therefore important to get fruit back down to a storage temperature as soon as possible however care must be taken as rapid cooling to below 4^{O}C will cause cold damage.

6.0.5 Pallets of fumigated avocados should ideally be labelled so distributors can adjust storage temperatures and other handling practices appropriately.

6.0.6 To protect your consignments during offshore (and on-shore) fumigations, ensure you are sighting the quarantine treatment documentation to ensure it lists a suitable temperature.

7.0 FREIGHT FORWARDING

Where product is physically handled at the premises of a Freight Forwarder, then handling practices should be according to other sections of this Quality Manual. Particular attention is drawn to:

7.1 Receivals

EMS Requirement

7.1.1 Pallets should be taken off trucks as soon as possible and moved directly to coolstorage rooms to remain within the 12-hour **guideline (see Part 5 Section 10.7 and Appendix 1 of this document)**. On no account are pallets to be placed on the ground in direct sunlight.

7.2 Storage

Best Practice

7.2.1 Fruit temperatures should be brought as quickly as possible to the required flesh temperature of 4-6°C. Cooling should commence within 12 hours of packing. If receival flesh temperatures exceed 10° C, then forced air cooling in a sealed tunnel is recommended, until flesh temperatures at the inside of the tunnel achieve the specified temperature.

7.2.2 Storage rooms for avocados should be carefully selected. They should be:

- Free of ethylene contamination from other fruits, combustion engines or pollution.
- Entirely separate from other cool stores containing other products as avocados are better stored separately.

7.2.3 Cool storage facilities should have strong air movement to achieve even flesh temperatures, right through pallets (see Part 5 Section 10.11 - a graph showing the comparatively high respiration rate of avocados). This makes strong cool store air movement very important.

7.2.4 If product has been fumigated prior to storage at the Freight Forwarder then it is recommended such pallets be:

- Clearly marked as having been fumigated.
- Re-cooled slowly.
- As a result of increased temperature at fumigation, treated fruit will have a shorter shelf life and may be more prone to chilling injury. It is therefore important to get such fruit down to a storage temperature as soon as possible after fumigation but be careful that over cooling to lower than about 4OC may cause cold damage.

7.3 Fruit Age (Pick to Load out Times)

Note: Day zero equals the day of picking

EMS Requirement

All avocados packed for export shall comply with the fruit age specifications for the specific market and shipping methods.

7.3.1 All Markets other than Australia or USA

Container Shipping

- 6 days to container loading, OR;
- 7 days to scheduled sailing

Reefer Shipping

- 8 days to scheduled sailing

Air Freight

- 14 days to scheduled flying

7.3.2 Australia

Container Shipping

Timeframe (harvest date)	Container loading	Scheduled Sailing
Beginning of harvest to 31 December:	9 days to container loading **OR**	11 days to scheduled sailing
1 January to 31 January.	7 days to container loading **OR**	9 days to scheduled sailing
1 February to end of harvest	5 days to container loading **OR**	7 days to scheduled sailing

- The relevant time frame is determined from the time of picking,
- Fruit age to market will be a consideration when processing any dispensation

Air Freight

- 14 days to scheduled flying

7.3.3 USA

Container Shipping

- 6 days to container loading, **OR**;
- 9 days to scheduled sailing

Reefer Shipping

- 8 days to scheduled sailing

Air Freight

- 14 days to scheduled flying

Non-compliant product must not be loaded unless a dispensation has been obtained by the exporter and a copy supplied to the packer.

Breach of the fruit age requirements constitutes a major non-compliance.

Delivery to Metroport 3 days prior to scheduled sailing from Tauranga constitutes time of scheduled sailing for Metroport.

7.3.4 **Automatic Dispensation for Japan**

Where a line of avocados is being packed concurrently for both the USA and Japan, an automatic dispensation to allow the onshore timelines for Japan to be exceeded by no more than 2 days shall apply, provided the following notification procedure is followed:

- The Grower and NZ Avocado are to be notified.
- The non-compliance is to be reported to NZ Avocado office through the email dispensation process **dispensations@nzavocado.co.nz.** Receipt of notification will be issued by NZ Avocado, and must be kept on file for audit purposes.

7.4 Procedures for Breach of the 48 Hours Pick to Pack Times

7.4.1 If under **exceptional** circumstances (i.e. plant breakdown, power cuts, weather) the 48 hours pick to pack time is exceeded by no more than 24 hours then the following procedures are to be followed by the Exporter:

7.4.2 **The Grower, the Packer and NZ Avocado** are to be notified in writing, through the dispensation process, if the fruit has exceeded the 48 hours pick to pack times. Follow the dispensation process on the website or email: dispensations@nzavocado.co.nz and include the following information:

- PPINS:
- No of bins:
- Pick Date:
- Pack Date:
- Storage conditions:
- Reason for dispensation:
- Confirmation that affected Grower(s) notified in writing:
- Name of Exporter and confirmation Exporter included in the dispensation application:

7.4.3 When planning pick to pack outside the EMS requirements, dispensation must be sought from NZ Avocado prior to the event NOT after the event has occurred. Final bin numbers by PPIN must be confirmed once the harvest is complete.

7.4.4 In the event of being notified of a non-compliance or a non-compliance that has been identified through audit, the non-compliance is to be reported to NZ Avocado office immediately (within the hour of being identified) via the dispensations process.

7.4.5 Receipt of notification will be issued by NZ Avocado, and will be kept on file for audit purposes.

7.4.6 The Exporter(s) must monitor the crop through the shipping and selling chain to avoid any outturn problems. If any problems occur the Exporter is to inform NZ Avocado.

7.4.7 Failure to notify the Grower, the Packer and NZ Avocado where the pick to pack EMS requirement has been breached constitutes a major non-compliance.

7.4.8 The Exporter shall provide NZ Avocado with the outturn report confirming the fruit quality at distribution if required.

7.4.9 Product that exceeds 48 hours from harvest will be clearly flagged in the inventory system and a visual indicator card, no smaller in size than A4, attached to the face of the pallet, marked "Mixed Age" identifying it as a mixed age pallet.

Mixed age pallet is defined as either:

- A pallet containing fruit which exceeded the pick to pack time, or
- A pallet containing compliant fruit packed more than four days apart.

Best Practice

Stock should be rotated as quickly as possible.

7.4.10 Wherever possible, packs should be air freighted intact on their pallets. This will minimise pack damage further down the distribution chain.

7.4.11 Stowage in sea containers. See recommendations in Part 5 Sections 11.2 and Part 7 Section 2.0. It is strongly recommended that any pallets re-assembled (at the Freight Forwarder) be strapped fully in accordance with procedures as described in Part 5 Section 9.5 Palletisation. The following are not considered acceptable:

- Pallet bases that are too big or too small.
- Medium or low density strapping (20mm and 400kg breaking strain is necessary)
- Hand tensioning. Strapping needs to be machine tightened to achieve an appropriate tension.
- Bottom horizontal straps. These must be no higher than the 2nd tray from the bottom of the pallet (or the bottom bulk pack).

8.0 SHIPPING

8.1 Fruit Age Management

EMS Requirement

8.1.1 Fruit age at time of shipping should comply with **Section 3 of this Part (see also Appendix 1)**. A dispensation is available for Exporters who want to manage on-shore timelines to minimize fruit age on arrival. The Exporter must apply to NZ Avocado for the dispensation and associated conditions through the dispensation process by emailing **dispensations@nzavocado.co.nz**.

8.2 Carriers and Services

Best Practice

8.2.1 Each Exporter should select carriers and services that minimise the risk of poor out-turns that may endanger market stability. It will be considered best practice to:

8.2.2 Select carriers (or Freight Forwarders) with modern equipment (i.e. high tech 2nd generation containers) and a proven record of successful carriage of fresh produce.

8.2.3 Utilise services in a manner that will minimise the time when avocados are held in containers, i.e.

- Stowage and dispatch to port as close as possible to vessel cut-off time.
- Moving directly from load-port to discharge-port wherever possible e.g. last port New Zealand to first port Australia.
- Subsequent transit and devanning should be immediate.
- Shipping at times when discharge will be speedy e.g. avoiding the possibility that devanning may be delayed by holiday periods.

9.0 APPENDIX 1: SUMMARY OF TIMECHAIN AND COOL CHAIN INDUSTRY GUIDELINES

The following is a summary of the general and minimum industry guidelines for both time-chain and cool-chain and should be observed by all those handling avocados prior to export.

Responsible	Activity	Time-chain from Harvest	Cool-chain	
Harvester and Packer	Picking	Should not pick if more than 5mm rain in previous 24 hours	Harvest at <30°C ambient air temperature. Hold in shade under cool conditions,	Best Practice
Packer	Fruit delivery to packhouse	Within 24 hours		EMS req
Packer	Post-harvest fungicide Application	Within 12 hours		Best Practice
Packer	Post-harvest Fungicide application	**May** be applied to fruit for Australia		EMS req
Packer	Storage prior to packing		Commence cooling to less than 15°C. Note: prior to packing, **fruit should be held just above the dew point, i.e. at 10-14°C**	Best Practice
Packer	Packed	Within 48 hours		EMS req
Packer	Into cool store	Within 12 hours of packing	Commence reducing flesh temperature to no less than 4.0°C and 7.0°C.	EMS req
Packer and Exporter	Cool storage	Within 72 hours of picking	Flesh temperature reduced to between 4.0°C and 7.0°C. Hold at temperatures between 4.0°C and 7.0°C up to 30 November. Hold at temperatures between 4.0°C and 6.5°C after 1 December to end of season.	EMS req
Packer	Load out to Freight Forwarder		**Container only** - Load at temperatures between 4.0°C and 10.0°C flesh. **Airfreight** – Temperatures taken and recorded at loadout	EMS req
LOAD OUT TO ALL MARKETS OTHER THAT AUSTRALIA OR USA				
Packer and Exporter	- Container	Loading within 6 days of harvest **OR** 7 days of scheduled sailing (as identified on pallet card).	Load at temperatures between 4.0°C and 7.0°C prior to 30 November, Load at temperatures between 4.0°C and 6.5°C after 1 December.	EMS req
Exporter	- Reefer ship	Shipment within 8 days of harvest to scheduled sailing (as identified on pallet card).		
Exporter	- Air Freight	Within 14 days of harvest (as identified on pallet card).	Temperatures taken and recorded at load out	
LOAD OUT TO USA				
Packer and Exporter	- Container	Loading within 6 days of harvest **OR** 9 days of scheduled sailing (as identified on pallet card)	Load temperatures between 4°C and 7.0°C prior to 30 November. Load at temperatures between 4.0°C and 6.5°C after 1 December.	EMS req
Exporter	- Reefer ship	Shipment within 8 days of harvest to scheduled sailing (as identified on pallet card)		
Exporter	- Air Freight	Within 14 days of harvest (as identified on pallet card)	Temperatures taken and recorded at load out	
LOAD OUT TO AUSTRALIA				
Packer and Exporter	- Container prior to 31 December	Within either 9 days of harvest to container loading **OR** 11 days of harvest to scheduled sailing.	Load at temperatures between 4.0°C and 7.0°C prior to 30 November Load at temperatures between 4.0°C and 6.5°C after 1 December	EMS req
Packer and Exporter	- Container 1 January to 31 January	Within 7 days of harvest to container loading **OR** 9 days of harvest to scheduled sailing.		
Packer and Exporter	- Container from 1 February	Within 5 days of harvest to container loading **OR** 7 days of harvest to scheduled sailing.		
Exporter	- Air Freight	Within 14 days of harvest.	Temperatures taken and recorded at load out	

10.0 APPENDIX 2: COUNTRIES EXCLUDED FROM ASSURANCE

10.1 Compliance with Importing Country MRL Requirements

Compliance to food safety programme requirements in this Quality Manual does not provide any assurance of compliance with the importing countries MRL requirements for the following countries:

Indonesia

PART 7

PACKAGING

Table of Contents

PACKAGING

1.0 GENERAL

EMS Requirement

1.0.1 Only packaging approved by NZ Avocado shall be used to pack avocados for export.

1.0.2 All packaging must be capable of achieving the following requirements:

- Arrival in the marketplace with both fruit and packaging in a sound condition.
- Protecting the fruit during normal handling and transportation through to the final customer.
- Retaining its integrity during shipping and cool storage.
- Allowing for efficient forced air cooling in its design.
- Complying with the industry, count size and minimum fruit weight requirements for each export market and nett weight where required.

1.0.3 All packaging must be assembled and used in accordance with the manufacturer's specifications and instructions.

1.0.4 All packaging used by export registered packers and exporters for export markets must carry an NZA approved AvoGreen® logo. All exporters are required to have a current AvoGreen® Brand Licensing Agreement.

2.0 PACKAGING

Permitted types will be as follows:

2.1 For USA

EMS Requirement

2.1.1 Single layer trays (as specified for **Australia** and other markets), with a minimum net fruit weight of 5.65 kgs.

2.1.2 USA 25 lb double layer lug **(A, O, V) *.**

- Containing two pocket packs, manufactured from moulded pulp.
- In sizes:

Single layer equivalent Count Size	16	18	20	23	24	25	30	**36**
Count to be labelled# on Lug	32	36	40	46	48	50	60	**72**

- When packed, having a minimum net fruit weight of 11.3 kgs (all counts).

2.2 For All Other Markets

EMS Requirement

2.2.1 Standard Single Layer Trays (95mm = 94mm internal) (SSL) (A, O, V) *

- Containing a pocket pack, manufactured from moulded pulp.
- In counts: 16@ 18 20 23 24 25 28 32 35 36

2.2.2 High Single Layer Trays (100mm = 98mm internal) (SSL) (A, O, V) *

- Containing a pocket pack, manufactured from moulded pulp.

  In counts: 14§ 16@ 18 20 23 24 25 28 30# 32 35 36

2.2.3 Bulk Packs (A, C, V).

- Loose filled
- In sizes:
- Single layer equivalent count size 28 30 32 36 42
- Count to be labelled# on bulk pack 56 60 64 72 120
- Equivalent to 2.0 SSL tray equivalents.

§ Count size 14 and 30 must be packed in the High Single Layer tray.

@ When packing a combination of count size 14 and 16 the high single layer tray must be used.

If other configurations are to be packed for other markets, a notification must be requested from NZ Avocado, by exporter. The information required in the dispensation request must include standard count size, weight bands and fruit count.

2.3 Pocket packs

Fibre pocket packs only are approved for use in avocado packaging (H1 and H2).

2.4 Approved manufacturers

Approved manufacturers for avocado packaging are as follows *:

Supplier	Current Specification Ref	Date
Opal (A) Charles Russell	TBC	2021
Oji Fibre Solutions (O)	Avocado Specification 1	2020
Visy (V) Mark Wakefield	Packing specification confirmed	2022
Hawk (H1) Marie Torr	Hawk moulded fibre tray	2021
Hutamaki (H2)	Hutamaki moulded fibre tray	2019

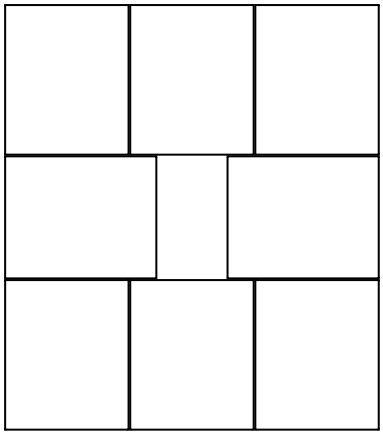
= "Labelled" throughout this manual is used as a generic term for both stamping and use of pre-printed adhesive labels.

3.0 PALLET SPECIFICATIONS

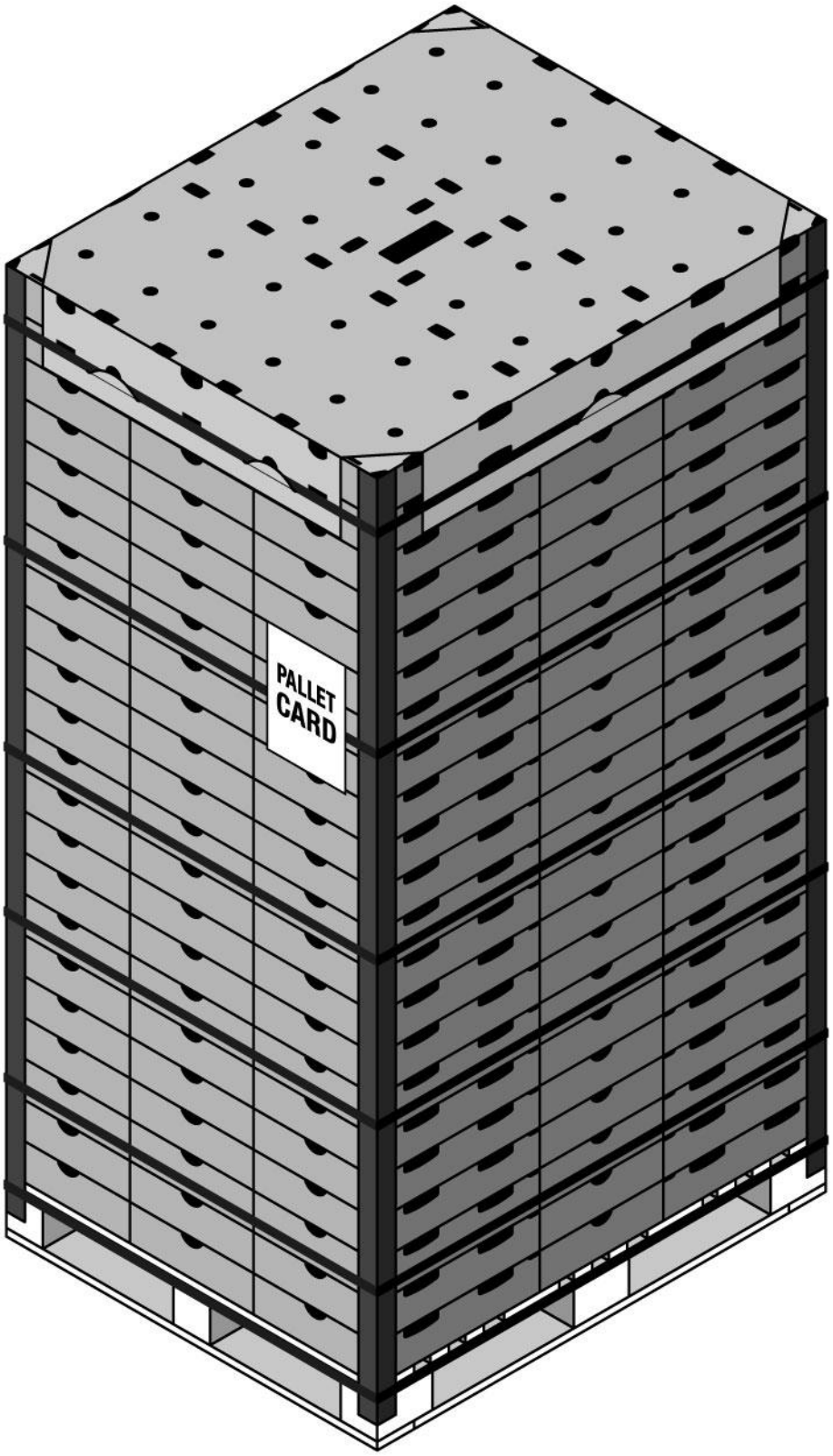
3.1 Standard Single Layer Tray

Pallet	1220 x 1016 USA Pallet		
Packs	Per Layer	Per Column	Total Per Pallet
	8	22	176
V Boards	Cardboard Cap - 4 x cardboard 2230mm positioned half way down pallet bearer		
Pallet Cap	Cardboard Cap		
Pocket Pack	Moulded Fibre Tray		
Dust Cover	Integral		
Interconnecting Strips	Placement (from the bottom of the pallet)		
	Cardboard Cap 3 sets layers 1, 10, 18		
Strapping Sequence	Placement (middle of layer)		
	Cardboard Cap		
	1. Layer 11		
	2. Layer 7		
	3. Layer 3		
	4. Top of pallet base over V board		
	5. Layer 16		
	6. Layer 21 securing cap using slots		
Tama X-Span N'dicator Wrap (excluding USA)	Follow the specifications in Section 4.4		
Pallet Card Placement	Short side of pallet, right hand column 6th pack from top		
Double Stacking	No		
EDI Codes			

Stacking Configuration



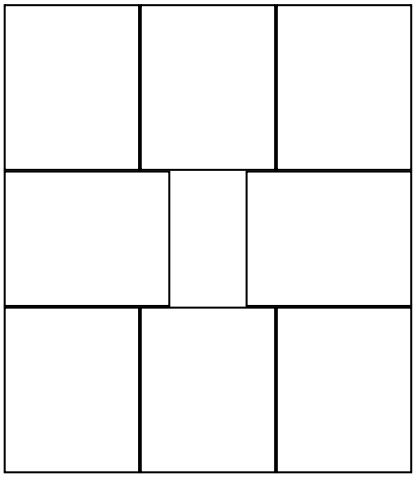
3.1.2 Standard Single Layer Tray – Cardboard Cap



3.2 Standard Single Layer Tray – 20" Refrigerated Container

Pallet	1220 x 1016 USA Pallet		
Packs	Per Layer	Per Column	Total Per Pallet
	8	20	160
V Boards	4 x cardboard 2000mm positioned half way down pallet bearer		
Pallet Cap	Cardboard Cap		
Pocket Pack	Moulded Fibre Tray		
Dust Cover	Integral		
Interconnecting Strips	Placement (from the bottom of the pallet)		
	Cardboard Cap 3 sets layers 1, 10, 18		
Strapping Sequence	Placement (middle of layer)		
	Cardboard Cap		
	1 Layer 11		
	2 Layer 7		
	3 Layer 3		
	4 Top of pallet base over V board		
	5 Layer 16		
	6 Layer 19 securing cap using slots		
Tama X-Span N'dicator Wrap (excluding USA)	Follow the specifications in Section 4.4		
Pallet Card Placement	Short side of pallet, right hand column 6th pack from top		
Double Stacking	No		
EDI Codes			

Stacking Configuration

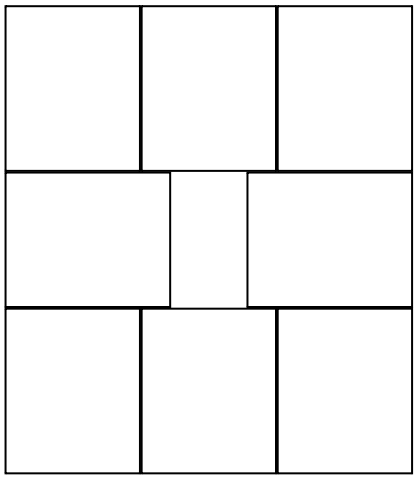


3.3 Standard Bulk Pack – Australia, 11.3 kg USA

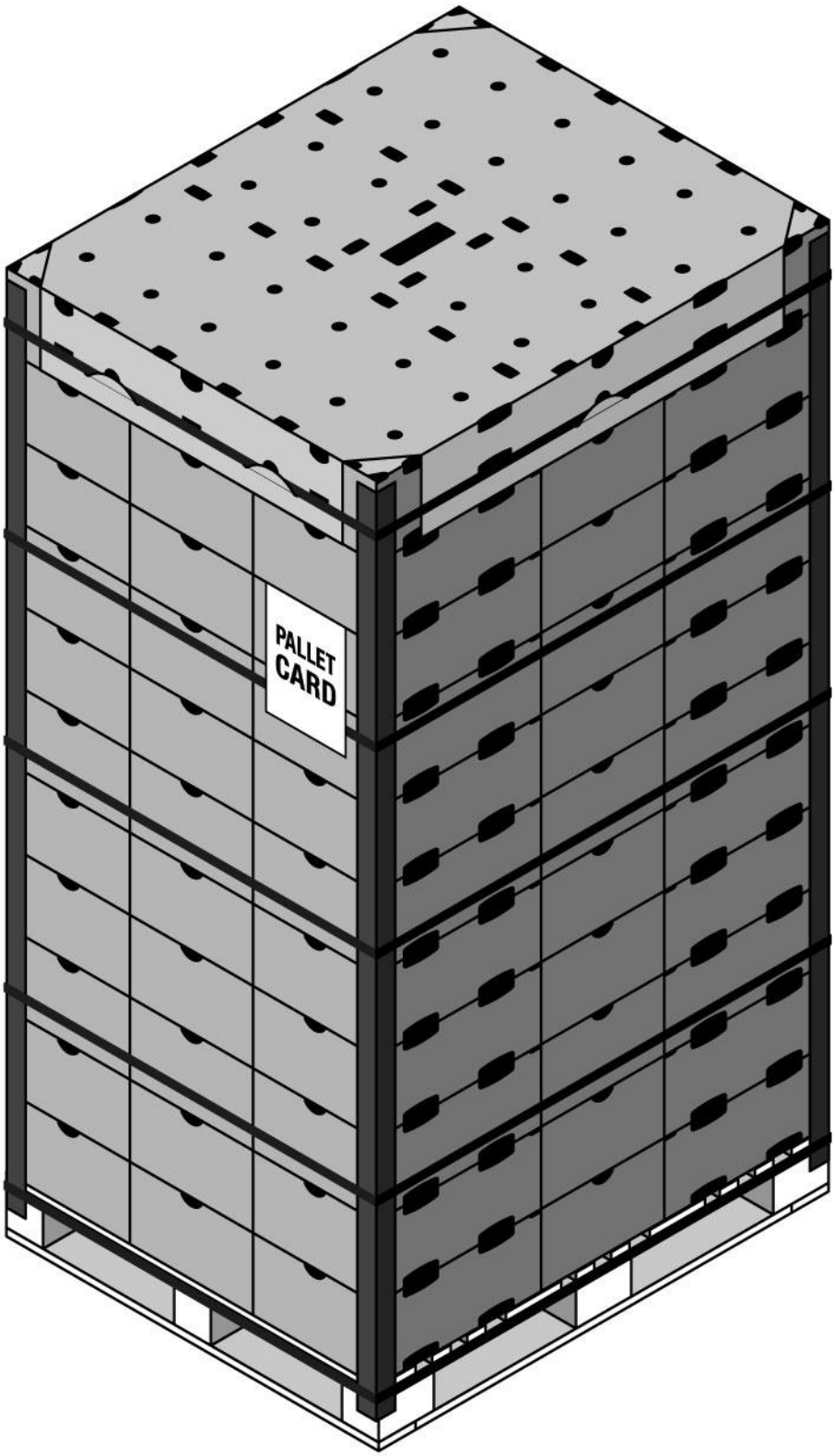
EMS Requirement

Pallet	1220 x 1016 USA Pallet		
Packs	Per Layer	Per Column	Total Per Pallet
	8	11	88
V Boards	Cardboard Cap - 4 x cardboard 2130mm positioned half way down pallet bearer pallet skid		
Pallet Cap	Cardboard Cap		
Pocket Pack	NA		
Dust Cover	Integral		
Interconnecting Strips	Placement (from the bottom of the pallet)		
	Cardboard Cap 2 sets layers 1, 6		
Strapping Sequence	Placement		
	Cardboard Cap (MB)		
	1. Layer 6 above vent		
	2. Layer 3		
	3. Top of pallet base over V board		
	4. Layer 8 below top vent		
	5. Layer 11 securing cap using slots		
Tama X-Span N'dicator Wrap (excluding USA)	Follow the specifications in Section 4.4		
Pallet Card Placement	Short side of pallet, right hand column 3rd pack from top		
Double Stacking	No		
EDI Codes			

Stacking Configuration



3.3.2. Standard Bulk Pack – Australia, 11.3 kg USA – Cardboard Cap



3.4 Other Requirements

EMS Requirement

3.4.1 Packaging used shall be indelibly marked externally with the manufacturer's identifying description and showing:

- Manufacturer name
- Short descriptive name of pack
- Code description for material content e.g. board type.

4.0 PACKAGING COMPONENTRY

4.1 Materials Used in Pallets

EMS Requirement

4.1.1 All materials used shall comply with phytosanitary requirements of the intended market e.g. wood to Australia. Any wood used for pallets must be treated (kiln dried or fumigated), check with Exporter for specific requirements. All wooden components must meet the International ISPM 15 Standard.

4.1.2 The pallet base (when constructed) shall accurately match the footprint of the packages to be stacked on it i.e. without overlap or overhang.

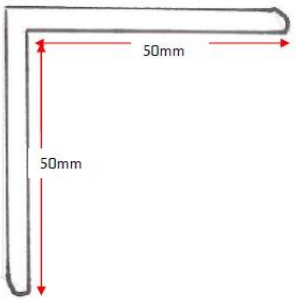
4.1.3 Nails shall be used in construction and these will have some means to ensure they hold fast e.g. screw or ridged.

4.2 Vertical V – Boards

EMS Requirement

4.2.1 Dimensions

Pallet Height	Cap	Length	Cross Sectional	Width
Standard (176 trays)	Cardboard Cap	Min. 2230mm (±5mm)	50mm x 50mm (±5mm)	4.5 mm (+0.5mm, -0)
20′ Container (160 trays)	Cardboard Cap	Min. 2000mm (±5mm))	50mm x 50mm (±5mm)	4.5 mm (+0.5mm, - 0)
Bulk Pack	Cardboard Cap	Min. 2130mm (±5mm)	50mm x 50mm (±5mm)	4.5 mm (+0.5mm, - 0)



- A V-board must be used on all height pallets.
- The V-board must not protrude above the top of the constructed pallet.
- The V-board must extend below the top of the pallet base by 50mm.

4.2.2 Material

- The V-boards shall be constructed as per the specification supplied by the approved manufacturer.

4.2.3 Colour and branding

- Colour as required by the marketer.
- Approved manufacturer's branding graphics may be present on the internal face of the V-board.

4.2.4 Performance

- The V-boards shall be constructed as per the approved manufacturer's specification.

4.3 Strapping and Strap Sealing

EMS Requirement

4.3.1 Material: Polypropylene

4.3.2 Description: Polypropylene textured strapping

4.3.3 Strap Width: Manual strapping 16mm – 19mm (maximum)

- Performance:
  - Minimum breaking strain: 400kg
  - Joint Strength: 150kg
- Strap Sealing System:
  - Steel H/D seals
  - Only H/D crimpers shall be used to secure H/D seals
  - Approved hand held automated strapping systems
  - The use of buckles is not permitted

4.3.4 Strap Width: Machine strapping 12mm (maximum)

- Performance:
  - Minimum breaking strain: 200kg
  - Joint Strength: 130kg
- Strap Sealing System:
  - Approved automated strapping systems.
  - Thermo electric welding.
  - Manual application: Steel M/D seals.
  - Internal side to be Embossed / serrated.
  - Only specific 12mm H/D crimp tools shall be used to ensure correct overlapping of seal.
  - The use of buckles is not permitted.

4.4 Tama X-Span N'dicator

EMS Requirement

4.4.1 Tama X-Span indicator wrap must be mechanically applied to the pallet with an approved wrapping machine using the following specifications in conjunction with the manufacturer's machine operation guidelines.

4.4.2 The 500mm wide roll is recommended for use in avocados.

4.4.3 Cornerboards and top caps

- V-boards and top caps must be used with Tama X-Span N'dicator
- Specifications for V-boards are detailed in Section 4.2 above.
- V-boards must not extend above the top of the top box.
- V-boards must extend down to cover the first 50mm of the pallet base.

4.4.4 Wrapping Sequence

- Wrap 2 wraps around the base of the pallet.
- Wrap up then 1 or 2 wraps around the top of the pallet.
- Wrap down then 1 wrap around the base of the pallet.
- Extra wraps around the top or bottom can be made.
- The bottom wrap must *cover the V-board* at the pallet base.
- The wrap should extend to sit just over the top of the pallet cap.

4.4.5 Optimal elongation

- Optimal elongation of 50 percent is recommended but not absolutely required.
- At optimal elongation the "blue line" will be straight.
- Pre elongation the "blue line" is a distinct zig zag.

- A wrap would be considered adequate if the zig zag has reduced to a "ripple" and when pulled away from the pallet the wrap "slaps" back indicating good elongation.

4.4.6 Wrap Tension

- V- Corner boards and top caps must be used.
- Adjust the tension back from optimum if any crushing of the trays or cartons is evident. Optimum elongation should be possible as the wrap width (460 mm) does not create "nodal" load points on the cornerboards.

4.4.7 Wrap overlap

- Wrap overlap is achieved by balancing the TURNTABLE speed and CARRIAGE (vertical) speed.
- With the use of corner boards full coverage of the pallet is not required. For cost effective wrapping it is only necessary to spiral wrap up and down the pallet as specified in 4.4.4.
- A maximum gap of 350mm ±50mm between the spiral wraps.

4.4.8 Tying off

- Tying off the wrap is critical to maintaining tension and stability of the pallet.
- All excess material must be removed to ensure no product is protruding from the pallet, avoiding tails.

4.5 MacroWrap NT613/ NT701

EMS Requirement

4.5.1 MacroWrap NT613/NT701 must be mechanically applied to the pallet with an approved wrapping machine using the following specifications in conjunction with the manufacturer's machine operation guidelines.

4.5.2 MacroWrap NT613/NT701, 500mm wide roll, is recommended for use in avocados.

- **NT613 is a pre stretched product and recommended for pallet wrappers without a powerhead**
- **NT701 is a non pre stretched product and is recommended for pallet wrappers with a powerhead and will give the greatest savings on wrap costs.**

4.5.3 Corner boards and top caps

- **V-boards and top caps must be used with MacroWrap NT613/NT701**

- Specifications for V-boards are detailed in Section 4.2 above.
- V-boards must not extend above the top of the top box.
- V-boards must extend down to cover the first 50mm of the pallet base.

4.5.4 Wrapping Sequence

- Wrap 1 wrap around the base of the pallet.
- Wrap up then 1 or 2 wraps around the top of the pallet.
- The wrap should extend to sit just over the top of the pallet cap.
- Wrap down then 1 wrap around the base of the pallet.
- Extra wraps around the top or bottom can be made.
- The bottom wrap must *cover the V-board* at the pallet base.

4.5.5 Optimal elongation

- For NT701 optimal elongation is 270% to 290%.
- For NT613 optimal elongations is 50%.
- A wrap would be considered compliant if the holes have enlarged to give adequate ventilation (see 4.5.9 Illustration of Elongation) and when pulled away from the pallet the wrap "slaps" back indicating good elongation.
- Note the key difference in hole shape and size.

4.5.6 Wrap Tension

- V- Corner boards and top caps must be used.
- Adjust the tension back from optimum if any crushing of the trays or cartons is evident.

4.5.7 Wrap overlap

- Wrap overlap is achieved by balancing the TURNTABLE speed and CARRIAGE (vertical) speed.
- For cost effective wrapping it is only necessary to spiral wrap up and down the pallet as specified in 4.5.4.
- Maintain a maximum gap of 350mm ±50mm between the spiral wraps.

4.5.8 Tying off

- Tying off the wrap is critical to maintaining tension and stability of the pallet.
- All excess material must be removed to ensure no product is protruding from the pallet, avoiding tails.

4.5.9 Elongation illustration

Figure 1: NT613 Prior to elongation

Figure 2: NT613 After elongation

Figure 3: NT701 Before elongation

Figure 4: NT701 After elongation

5.0 PACKAGING APPROVAL PROCESS

EMS Requirement

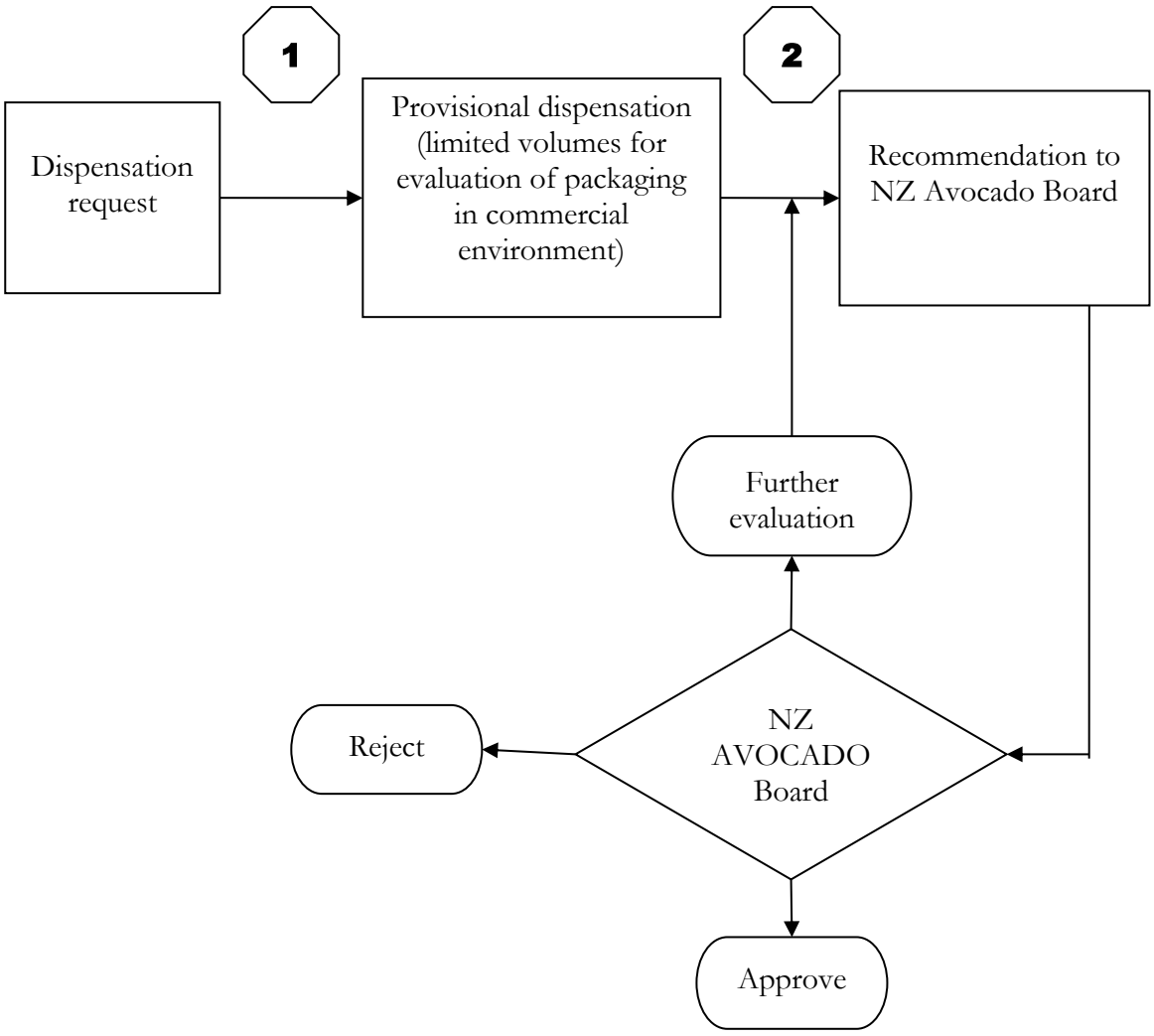
5.1.1 Approval will only be given for packaging that has been demonstrated to be sufficiently robust to ensure adequate quality (of fruit and packaging) at outturn.

5.1.2 A dispensation may be applied for to trial non-approved packaging in order to demonstrate its suitability in a commercial environment.

5.1.3 This involves a two stage application process as per the schematic below. In the first step supporting information must be provided with the dispensation request to demonstrate the suitability of the packaging. This information will be used to determine if a provisional dispensation should be issued in Step 2.

5.1.4 This allows for limited volumes of the product to be packed using the packaging in a commercial environment for evaluation purposes.

Fig 1. Flow diagram of dispensation approval process



6.0 DISPENSATION PROCESS

EMS Requirement

6.1 Dispensation Request

Any dispensation requests must be supported by the following information:

- Details of the packaging construction, including photograph if available.
- Standard count size and fruit pieces in package.
- Intended market.
- Documented evidence to indicate the suitability of the proposed packaging.

6.2 Provisional Dispensation

Based on the information supplied in the dispensation request a provisional dispensation may be granted to allow for limited volumes of the product to be packed using the packaging in a commercial environment for evaluation purposes.

This provisional dispensation will include a limit on the volume that can be packed and a requirement to evaluate product as directed.

Depending on the nature of the proposed packaging factors to be included in the evaluation as part of the provisional dispensation may include:

- Integrity of pack
- Fruit damage (physical)
- Venting and cooling characteristics (temperature profiles within pallet)
- Condensation
- Fruit support (pocket packs)
- Fruit size and fruit numbers including SSL tray equivalent.
- Independent assessment of fruit quality at out-turn in an approved format
- Palletization/stacking/container fit
- Labelling (legability/durability)

This is not an exhaustive list as the issues of concern will be determined by the information supplied in the dispensation request and will be determined on a case by case basis. Once granted, a condition of the dispensation will be to produce an evaluation report to NZ Avocado based on the out-turn quality of each shipment utilizing the new packaging within 10 days of the arrival at destination. The format of the report will be provided by NZ Avocado and is to include photos of package and fruit condition. Any approval of the packaging will be contingent upon satisfactory performance of the packaging as evidenced by the outturn evaluation.
Based on these reports NZ Avocado will make a recommendation to NZ Avocado Board. The Board may approve or reject the dispensation or instruct a further provisional dispensation to be issued to allow for further evaluation.

PART 8

EXPORT MATURITY STANDARDS

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MATURITY ASSESSMENT

1.0 GENERAL

EMS Requirement

1.0.1 Dry Matter assessment is the method required by NZ Avocado for assessing avocado maturity. Before fruit is harvested for the first time a dry matter test must be performed to demonstrate that the fruit meets the minimum standards for export. Early season fruit will require a clearance to pick from the Independent Testing Organisation (ITO) appointed by NZ Avocado.

1.0.2 Then fruit has assessed as reached the required maturity the Packer will contact NZ Avocado appointed ITO to carry out a clearance to pick test. This clearance relates specifically to maturity requirements only.

1.0.3 A maturity clearance to pick will be obtained from the Independent Testing Organisation (ITO), until such time as notified by NZ Avocado (see **3.14.5** below). This clearance relates specifically to maturity requirements only and does not otherwise indicate suitability of fruit for export.

1.0.4 Dispensations for maturity test.

There are two different types of dispensation issued by NZ Avocado:

Regional dispensation – exempting requirements for Independent Testing Organisation (ITO) clearance issued by region or distinct area within a region. There is the requirement for Packers to perform in house maturity tests prior to first harvest. i.e. Waihi - Athenree having dispensation and requiring an in house test prior to first harvest, everywhere else still having to go up for clearance through the ITO.

A blanket clearance for regions exempting both the requirement for independent verification for clearance and the test prior to the first harvest.

1.0.5 When a Regional Dispensation has been issued the requirement for ITO clearance testing is no longer required BUT the Packer is still required to perform a dry matter test prior to first harvest for a PPIN. This requirement will remain in place until such time as a Blanket Clearance has been issued, exempting this requirement (see Part 5: Section 4.1.4 and 4.1.5).

1.0.6 Packers are required to forward to NZ Avocado any copies of the in-house maturity test results obtained while the regional requirement for independent clearance in place. This information will be taken into account in deciding when the requirement to test prior to first harvest is lifted to the status of blanket clearance.

1.0.7 NZ Avocado can issue dispensation to an ITO test requirement either as a Regional Dispensation (area or region) or a Blanket Clearance (nationally).

1.0.8 **NZ Avocado will cover the collection and testing cost of all export maturity clearance samples that pass the export clearance criteria. The cost of samples that fail will be recouped by NZ Avocado by way of invoice back to the Grower via the packhouse.**

2.0 HASS MARGINAL FAIL CRITERIA

EMS Requirement

- In order to minimize the cost of failed maturity tests marginal failure criteria have been implemented. For any tests where fruit fail to meet the industry standards and either:
  - Average dry matter **meets or** exceeds 23.8% DM (provided 18 out of 20 fruit **meet or** exceed 20.8% DM) **OR**
  - 17 out 20 **meet or** exceed 20.8% DM (provided average dry matter exceeds 24%DM)
- A marginal failure will be issued with an automatic clearance date *on the marginal failure result certificate* sent out at the time of initial notification of the test result.
- Harvesting from the orchard may only proceed where each of the following criteria is met in any test:
  - At least 18 out of the 20 fruit sampled **meet or exceed** 20.8% dry matter content.
  - The average across the 20 fruit sampled is at least 24% dry matter content (Hass) or 23% dry matter content (Reed).
  - A clearance to pick has been received from NZ Avocado appointed Independent Verification Agency.
- The Packer must retain or have access to a copy of the test records for NZ Avocado audit purposes.
  - Marginal maturity clearances may be issued at the discretion of NZ Avocado.
  - An Early Start programme may operate in some seasons. NZ Avocado will notify relevant parties as to the maturity criteria.

3.0 GEM EXPORT MATURITY CRITERIA

EMS Requirement

- Harvesting from the orchard may only proceed where each of the following criteria is met in any test:
  - At least 20 out of the 20 fruit sampled **meet or exceed** 23.0% dry matter content.
  - The average across the 20 fruit sampled **meets or exceeds** 29% dry matter.
  - A clearance to pick has been received from NZ Avocado appointed Independent Verification Agency.
- The Packer must retain or have access to a copy of the test records for NZ Avocado audit purposes.

4.0 MATURITY CLEARANCE AREA (MCA)

4.1 Maturity Clearance Area Definition

A Maturity Clearance Area (MCA) is defined as an area that is to be cleared by a single maturity test. This area may consist of more than one block. Each MCA shall be clearly identified by name and location.

4.2 Minimum Maturity Clearance Areas (MCAs).

EMS Requirement

- **Maturity areas should be representative in terms of tree age and fruit size of the blocks to be harvested.**
- **Where there is considerable variation in tree age between blocks these should be defined as separate maturity areas.**
- **The maturity clearance will only apply to fruit in blocks defined under a particular maturity area.**
- **There is no maximum size for a single maturity clearance area.**

MINIMUM maturity clearance areas PER ORCHARD are as follows:

ORCHARD size (ha)	Minimum number of Maturity Clearance Areas (MCA)	Number of 20 fruit maturity clearance samples	Number of fruit in each sample
0 – 5ha	1	1	20 per MCA
5.1 – 10.0ha	2	2	20 per MCA
Greater than 10.1ha	3	3	20 per MCA

A Grower can divide the orchard into more maturity clearance areas – the above is the minimum requirement for an orchard.

4.3 Registration and Process

4.3.1 In every case an orchard map must be prepared showing the layout of the orchard and clearly identifying all orchard blocks and the boundaries of the MCA to be sampled. NZ Avocado will provide this map to the IVA annually or when any update has been made.

4.3.2 All maturity areas must be registered with the IVA prior to collection of fruit and blocks must match the orchard map retained in the **NZ Avocado Avodiary**.

4.3.3 The registration process shall include tree age and the composition in % of tree age where known.

4.3.4 If more than one maturity area is identified or required (see 2.2) these must be sampled separately.

4.3.5 It is essential the processes be performed exactly as documented. Should any part of the process be varied (e.g. field sampling, peeling or delays in testing) then inaccurate or misleading results are likely.

5.0 METHOD

5.1 General

Tests may be done using the peel or the core method or the disc method.

Equipment required includes:

- A dehydrator.
- Scales (laboratory balance beam or electronic) capable of measuring to within one tenth (0.1) of one gram accurately.
- Computer for recording and calculation
- See also **APPENDIX 1** "Dry Matter Assessment Sheet."

5.2 Fruit Selection

The sample should be representative in terms of tree age and fruit size of the blocks to be harvested. Where there is considerable variation in tree age between blocks these should be sampled as separate maturity areas. The maturity clearance will only apply to fruit of that particular maturity area and fruit size included in the sample.

5.2.1 Collect 1 fruit from every 20-30 trees, walking diagonally across the maturity area.

5.2.2 Snip fruit from north-eastern sides of trees. Use a compass to identify the correct side.Take samples from the same side and randomly between 1.5 and 6.0m on each tree.

5.2.3 Select a total of 20 fruit samples from the MCA. Fruit must be:

- Free of sunburn and/or wounds.
- Representative of sizes to be harvested.
- No individual fruit to weigh less than 162 grams

NB: If the Maturity Clearance Area has trees of mixed ages the sample must be taken in proportion to the age class represented (e.g. if the MCA has 75% 8-year-old trees and 25% 3-year-old trees the sample to be analysed should have 75% fruit from the 8-year-old trees and 25% from the 3-year-old trees).

5.3 Handling of Samples

5.3.1 Immediately place fruit in a plastic bag, to minimise fruit moisture loss.

5.3.2 If the fruit carries excess water – wipe off with a few damp paper towels to maintain humidity. Ensure there is no free water in the sample bag. Record that sample was wet.

5.3.3 Place damp paper towel in plastic bag to maintain humidity and seal the bag.

5.3.4 Record grower/sample site and MCA on the bag with a permanent marker.

5.3.5 Keep the samples sealed and cool and get them quickly to the testing station.

5.3.6 Samples must be processed within 12 hours of picking.

NB: Moisture loss can significantly corrupt results of a dry matter test. It is essential fruit is tested promptly and not subjected to drying or hot conditions.

5.4 Preparation of Samples

At the testing station:

5.4.1 Lay out a filter paper for each of the test samples (alternately, thermoplastic or glass sampling dishes may be used).

5.4.2 With a marker pen write an identifier code on a corner of each of the filter papers and towels (e.g. H-1 for Hollywell sample 1 and H-2, H-3 etc.)

5.4.3 Weigh each fruit with scales and record weight on Assessment Sheet, in "Fruit weight" column.

5.4.4 Remove all moisture from filter papers by placing in:

Microwave for 2-3 minutes or

Dehydrator for 15 minutes.

NB. A dehydrator is required for the drying of fruit samples; however, a microwave is suitable for drying the filter papers.

5.4.5 Weigh the filter paper for each test sample.

Use scales capable of measuring to within one-hundredth of one gram accurately. NB. Kitchen scales are not accurate enough to achieve this.

Record the filter paper weight on the Assessment Sheet, "Container Weight" column. Write to nearest one-hundredth gram e.g. 2.45g.

5.4.6 Slice each avocado in half longitudinally i.e. a vertical cut from button to base.

5.4.7 From the test sample (half), remove the seed from the flesh and:

Observe colour and texture of the seed coat.

Peel seed coat from the flesh carefully to avoid removing flesh.

Rate and record observations of seed coat on the Assessment Sheet as follows:

Seed Coat Notation	Description
Mat	Where the seed coat is dark brown, paper thin and transparent.
Med/Mat	Where the seed coat is brown in colour, transparent but not paper thin.
Med	Where the seed coat is beginning to develop brown colour and the seed coat is thinning towards more transparency. Can be brown spotting.
Imm/Med	Where the seed coat is yellow, opaque but thinning and vascular tissue can be seen.
Imm	Where the seed coat is pale yellow and fleshy – up to 1mm thick

5.4.8 For each sample in the test:

- Cut the test sample in half longitudinally.
- Peel away some skin from one quarter, taking care not to remove flesh.
- With a potato peeler, take a number of slices totalling 20-30 grams (without skin) from top to bottom of the inside face of one quarter (from the test sample).
- Weigh the "20 gram" sample on filter paper base, with laboratory scales.
- Record the weight on the Assessment Sheet in "Fresh + container. weight" column e.g. 21.8 grams.

Alternatively plugs of tissue may be taking from through the centre of the fruit using a Coring machine OR for the disc method, sampling 2 x 5mm samples from the opposite equatorial sites of the avocado.

5.5 Drying

5.5.1 Place each "20gram" sample and filter paper base in the dehydrator, allowing sufficient space in the tray for proper air circulation.

5.5.2 Set the thermostat at 55° Celsius.

5.5.3 Samples must be dried to constant weight. Leave sample to dry initially for 12 hours*.

***Note:** For the first few times tests are done it is best to **wait a minimum of 12 hours**, weigh a sample (including the filter paper base) and then place the sample back in the dehydrator for another hour. Take the same sample out and re-weigh. Do this hourly until the **weight is constant** - it can be taken that the sample has been fully

dried and further drying is unnecessary. With repetition of this check, the operator will be able to determine the minimum drying time required to remove all moisture.

Drying time will depend in the volume and density of the sample, the temperature the dehydrator maintains and how high the trays are stacked in the dehydrator. It is recommended that trays be stacked not more than 6 trays high.

5.5.4 When the samples are completely dry, they must be weighed immediately on removal from the dehydrator as they will quickly pick up moisture from the air and this will corrupt the test.

5.5.5 Record all sample gross weights.

5.6 Calculating Results

5.6.1 Subtract the weight of the filter paper base (Container weight) from the weight of the dry sample (Dry + cont. weight). Enter this figure on the Assessment Sheet and write this figure in the column headed "Net weight of dry."

5.6.2 Divide the "Net weight of dry" figure by the "Net weight of fresh", to derive the "% dry matter" of the sample. Enter this on the Data Sheet, in column "% dry matter."

5.6.3 When all 20 samples are calculated, add up the number of samples that are 20.8% or greater. Enter this number in the box "Number achieving 20.8% in test."

5.6.3 Calculate the "Average % dry matter" and "% variation" figures (optional).

5.7 Assessing Results

5.7.1 **Seed coat.** There is generally a strong correlation between the condition of the seed coat and fruit maturity. This is an excellent field test to aid in the timing of initial sampling (dry matter test). The darker, thinner and dryer the seed coat, the more likely the fruit will be mature.

5.7.2 **% Dry Matter** indicates the relative maturity of each fruit compared to others in the sample. The lowest maturity level and the spread are key issues.

5.7.3 **Acceptable maturity.** This is where at least 18 out of the 20 fruit sampled achieve 20.8% dry matter, and the average dry matter content across the 20 fruit is at least 24%.

5.7.4 **% Variation.** The Ripening Operator will find this figure useful as it indicates variability in ripening speed and colour that can be expected in a pre-ripened tray of fruit. Gas ripening at an optimum temperature tends to make the fruit turn red. A higher temperature would create better colour, however this would reduce shelf life and increase rot levels.

5.8 After the Test

5.8.1 If the samples meet the above criteria and have been assessed by an IVA they will be given a "Maturity Clearance". Maturity Assessments must be carried out by an IVA until such a time as NZ Avocado issues a **Regional Dispensation (see Section 1.3)** with negates the requirement for independent verification. Once a **Regional Dispensation** (see Section 1.3) to independent verification has been issued, a maturity test is still required for the first harvest of a PPIN until such a time as a **Blanket Dispensation** from this requirement is issued. Blocks which have passed this testing procedure are cleared for harvest.

5.8.2 Retain test results on file and make available for NZ Avocado audit.

5.8.3 Make available to the Packer, Exporter and/or Ripening Operator, as instructed.

6.0 APPENDIX 1: Dry Matter Assessment Sheet

Dry Matter Assessment Sheet

	Sample	Fruit weight	Seed coat	Container weight	Fresh + cont. weight	Nett weight of fresh	Dry + cont. weight	Nett weight of dry	% dry matter	
Grower	1									Number achieving 20.8%
	2									in test
	3									
	4									
	5									
	6									
	7									
	8									Average % dry matter
	9									
	10									
Date	11									
	12									
	13									
	14									% variation
	15									
	16									
	17									
	18									
	19									
	20									

PART 9

FOOD SAFETY

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FOOD SAFETY

1.0 GENERAL

The objective of any compliance to an accredited food safety programme is to provide consumers of New Zealand avocados, both locally and internationally, with fruit that is free of significant health hazards and may have only residues of approved products at or below the allowable MRL.

Please refer to your Exporter for additional requirements customers and markets may have

1.1 Compliance

EMS Requirement

1.1.1 Under the New Zealand Food Act 2014, those working with food products are required to have a Food Plan for both local market and export growing, harvesting and packing; have this verified by an independent third party and be registered for compliance with the Food Act (2014) with MPI.

New Zealand Market Food Safety

1.1.2 Under the New Zealand Food Act 2014, those working with food products and supplying the New Zealand market only are required to have a Food Plan and have this verified by an independent third party such as the Regional Council or an IVA (AsureQuality and SGS).

1.1.3 Once verified, a local market Grower can register compliance with the Food Act via MPI and will be issued with a Certificate of Assurance Verification and number.

This registration for compliance can be completed online by either the independent verifying agent or the Grower.

Export Food Safety

1.1.4 Growers, Contract Harvesters, Packers and Exporters must be able to provide evidence of accreditation to a Global Food Safety International Standards programme for avocados for avocados such as GlobalGAP, NZGAP, BRC, SQF1000. These programmes have equivalence and therefore recognised as meeting the requirements of the Food Act 2014. In addition, they cover the export requirements of our importers and retailers.

1.1.5 Once verified, entities can register compliance with the Food Act via MPI and will be issued with a Certificate of Assurance Verification and number.

This registration for compliance can be completed online by either the PMO or the IVA or by the Growers, Contract Harvesters, Packers and Exporters individually.

1.1.6 Please refer to the Grower, Contract Harvester, Packer or Exporter sections of the Quality Manual for specific operation and compliance requirements and to Exporters for additional customers and markets requirements.

2.0 RESIDUE AND MICROBIOLOGICAL TESTING VERIFICATION

In order to verify the credibility of the Exporter residue testing programme and the MRL and PHI parameters set in the industry spray diary, NZ Avocado will conduct random residue tests on fruit. These tests will be to a level that satisfies requirements of any relevant certifying authority. Microbiological testing will be undertaken to verify the low risk status of avocados.

2.1 Agrichemicals and Heavy Metals

EMS Requirement

2.1.1 Residue testing will be undertaken to verify that chemical residues are within acceptable levels. Samples of fruit will be collected at random from the packing line, both at the start of export season and throughout the harvest season. Up to 150 samples selected at random from all registered Growers will be tested in any one year. Samples will be submitted for standard GC and LC multiscreen residue tests. Test results will be made available to any New Zealand food safety authority as required.

2.2 Microbial

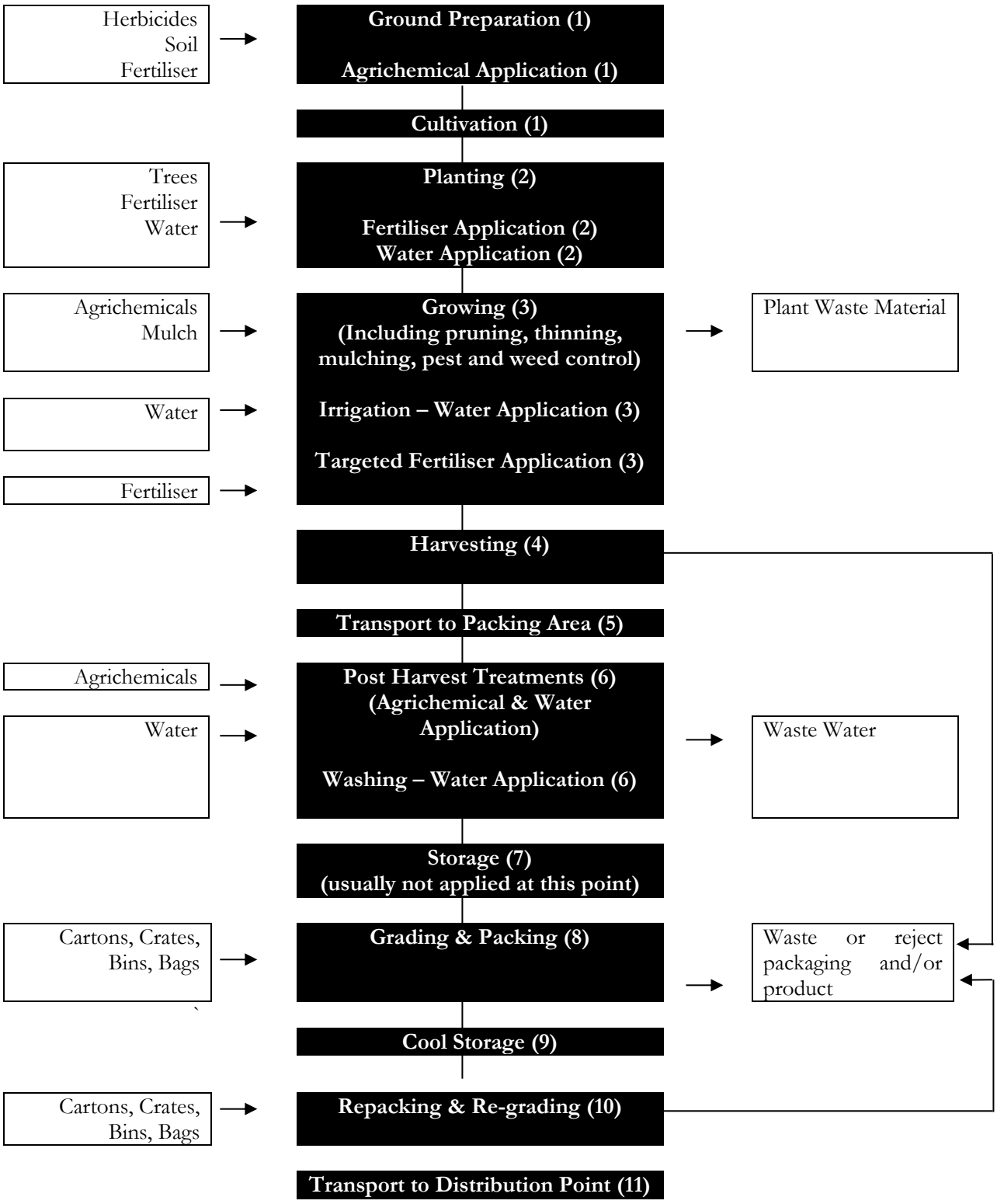
2.2.1 Fruit samples for microbiological testing will be collected from randomly selected packhouses during the harvest season. Samples will be screened for the presence of major food pathogens. The current screening programme is exploratory and only intended to verify that avocados are actually low risk. Organisms included in the screen are: Escherichia coli, Escherichia coli 0157:H7, Listeria monocytogenes, Salmonella sp

3.0 PRODUCT DESCRIPTION, FOOD SAFETY & HAZARD IDENTIFICATION

3.1 Avocado Fruit Product Description

Description:	Avocado (Hass, Fuerte, Reed, Gwen, Gem, Zutano)
Relevant safety information:	• Grown above ground, outside. • Fruit is not picked off the ground. • Fruit has a waxy cuticle. • Fruit is washed at packing to remove surface contamination. • Predominantly eaten raw. • Eaten peeled and/or cut •
Packaging:	Various forms including • Loose in bins. • Bagged. • Crates • Loose in cartons. • Tray packs in cartons.
Durability & storage conditions:	• Storage conditions range from refrigerated storage to open dry areas. • Fruit is chilled and stored.
Method of distribution:	**Within New Zealand harvested product is transported bins on trucks or suitable trailers**. Export avocados are transported in refrigerated sea containers, bulk break reefer (under refrigerated conditions) or at ambient temperature in aircraft holds. Transport and storage is refrigerated for larger New Zealand markets
Expected uses:	Predominantly eaten raw. May be cooked. Is used to produce oil. May be used in the manufacture of cosmetics. May be processed for convenience food and food service.
Vulnerable groups of population:	All groups may consume avocados either raw and/or cooked. Commonly used as a baby food. Allergens
Potential for abuse:	Eating product past its optimal ripeness. Not refrigerated when cut, either in home, retail and/or food service sector.

3.2 Process flow for avocado fruit



3.3 Avocado fruit hazard identification and analysis

Process Step	Potential Hazard Source	Potential Hazard	Control Measure
1 – Ground Preparation and Cultivation	Compost / biosolids/organic mulch	Norwalk-like Viruses Hepatitis A *E. coli* O157:H7 *Salmonella* *Campylobacter* *Shigella* *Listeria* *Clostridium*	Manures, bio-solids and mulches are certified or sourced from reputable suppliers following appropriate composting standards to ensure proper treatment. Stockpiles are located and secured to prevent contamination of field (e.g. run-off and/or leaching).
	Agrichemical Application e.g. Synthesized Fertilisers, Herbicides, Pesticides	Chemical residues	Agrichemicals are not used outside condition of registration and rate of application as per manufacturer's instructions are followed (chemical label). All Agrichemicals applied by Growsafe® conpliant individuals.
2 – Planting	Contact with ill workers	Hepatitis A *E. coli* O157:H7 *Salmonella* *Campylobacter* *Shigella* *Listeria* *Clostridium*	Workers do not come to work when suffering from symptoms of a communicable disease (e.g. nausea, abdominal cramps, vomiting, diarrhea (MoH guidelines)). Workers have no contact with edible fruit at this point.
	Incorrect Agrichemical Application	Chemical residues	Agrichemicals are not used outside condition of registration and rate of application as per manufacturer's instructions are followed (chemical label). In addition withholding periods for agrichemicals are followed before planting. All Agrichemicals applied by Growsafe® compliant individuals.
	Contaminated water (faecal, chemical and or physical contaminants)	Norwalk-like Viruses Hepatitis A *E. coli* O157:H7 *Salmonella* *Campylobacter* *Shigella* *Giardia* *Listeria* *Cyclospora* *Yersinia* *Clostridium* Heavy Metals Chemical residues	An information pack is provided to Growers for them to carry out an annual documented Water Risk Assessment.
	Contaminated Soils	Norwalk-like Viruses Hepatitis A *E. coli* O157:H7 *Salmonella* *Campylobacter* *Shigella* *Listeria* *Clostridium* Heavy Metals Chemical Residues	Time between manure, bio-solids or other natural fertiliser is appropriate (there is at least 3 years between harvesting and planting). Soil is not applied to the fruit and fruit is not harvested from the ground **(Part 2 Section 6.1.1 and Part 4 Section 2.3)**

Process Step	Potential Hazard Source	Potential Hazard	Control Measure
3 – Growing	Contaminated water (faecal, chemical and or physical contaminants)	Norwalk-like Viruses Hepatitis A *E. coli* O157:H7 *Salmonella* *Campylobacter* *Shigella* *Giardia* *Listeria* *Cyclospora* *Yersinia* *Clostridium* Heavy Metals Chemical residues	An information pack is provided to Growers for them to carry out an annual documented Water Risk Assessment. Waxy fruit cuticle acts as barrier to water borne contaminants Herbicides applied to ground and not directed at trees or fruit.
	Incorrect Agrichemical Application e.g. Pesticides	Chemical residues	Agrichemicals are not used outside condition of registration and rate of application as per manufacturer's instructions are followed. NZ Avocado has requirements for applicators to be Growsafe® registered and to complete a spray diary recording all applications **(Part 2 Section 4.0 Electronic Spray Diary Requirements).** This is audited by the packhouse and the integrity of the whole process is supported by a random fruit sampling programme with independent residue analysis**.**
4 – Harvesting	Contact with pickers	Norwalk-like Viruses Hepatitis A *E. coli* O157:H7 *Salmonella* *Campylobacter* *Shigella* *Giardia* *Listeria* *Clostridium*	Pickers do not come to work when suffering from symptoms of a communicable disease (e.g. nausea, abdominal cramps, vomiting, and diarrhea) (MoH guidelines). Pickers maintain an appropriate degree of personal cleanliness including that cuts and wounds are covered and hands are washed and sanitised where applicable **(Part 2 Section 8.2, 8.3, 8.3 and Part 4 Section 2.0)** Amenities provided for pickers are kept in a good state of repair, clean and well-stocked in addition field equipment is maintained and clean. **(Part 2 Section 8.0 and Part 4 Section 2.0)** Packaging materials (i.e. bins, cartons and tray packs) are maintained and clean and inspected before use. Pickers conduct their work in such a manner that reduces the opportunity for potential contamination from physical objects such as sticking plasters, wood, metal, glass, etc. Adequate toilet and hand washing facilities are provided and used **(Refer Part 2 Section 9.0 and Part 4 Section 2.0).** Training records maintained verifying training of all workers.
	Physical objects (e.g. sticking plasters, wood, metal, glass, etc.	Foreign matter	
5 – Transport to Packing Area	Physical contamination (e.g. dust and soil) Mixed storage /transport	Foreign matter	Storage on orchard in clean areas off dirt. and free of contaminants. Transport vehicles are soundly constructed and clean and inspected before use **(Refer Part 2 Section 9.0 Part 4 Section 2.0).**

Process Step	Potential Hazard Source	Potential Hazard	Control Measure
6 – Storage	Dust, Dirt, Rodents, Bird Droppings	Foreign matter	Storage facilities are built in a manner to avoid access by pests and reduce the opportunity for physical contamination and are inspected before use **(Refer Part 5 Section 3.9)**. A Rodent Control Plan is in operation as each storage facility/packhouse.
7 – Post-harvest Treatment/washing	Incorrect Agrichemical Application e.g. Post-harvest dips	Chemical residues	Agrichemicals are not used outside condition of registration and rate of application as per manufacturer's instructions are followed **(Refer Part 2 Section 4.2; Part 3; Part 5 Section 4.5 and Section 5.0)**
	Contaminated water (faecal, chemical and or physical contaminants)	Norwalk-like Viruses Hepatitis A *E. coli* O157:H7 *Salmonella* *Campylobacter* *Shigella* *Giardia* *Listeria* *Cyclospora* *Yersinia* *Clostridium* Heavy Metals Chemical residues	Water Risk Assessment documented annually in each facility as per NZ Avocado Food Safety Guide. **(Refer Part 5 Section 3.11)**
8 - Grading/Packing	Contact with ill food-handlers	Norwalk-like Viruses Hepatitis A *E. coli* O157:H7 *Salmonella* *Campylobacter* *Shigella* *Giardia* *Listeria* *Clostridium*	As above for food-handlers (step 5), in addition product contact surfaces are maintained and clean and inspected before use, records of cleaning maintained. **(Refer Part 5 Section 3.6**). Training records maintained verifying hygiene training of all workers.
9 – Cool Storage	Physical contamination	Foreign matter	Storage facilities are built in a manner to avoid access by pests and reduce the opportunity for physical contamination and are inspected before use **(Refer Part 5, Section 3.9)**. A Rodent Control Plan is in operation as each storage facility/packhouse.
10– Repacking/ Re-grading	Contact with food-handlers	Refer Step 5	As above Step 9 **(Refer Part 5, Section 3.4 and 3.7 and 3.9).**
11 – Transport	Physical contamination	Various	Transport vehicles are soundly constructed and clean and inspected before use **(Refer Part 2 Section 9, Part 4 Section 2.1).**
12 –Storage and Distribution			

3.4 Critical control point monitoring and corrective action

For each Critical Control Point (CCP) critical limits, monitoring and corrective action need to be determined. Critical limits are the criteria that separate acceptability from unacceptability.

The critical limits are determined based on scientific data so that the potential hazard will be controlled by the CCP and meet the food safety outcomes.

The monitoring procedures are a planned sequence of observations or measurements of control parameters to assess whether a CCP is under control. This is supported by way of Record Keeping.

The corrective action requirements are actions to be taken when the results of the monitoring at the CCP indicate that the critical limits have been breached. These should be such that the process will be adjusted to maintain control and prevent non-compliance against the food safety objectives.

The following table describes critical limits, monitoring and corrective action for the identified CCP's:

CCP 1: Grower Registration

Critical Limits	
Parameters being checked	**Grower Registration**
Target level for each parameter	All Growers exporting fruit are registered with NZ Avocado before harvest commences
Monitoring Procedures	
Responsibility for monitoring	Packer
What is going to be done	Grower export registration is to be part of the Pre-harvest checklist
Monitoring method, sampling regime etc.	No clearance to pick until registration sighted and hard copy received
Monitoring frequency	Check prior to first clearance to pick for every Grower
How the observations are to be recorded	Maintenance in Packhouse Records
Corrective Action Procedures	
Responsibility for taking corrective action	Packer
How is control restored	Frequent Audits
Action taken to prevent the problem from happening again	Robust checking systems in place and identification of non-compliant Grower files
Escalating response is available if preventative action fails	De-registration of Packer
How the above actions are to be recorded	NZ Avocado records e.g. communication with Packer

CCP 2: Incorrect Agrichemical Application

Critical Limits	
Parameters being checked	**Application rates, chemical residues**
Target level for each parameter	Label recommendation for each chemical, market specific MRL for each chemical.
Monitoring Procedures	
Responsibility for monitoring	Packer
What is going to be done	Application according to NZ Avocado and GrowSafe® requirements **(refer NZ Avocado Quality Manual, Part 2 Section 4.0).**
Monitoring method, sampling regime etc.	▪ Measuring correct quantities of chemicals as per **Part 3, Section 3.0 of the Avocado Quality Manual** (within 25% of label rate). ▪ Verify GrowSafe® registration ▪ Independent residue test, random residue test selection by 3rd party auditor
Monitoring frequency	Check spray diary for every application. Independent residue test for 25% of Registered Growers or exporters requirements.
How the observations are to be recorded	Maintenance of spray diary **(refer Part 2 Section 4.6).** Log of residue finds.
Corrective Action Procedures	
Responsibility for taking corrective action	Packer
How is control restored	▪ Use the NZ Avocado electronic spray diary to assess earliest calculated pick date. ▪ For a registered chemical delay harvest until the relevant market withholding period is met or exceeded. ▪ For a non-registered chemical contact, NZ Avocado to develop a management strategy. This will involve having an independent residue analysis of the fruit carried out to confirm nil detectable residue of the chemical applied. ▪ Do not apply non registered chemicals.
How is control and disposition of non-conforming product managed	Product redirected to a market with which it conforms or discarded.
Action taken to prevent the problem from happening again	Advise the relevant authorities where GAP followed but violation occurred. Inform relevant authority if illegal off-label use detected.
Escalating response is available if preventative action fails	Re-training of relevant Grower/Spray Contractor. Revision of withholding periods by NZ Avocado (export) or relevant authority (New Zealand). De-registration of Grower if repeat problems or illegal use detected.
How the above actions are to be recorded	As a component of NZ Avocado spray diary.

CCP 3: Harvesting

Critical Limits	
Parameters being checked	**Withholding periods, use of registered pesticides**
Target level for each parameter	Market specific withholding periods for each chemical, Registered products for specific markets **(Part 3 NZ Avocado Quality Manual)**
Monitoring Procedures	
Responsibility for monitoring	Packer
What is going to be done	Grower harvests according to NZ Avocado requirements **(refer NZ Avocado Quality Manual Part 2 Section 6.0 & 9.0)** and export spray diary (**Part 2 Section 4.0**).
Monitoring method, sampling regime etc.	▪ Determination that product registered for intended market as per **Part 3 Section 1.0 and 2.0 of the Avocado Quality Manual**. ▪ Determination of the withholding period for the market being supplied **(as per Part 3 Section 4.0).** ▪ Determine validity of spray diary (10 days from submission)
Monitoring frequency	For every harvest per PPIN
How the observations are to be recorded	Maintenance of spray diary **(refer Part 2 Section 4.6).**
Corrective Action Procedures	
Responsibility for taking corrective action	Packer
How is control restored	▪ For a registered chemical delay harvest until the relevant market withholding period is met or exceeded. ▪ For a non-registered chemical contact NZ Avocado to develop a management strategy. This will involve having an independent residue analysis of the fruit carried out to confirm nil detectable residue of the chemical applied. ▪ Do not apply non registered chemicals.
How is control and disposition of non-conforming product managed	Product redirected to a market with which it conforms or discarded.
Action taken to prevent the problem from happening again	Refer to NZ Avocado Registered Chemical List for Avocados for the market being supplied. Operator to verify spray diary for grower concerned prior to harvest.
Escalating response is available if preventative action fails	Re-training of relevant Grower/Spray Contractor. De-registration of Grower if repeat problems.
How the above actions are to be recorded	As a component of NZ Avocado spray diary.

4.0 APPENDIX 1: Countries Excluded from Assurance

Countries Excluded from an Assurance of Compliance with Importing Country MRL Requirements

This Food Safety Programme does not provide any assurance of compliance with the importing countries MRL requirements for the following countries:

Indonesia

PART 10

NEW ZEALAND MARKET GUIDELINES

Table of Contents

1.0 GENERAL

New Zealand is a key market for all avocado growers. The value returned from sales of avocados in New Zealand impacts all growers and consequently the packers, harvesters, marketers and contractors who support and represent them.

Best practice guidelines included in sections 1-9 of NZ Avocado Quality Manual are intended for use as best practice in the New Zealand market. The purpose of this section of NZ Avocado Quality Manual is to consolidate existing industry best practice guidelines that are specific to the New Zealand market so that they can easily be referenced. These best practice guidelines cover, grade standards, maturity and New Zealand market weight bands.

The guidelines have been created by New Zealand market stakeholders including growers, packers, and marketer suppliers, to support the growth of value for avocados sold in the New Zealand market.

2.0 FOOD SAFETY

Please refer to Part 2 Grower and Part 9 Food Safety

New Zealand Market Food Safety

- Growers must register their business the New Zealand Food Act 2014, this is a requirement for those working with food products and supplying the New Zealand market. Growers will need to have a Food Control Plan and have this verified by an independent third party such as the Local District Council or and IVA (AsureQuality and SGS).
- Once verified a New Zealand market Grower can register compliance with the Food Act vis MPI or through an MPI approved food control plan template covered by **NZGAP, GLOBALGAP** and will be issued with a Registration Number.

3.0 NEW ZEALAND MARKET MATURITY

NZ Avocado working with the NZ Marketer Group, Avocado Packers Forum and NZ Avocado Quality Standards Consultative Group, has agreed a maturity standard for the New Zealand market. The NZ Avocado early start programme for the New Zealand market is established to ensure that the quality of early season fruit entering the New Zealand market is of an acceptable standard. This programme will only operate until such time as adequate volumes of fruit that meets the normal maturity requirements are available. It is not designed as a de facto lowering of the maturity standard, nor is it intended to encourage supply of early season product. The focus of the programme is to ensure that the demand for early season fruit is met by product that will generate market and consumer confidence. NZ Avocado, Avocado Packers Forum and the NZ Marketer Group will review the success of this approach each season.

NZ Avocado will cover the collection and testing cost of all New Zealand market maturity clearance samples that pass the New Zealand market clearance criteria for the period 1 May 1 through to 30 July annually. The cost of samples that fail will be recouped by NZ Avocado by way of invoice back to the Grower via the packhouse.

4.0 MINIMUM MATURITY REQUIREMENTS

4.1 Domestic Early Start

By default, the Domestic Early Start programme will operate on a regional basis until such time as the regional average based on the monitor orchards reaches 24% dry matter content. The criteria for the Domestic Early Start Programme are:

- The average dry matter content across the fruit sampled **meets or exceeds** 23%
- A minimum 20 fruit sample per maturity clearance area is required for local market clearance
- A maximum maturity clearance area applies and area and associated sample size is notated in **Section 7.2.**
- A minimum of 18 out of 20 of number of fruit sampled must **meet or exceed** 20.8% dry matter.
- Clearance must be collected and verified by an Independent Third Party.
- All fruit to be ethylene ripened using NZ Avocado Ethylene Ripening Protocol.
- All fruit must be test ripened to ensure confidence in product.
- A copy of the verified maturity test must accompany the consignment.

4.2 Blanket Dispensation for Maturity Testing

At such time as NZ Avocado grants an industry wide or regional dispensation for maturity testing for export fruit, the maturity testing requirement for the New Zealand market will also be lifted. **NO MATURITY TESTING AFTER THIS DATE IS REQUIRED.**

4.3 New Zealand Market Marginal Fail Criteria

In order to minimise the cost of failed maturity tests, marginal fail criteria have been implemented. For any test where fruit fail to meet the industry standards for maturity and either:

- Average dry matter **meets or exceeds** 22.8%DM (provided 18 out of the 20 fruit **meets or exceeds** 20.8%DM) OR
- 17 out of 20 **meets or exceeds** 20.8%DM (provided the average dry matter exceeds 23%DM)

A marginal failure will be issued with an automatic clearance date on the marginal failure result certificate sent out at the time of initial notification of the test result.

5.0 INDEPENDENT VERIFICATION

All maturity tests must be collected and verified by an independent third party.

- The independent third party must be someone who does not have a vested interest in the outcome of the maturity test.

- The sample for maturity testing must be collected by an independent third party using the procedure outlined in **Section 3.0.** This need not be the same person performing the maturity test.
- Testing of the sample for dry matter content must be done according to the protocol in **Section 8.0**. Again, the testing procedure must be performed by a person who does not have a vested interest in the outcome.
- Those responsible for collecting and testing of the maturity sample must be named and sign the maturity test form. Some local marketers have indicated that they may insist on sighting these forms.

6.0 RECORDS

The Packer must retain test records (i.e. Copies of Dry Matter Assessment Sheets) for inspection by local marketers. Proof of maturity may be asked for by appropriate marketing agencies, NZ Avocado or the Avocado Packers Forum to verify questions from the market.

7.0 MATURITY SAMPLE COLLECTION PROCEDURE

The sample should be representative in terms of tree age and fruit size of the blocks to be harvested. The maturity clearance will only apply to fruit of that particular maturity area included in the sample.

Moisture loss can significantly corrupt results of a dry matter test. It is essential fruit is tested promptly and not subjected to drying or hot conditions.

7.1 Maturity Clearance Area

Where there is considerable variation in tree age between blocks these should be sampled as separate maturity areas. The maturity clearance will only apply to fruit of that particular maturity area included in the sample.

A Maturity Clearance Area (MCA) is defined as an area that is to be cleared by a single maturity test. This area may consist of more than one block. Each MCA should be clearly identified by name and location. The MCA may be defined by tree age e.g. a separate fruit maturity sample for each age band. If, however, a defined maturity area is to include different age trees then the sample should include, proportionately, fruit from all tree ages.

Normally young trees 2 to 3 years of age at set will be up to six weeks ahead of mature trees with 4 to 5-year-old trees somewhere in between. It is important that this difference be incorporated into the sample selection to avoid bias.

A map should be available outlining the boundaries of the MCA's. These maps need to be provided to the person collecting the samples. These maps will also need to be used by the harvesting gangs so they know where to pick.

7.2 Minimum fruit sample per Maturity Clearance Area

The minimum fruit sample per maturity clearance area is equivalent to that for export avocados. Minimum fruit sample per maturity collection area size is shown in the table below.

- Maturity areas should be representative in terms of tree age and fruit size of the blocks to be harvested.
- Where there is considerable variation in tree age between blocks these should be defined as separate maturity areas.
- The maturity clearance will only apply to fruit in blocks defined under a particular maturity area.
  Minimum fruit sample per maturity clearance areas are as follows:

Orchard size (ha)	Minimum number of Maturity Clearance Areas (MCA)	Number of maturity clearance samples	Fruit sample number
0 – 5ha	1	1	20
5.1 – 10.0ha	2	2	20
Greater than 10.1ha	3	3	20

A Grower can divide the orchard into more maturity clearance areas – the above is the minimum requirement for an orchard.

7.3 Fruit Collection

1. Clearly label bags for collecting fruit (using permanent marker) with growers PPIN and/or name. Bags should also be labeled with the date time of sampling and the name of the sampler.

2. Select one fruit from 10 - 15 trees ensuring fruit is free of sunburn and/or wounds. Fruit that is ridged or has minor blemishes is acceptable.

2. Walking diagonally across the MCA collect fruit from the North-East side of the trees, using a compass.

3. Select fruit at random between 1.5m and 4m above the ground. Take no more than one fruit per tree. In the case of mature trees where the majority of fruit is above 4m fruit can be selected up to 6m.

4. If the Maturity Clearance Area has trees of mixed ages the sample must be taken in proportion to the age classes represented e.g. If the MCA is made contains 75% of 8-year-old trees and 25% of 3-year-old

trees the sample to be analysed must have 8 fruit from the 8-year-old trees and 2 fruit from the 3-year-old trees.

4. The size of the sampled fruit should be representative of those to be harvested. No individual fruit to weigh less than 162g.

5. Fruit must be snipped from the trees. Cut stalks short and square to prevent them puncturing plastic bags.

6. Fruit must be placed immediately into labelled plastic bags and sealed to ensure minimal water loss. Place damp paper towels in the plastic bag to maintain humidity ensuring there is no free water in the plastic bags.

7. If samples are not to be processed immediately place the sealed plastic bag with the samples into a chilly bin. Between picking and testing samples must be kept under conditions which will minimise water loss.

8. Samples must be processed within 12 hours of picking.

9. Sampling wet fruit
Although sampling dry fruit is ideal it will at times be necessary to sample wet fruit. When this situation arises any wet fruit collected should be dried immediately with a paper towel and then treated as per normal sampling procedure. The fact that the fruit were wet when sampled should be noted, and recorded with the sample results.

8.0 DRY MATTER TESTING METHOD

8.1 See Part 8: Export Maturity

9.0 NEW ZEALAND MARKET WEIGHT BANDS

Single layer tray	5.5kgs	47 litre crate 3.35 TEQ	Combined Count
		Nominal weight 18.5kgs	
10 count	504 gm +	40 count	11
12 count	425 – 503 gm		
14 count	368 – 424 gm	50 count	15
16 count	325 – 367 gm		
18 count	290 – 324 gm	65 count	19
20 count	257 – 289 gm		
23 count	229 – 256 gm	80 count	24
25 count	208 – 228 gm		
28 count	184 – 207 gm	100 count	30
32 count	162 – 183 gm		
36 count	142 – 161 gm	120 count	39
42 count	123 – 141 gm		
48 count	108 – 122 gm	140 count	51
54 count	96 – 107 gm		

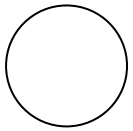
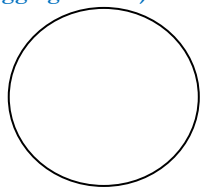
10.0 GRADE STANDARDS

Major Defects (with an AQL tolerance of 2%)

Defect Type	Class 1	Class 2	Class 3	Class 4	Description or Comment
Cuts & punctures	Nil	Nil	Nil	Nil	Unhealed crack, cut, puncture or insect or pest damage that penetrates into and/or exposes flesh.
Clipper cuts - penetrating flesh - not penetrating flesh	Nil Allowable	Nil Allowable	Nil Allowable	Nil Allowable	Unhealed surface cuts around the stem button that penetrate into the flesh. Peel may or may not be damaged. Small unhealed surface cuts around the stem button that do not penetrate into the flesh. Peel may or may not be removed.
Soft fruit (at packing)	Nil	Nil	Nil	Nil	Fruit that is soft to the touch. Pre-ripened fruit is exempt.
Spray deposits - Copper spray - Other spray deposits	Surface "bloom" or small trace around stem pedicle or base of fruit Nil	Surface "bloom" or small trace around stem pedicle or base of fruit Nil	Surface "bloom" or small trace around stem pedicle or base of fruit Nil	Allowable	Fruit may be harvested with spray deposits providing these can be removed during the packing process.
Surface deposits	A small trace of dust around the stem pedicle is allowable	A small trace of dust around the stem pedicle is allowable	A small trace of dust around the stem pedicle is allowable	Allowable	Grease, bird droppings or other foreign matter. Fruit may be harvested with surface deposits providing these can be removed during the packing process.
Pollen	A small trace allowable	A small trace allowable	A small trace allowable	Allowable	Yellow surface deposit usually found at the basal end of the fruit. Fruit may be harvested with pollen deposits providing these can be removed during the packing process.
Anthracnose	Nil	Nil	Nil	Nil	Brown to blackish spots with no underlying green colour on fruit surface. Spots have defined edges (not jagged) and are slightly sunken. In cases of severe/advanced infection, pinky-white spores may be present on spots.
Ridging Height	No ridge will be more than 2mm high.	No ridge will be more than 2mm high	No ridge will be more than 2mm high	Allowable	Ridging is easily damaged in the handling process and contributes to rot development after packing. A protuberance ceases to be a protuberance and becomes a ridge when it exceeds 10mm in any one lateral plane.

Defect Type	Class 1	Class 2	Class 3	Class 4	Description or Comment
Protuberance	No protuberance will be more than 3mm high.	No protuberance will be more than 3mm high.	No protuberance will be more than 3mm high.	Allowable	A small, singular, pimple-like structure on the peel of the fruit. It does not include bumps that are the result of nutritional malformation. A protuberance ceases to be a protuberance and becomes a ridge when it exceeds 10mm in any one lateral plane.
Bruising	Less than 0.25cm² 	Less than 0.25cm² 	Less than 0.25cm² 	Allowable	A bruise is an area of damaged peel resulting from pressure. This includes flattened and compressed areas. Bruising is normally dark coloured but may not be if the damage is recent. Any bruise of less than 0.25cm² is allowed.
Colour - Matt black - Red - Yellow - Blue black - Reddish/Brown - Yellow/Green	Less than 0.25cm²  Allowable where colour has a green background and/or where lenticels are green. Allowable where colour has a green background.	Less than 0.25cm²  Allowable where colour has a green background and/or where lenticels are green. Allowable where colour has a green background.	Less than 0.5cm²  {<10% {<20% (in any one view) Allowable Allowable where colour has a green background.	Allowable Allowable Allowable Allowable Allowable	Yellow, red, black due to sun exposure – this may be general or very localized. Blue black due to maturity.
Sunburn Lesion	Nil	Nil	Nil	Allowable	Black/brown sunken lesion caused by sun exposure.
Stems missing	Nil	Nil	Nil	Nil	Stems totally missing. These allow for possible pathogen entry and may indicate windfall fruit.

Minor Defects (with an AQL tolerance of 4%)

Defect Type	Class 1	Class 2	Class 3	Class 4	Description or Comment
Scale	Allowed are: Up to 4 scale on any view of fruit. Scale around the button	Allowed are: Up to 4 scale on any view of fruit. Scale around the button	Allowed are: Up to 4 scale on any view of fruit. Scale around the button	Allowed are: Up to 4 scale on any view of fruit. Scale around the button	Colour of scale may vary from oatmeal to dark brown. Juvenile scales less than 1mm are not counted.
Blemish	2cm² (block or aggregate area)  Total blemish area may not exceed 2cm²	4cm² (block or aggregate area)  Total blemish area may not exceed 4cm²	< 50% of the surface area of the fruit in any one view	Allowable	Superficial healed surface scar less than 2mm deep. Colour may be light brown to black. Scarring may be slight to solid blocks of scarred peel resulting from fruit rub, wind damage or superficial insect feeding damage. Any blemish deeper than 2mm is out of grade, regardless of size
Lenticel damage	Less than 25% of fruit surface may be affected in any one longitudinal view of fruit.	Less than 50% of fruit surface may be affected in any one longitudinal view of fruit.	Less than 50% of fruit surface may be affected in any one longitudinal view of fruit.	Allowable	Fresh lenticel damage is excluded from the blemish allowance and is the physical damage of nodules to remove part of the outer layer of peel (but no exposure of flesh) and resulting in localized damage restricted to the nodule. Lenticel Damage includes any visible damage to the nodule, and is likely to fall under one of the following descriptions: • Superficial damage to the nodules which are sunken and have turned black and glossy. • The tops of nodules have been damaged, removed or cut. Generally visible as superficial, corky-coloured wound. .

Defect Type	Class 1	Class 2	Class 3	Class 4	Description or Comment
Peel handling damage	Less than 25% of fruit surface may be affected in any one longitudinal view of fruit.  Block area of 0.25cm² is permitted	Less than 50% of fruit surface may be affected in any one longitudinal view of fruit.  Block area of 0.25cm² is permitted	Less than 50% of fruit surface may be affected in any one longitudinal view of fruit.	Allowable	A dark grey diffuse area spreading beyond individual nodules. Any individual affected area of peel handling damage must not exceed 0.25 cm².
Misshapen	Slight malformation providing it does not detract from the appearance of the fruit.	Slight malformation providing it does not detract from the appearance of the fruit.	Moderately well formed	Allowable	Malformation of fruit not consistent with variety. Includes extreme neckiness, totally round fruit, autumn fruit set and double embryo formation.
Long stems	Nil	Nil	Nil	Allowed	Stems longer than 5mm.
Mixed sizing	No more than 10% of the fruit to be below the count size individual minimum weight.	No more than 10% of the fruit to be below the count size individual minimum weight.	No more than 10% of the fruit to be below the count size individual minimum weight.	Allowable	Fruit that does not correctly meet the count size requirements of the package that it is contained in.
Chimeral Fruit	Nil	Nil	Allowable	Allowable	Genetic abnormality. A straight line of green/yellow/brown colour change restricted to the peel and running down the fruit.
Variety	Nil	Nil	Nil	Allowable	Will be typical of the variety being packed. Only one variety is to be packed per tray/consignment and is to be correctly identified on the label.
Ridging and Netted Area	Less than 25% of fruit surface may be ridged on any one longitudinal view of fruit.	Less than 50% of fruit surface may be ridged on any one longitudinal view of fruit.	Allowable	Allowable	Surface ridging and netted malformation of fruit peel that detracts from fruit appearance. Scarring may be slight surface scattered netting. Colour may be light brown to black.

