Avocado

Strategic Agrichemical Review Process (SARP)

April 2024

Hort Innovation
Project – MT23001

Hort Innovation Project Number:
MT23001 – Strategic Agrichemical Review Process (SARP) - Updates

SARP Service Provider:
AGK Services

Purpose of the report:
This report was funded by Hort Innovation to investigate the pest problem, agrichemical usage and pest management alternatives for the avocado industry across Australia. The information in this report will assist the industry with its agrichemical selection and usage into the future.

Date of report:
April 2024

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1. Summary

The strategic levy investment project Strategic Agrichemical Review Process (SARP) - Updates (MT23001) is part of the Hort Innovation Avocado Fund. A Strategic Agrichemical Review Process (SARP), through the process of a desktop audit and industry liaison; Assesses the importance of the diseases, insects and weeds (plant pests) that can affect a horticultural industry;

(i) Assesses the importance of the diseases, insects and weeds (plant pests) that can affect a horticultural industry;
(ii) Evaluates the availability and effectiveness of fungicides, insecticides and herbicides (pesticides) to control the plant pests;
(iii) Determines any gaps in the pest control strategy and
(iv) Identifies suitable new or alternatives pesticides to address the gaps.

Alternative pesticides should ideally be selected for benefits of:

- Integrated Pest Management (IPM) compatibility
- Improved scope for resistance management
- Sound biological profile
- Residue and trade acceptance domestically and for export

The results of this process will provide the Avocado Industry with sound pesticide usage for the future that the industry can pursue for registration with the manufacturer, or minor-use permits with the Australian Pesticide and Veterinary Medicines Authority (APVMA).

1.1 Diseases

The high priority diseases are:

Disease	Priority
Phytophthora Root Rot (*Phytophthora cinnamomi*)	H
Anthracnose (*Colletotrichum gloeosporioides*)	H

1.2 Insects and other pests

The high priority insects and other pests are:

Insects and Other Pests of Avocados	Priority
Fruit Spotting Bug (*Amblypelta nitida*)	H
Banana Spotting Bug (*Amblypelta lutescens*)	H

1.3 Weeds

The high priority weeds are:

Weeds	Priority
Flaxleaf Fleabane (*Conyza bonariensis*)	H

1.4 Plant Growth Regulators

The high priority Plant Growth Regulator issues are:

PGR Issue	Priority
Control of vegetative growth	H

2. The Australian Avocado Industry

Avocado production occurs mainly in Queensland and Northern New South Wales during the winter, and Western Australia during the summer. The most common varieties of avocado in Australia are the Hass and Shepard.

Production for the year ending June 2023 was 115,385 tonnes. The value of production was worth $560.7m while the wholesale value of fresh supply was $618.8m.

Fresh Avocados Seasonality by State[1]

State	22/23 Tonnes	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Queensland	74,957												
Western Australia	20,782												
New South Wales	12,966												
Victoria	3,615												
South Australia	2,994												
Tasmania	70												
Availability Legend			High			Medium			Low			None	

Avocado production has been growing strongly in recent years, with increasing domestic consumption underpinning demand as well as a concerted industry push to increase export volumes. Australia has traditionally been a net importer of fresh avocados. The reliance on imports has lessened with only 2,224tonnes net import for the year ending June 2023.

Export volumes have grown strongly from 3,155 tonnes in 2020/21 up to 10,672 tonnes in 2022/2023. This represents 10% of Australia's total production for the year ending June 2023. Exports are focused into South East Asia, with 48% going to Hong Kong, 32% to Singapore and 16% to Malaysia.

[1] Hort Innovation (2024). Australian Horticulture Statistics Handbook 2022/23. [online] Available at: https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/australian-horticulture-statistics-handbook/

3. Introduction

3.1 Background

Growers of some horticultural crops suffer from a lack of legal access to crop protection products (pesticides). The problem may be that whilst a relatively small crop area is valuable in an agricultural sense, it may not be of sufficient size for Agrichemical companies to justify the expense of registering a product use on that crop. Alternately, the disease, pest, or weed problem may be regional or spasmodic, making Agrichemical companies unwilling to bear the initial high cost of registering suitable pesticides.

Growers may face severe losses from diseases, pests and weeds due to a lack of registered or approved (via a permit) chemical control tools.

Environmental concerns, consumer demands, and public opinion are also significant influences in the marketplace related to pest management practices. Industry IPM practitioners must strive to implement best management practices and tools to incorporate a pest management regime where strategies work in harmony with each other to achieve the desired effects while posing the least risks.

In combination with cultural practices, pesticides are important tools in avocado production and respective IPM programs. They control the various diseases, insects and weeds that affect the crop and can cause severe economic loss in modern high intensity growing operations. Pesticides are utilised during establishment and development, and to maximise quality and customer appeal.

As a consequence of the issues facing the avocado industry regarding pesticide access, Hort Innovation has undertaken the current project to update the Strategic Agrichemical Review Process (SARP) for avocados.

The SARP process identifies diseases, insect pests and weeds of major concern to the avocado industry. Against these threats, available registered or permitted pesticides are evaluated for overall suitability in terms of IPM, resistance, efficacy, trade, human safety and environmental issues. Where tools are unavailable or unsuitable the process aims to identify potential future solutions. Potential new risks to the industry are also identified.

The results will provide the avocado industry with a clear outlook of gaps in existing pest control options. This report is not a comprehensive assessment of ALL pests and control methods used in avocados but attempts to prioritise the major problems.

Exotic plant pests, not present in Australia, are not addressed in this document. Biosecurity plans have been developed for the avocado Industries in consultation with industry, government and scientists. The Biosecurity Plan outlines key threats to the industry, risk mitigation plans, identification and categorisation of exotic pests and contingency plans. High priority exotic pests have been assessed based on their potential to enter, establish, and spread in Australia (e.g. environmental factors, host range, vectors) and the cost to industry of control measures. More information is available at this link[2].

[2] https://www.planthealthaustralia.com.au/industries/

3.2 Minor use permits and registration

From a pesticide access perspective, the APVMA classifies avocados as a major crop. They fit within the APVMA Crop Group 006: Assorted tropical and sub-tropical fruits – inedible peel and Subgroup 006B: Assorted tropical and sub-tropical, inedible smooth peel – large. Access to minor use permits can be achieved as long as a reasonable justification is provided in accordance to the APVMA's minor use guidance[3]. Possible justification for future permit applications could be based on:

- New disease, insect or weed identified as a cropping issue
- No pesticide approved for the problem
- Insufficient options for resistance management
- Current pesticides ineffective due to resistance
- Trade risk - current pesticides unsuitable where crop commodities will be exported
- IPM, environment or OH&S issues
- Loss of pesticides due to removal from market or chemical review restrictions
- Opportunity to extrapolate a use pattern when a new, effective pesticide is registered in another crop
- Alternate pesticide has overseas registration or minor use permit
- Market failure – insufficient return on investment for registrant.

With each of these options, sound, scientific argument is required to justify any new permit applications. Another option for the avocado industry is for manufacturers to register new pesticides uses in the crop.

3.3 Methods

The current version of the Avocado Strategic Agrichemical Review Process (SARP) was conducted by desktop audit and included an online industry survey. The process included gathering, collating and confirming information. The steps in the process were:

Process of Review	Activity / Date
Industry survey	Preparation and circulation of online industry survey to update priority pests and identify priority control gaps. Survey released: 6 November 2023 Survey closed: 22 December 2023
SARP data updated via a desktop audit	Updated registrations and permits Updated MRL tables Updated available and potential pesticides against low, moderate and high priority pests, including an assessment of their suitability Included information on regulatory risks from MT20007
Captured industry input	Collated and analysed survey results Consolidated and incorporated industry needs and insights

[3] https://apvma.gov.au/node/10931

3.4 Results and discussions

3.4.1 Detail

Results and discussions are presented in the body of this document.

3.4.2 Appendices

Refer to additional information in the appendices:

Appendix 1. Products available for disease control in avocado
Appendix 2. Products available for control of insects and other pests in avocado
Appendix 3. Products available for weed control in avocado
Appendix 4. Plant Growth Regulators available in avocado
Appendix 5. Current permits for use in avocado
Appendix 6. Avocado Maximum Residue Limits (MRLs)
Appendix 7. Avocado regulatory risk assessment

4. Diseases, pests and weeds of Avocados

Resistance management: To manage the risk of resistance development, integrated disease/pest/weed management (IDM/IPM/IWM) strategies should be adopted. The general principle is to integrate diverse chemical and non-chemical strategies; maximise efficacy; not rely on singular tools and rotate between different modes of action. It is always essential to follow all the label instructions. Specific resistance management strategies may apply. These can be found, along with other useful information, on the CropLife Australia website[4].

Information on regulatory risk derived from project MT20007 (Chapter 4) - Regulatory support and coordination (Appendix 7) has been incorporated.
Some of the suggested options have no overseas MRLs (see Appendix 6). If treated fruit is to be exported nil residues at harvest would be needed for these options.
While care has been taken to ensure the accuracy of the information provided in this document the APVMA registered label and where relevant the APVMA approved permit must always be followed.

[4] https://www.croplife.org.au/resources/programs/resistance-management/

4.1 Diseases of Avocados

4.1.1 Disease priorities

Disease	Priority
Phytophthora Root Rot (*Phytophthora cinnamomi*)	H
Anthracnose (*Colletotrichum gloeosporioides*)	H
Stem End Rot (*Dothiorella dominicana*, *Phomopsis* spp., *Botryodiplodia theobromae* & *Lasiodiplodia theobromae*)	M
Verticillium Wilt (*Verticillium dahliae*)	L
Sunblotch (Avocado sunblotch viroid)	L
Sooty Blotch (various, including *Stomiopeltis citri Bitanc*)	L
Brown Root Rot (*Phellinus noxius*)	L
Soft Rot of Fruit (*Erwinia* spp.)	L
Black Root Rot (*Calonectria ilicicola*)	L
Cercospora Leaf Spot (*Pseudocercospora purpurea*)	L

Phytophthora Root Rot and Anthracnose were identified as high priority diseases in our industry consultation. Disease control is a major focus in avocado orchards and it is recommended that an Integrated Disease Management Strategy is implemented. This should include a range of cultural practices to support fungicides, and potentially reduce the reliance on fungicides for disease control.

Cultural controls include:

- Promoting good drainage and avoid waterlogging through irrigation to reduce the risk of root diseases.
- Canopy management (rejuvenation pruning) to promote airflow.
- Orchard hygiene – remove dead plant material that could contain disease inoculum.
- Avoid tree stress through good nutrition and water management.

In controlling fungal and bacterial diseases, the industry should be mindful of resistance management. There has been significant reliance on the use of strobilurin fungicides and it is important to be aware of the risk of fungicide resistance developing from over-reliance on one mode-of-action. In addition to cultural controls, it is important to include a range of fungicide groups in a foliar spray program, including the use of protectant fungicides. Fungicide programs should be planned at the start of the season to ensure that effective disease control is achieved in conjunction with appropriate product rotation.

CropLife Australia has a resistance management strategy[5] specifically related to the control of Anthracnose in avocados, and users must refer to it before using any product.

[5] https://www.croplife.org.au/resources/programs/resistance-management/avocado-and-mango-anthracnose-colletotrichum-spp/

4.1.2 Available and potential products for priority diseases

TABLE KEY: Note that blank fields in the table indicate no information has been provided.

Availability		Regulatory risk (refer to Appendix 6)	
A	Available via either registration or permit approval	R1	Short-term: Critical concern over retaining access
P	Potential - a possible candidate to pursue for registration or permit	R2	Medium-term: Maintaining access of significant concern
P-A	Potential, already approved in the crop for another use	R3	Long-term: Potential issues associated with use - Monitoring required

Withholding Period (WHP) – Number of days from last treatment to harvest (H) or Grazing (G)			
Harvest	H	Not Required when used as directed	NR
Grazing	G	No Grazing Permitted	NG

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Phytophthora Root Rot (*Phytophthora* spp.) **Priority: High**							
Phytophthora is rated as a high priority in QLD, NSW & WA. Phytophthora is a widespread soil-borne pathogen that thrives in poorly drained soil and warm temperatures. Severe infections can lead to severe necrosis of roots and subsequent yellowing and wilting of above ground plant parts. Trees can eventually die. Management includes site selection to ensure good drainage, improving soil organic matter, careful irrigation management and fungicide treatments.							
Fosetyl Aluminium (Aliette)	33	Protectant	1	A	QLD, NSW, SA, VIC & WA	Registered in avocados for control of **Phytophthora Root Rot**. Apply as a foliar spray during the spring flush and again at intervals of 6 weeks until autumn. Treatments per season not limited.	-
Metalaxyl-M (Ridomil Gold 25G) Syngenta	4	Protectant & Curative	7	A	QLD, NSW, SA & WA	Registered in avocados for control of **Phytophthora Root Rot**. Replanting Infested Sites / Potted Nursery Trees / Dry Soil Mix: Apply to the soil at planting and repeat 8-12 weeks later. Incorporate by cultivation or watering. Curative Treatment: Apply as a soil application at the start of summer wet season and repeat 8-12 weeks later, until trees have recovered. Protective Treatment: Apply as a soil application at the start of summer wet season and repeat 3-6 months later. Apply in alternate years only. Treatments per season not limited.	R3
Phosphorous Acid	33	Protectant & Curative	NR G:14	A	QLD, NSW, SA, VIC & WA	Registered in avocados for control of **Phytophthora Root Rot**. Trunk Injection: Inject trees at spring flush maturity and repeat in February or March. Foliar Spray: Curative – apply every 3 weeks until disease is under control. Preventative – apply every 5-6 weeks. Treatments per season not limited.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime Soil Ameliorant and Biofungicide) Bayer	BM01	Biological	NR	P-A	ALL	Available in tree crops for application to soil to improve bioavailability of soil resources to horticultural crops. Registered for suppression of soil-borne diseases such as Black Scurf in potatoes and Pineapple Disease in sugarcane and it is also registered as a biofungicide for control of Yellow Sigatoka in bananas as a foliar spray. Note: Bayer have a Serenade Prime users guide for Avocados on their website.	-
Mandipropamid (Revus) Syngenta	40	Curative / Protectant		P		Registered for control of Downy Mildew in grapes, lettuce, leafy vegetables and oilseed poppies. US registration for control of **Phytophthora** in various crops, including as a foliar application for protection of citrus from Phytophthora Root Rot.	-
Oxathiopiprolin (Zorvec Enicade) Corteva	49	Protectant & Curative		P		Registered for control of Downy Mildew in bulb vegetables, brassicas, cucurbits, leafy vegetables and poppies. Permitted for control of **Phytophthora Root Rot** in raspberries and blackberries. US registration for control of **Phytophthora** Canker and Brown Rot in citrus.	-
Anthracnose (*Colletotrichum gloeosporioides*) **Priority: High**							
Anthracnose is rated as a high priority in QLD, and as a moderate priority in NSW and WA. Anthracnose is particularly prevalent in wet seasons. A sustained protectant program, along with good canopy management is required to ensure that the disease does not affect yields and quality. Anthracnose can also cause secondary issues such as post-harvest diseases.							
Azoxystrobin (Amistar)	11	Protectant & Curative	7	A	ALL	Registered in avocados for control of **Anthracnose** and Stem End Rot. Apply one application during early fruit set. Follow with applications of an approved fungicide from a different chemical group. Apply 2 final applications of azoxystrobin at 14-28 day intervals with the final application applied 7 days prior to harvest. DO NOT use more than 3 applications per season. DO NOT use curatively and do not start disease control program with azoxystrobin.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Bacillus amyloliquefaciens Strain QST 713 (Serenade Opti) Bayer	BM01	Biological	NR	A	ALL	Registered in avocados for control of **Anthracnose** and suppression of Stem End Rot. Use preventatively before disease symptoms appear. Begin applications as soon as crop development has reached susceptible stages for anthracnose infections to occur. Rotate with other registered fungicides and repeat every 7-21 days, use the shorter interval when conditions are very favourable for infection. Treatments per season not limited.	-
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime) Bayer PER93515	BM01	Biological	NR	A	QLD	Permitted in avocado for control of **Anthracnose** (*Colletotrichum* spp.) and suppression of Stem End Rot. Apply preventatively before disease symptoms appear. Apply first treatment over flowering then fortnightly or monthly. Rotate applications with other registered fungicides every 7-21 days. Minimum retreatment interval 14 days. Maximum number of applications per season not specified.	-
Copper (Cu) present as Copper Ammonium Acetate	M1	Protectant	1	A	ALL	Registered in avocados for control of **Anthracnose**, Cercospora Spot, Sooty Blotch and Phytophthora Stem Canker. Spray every 4 weeks from the end of flowering to harvest. During extended wet weather, spray every 14 days. Treatments per season not limited.	-
Copper (Cu) present as copper oxychloride	M1	Protectant	1	A	ALL	Registered in avocados for control of **Anthracnose.** Spray every 4 weeks from the end of flowering to harvest. During extended wet weather, spray every 14 days. Treatments per season not limited.	-
Copper (Cu) present as cuprous oxide	M1	Protectant	1	A	ALL	Registered in avocados for control of **Anthracnose** and Phytophthora Stem Canker. Spray every 4 weeks from the end of flowering to harvest. During extended wet weather, spray every 14 days. Treatments per season not limited.	-
Copper (Cu) present as cupric hydroxide	M1	Protectant	1	A	ALL	Registered in avocados for control of **Anthracnose** and Phytophthora Stem Canker. Spray every 4 weeks from the end of flowering to harvest. During extended wet weather, spray every 14 days. Treatments per season not limited.	-
Copper (Cu) Present as Tribasic Copper Sulphate	M1	Protectant	1	A	ALL	Registered in avocados for control of **Anthracnose** and Phytophthora Stem Canker. Spray every 4 weeks from the end of flowering to harvest. During extended wet weather, spray every 14 days. Treatments per season not limited.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Difenoconazole, Cyprodinil & Fludioxonil (Score, Switch) PER94009	3+9+12	Protectant & Curative	NR NG	A	ALL	Permitted in avocado for control of **Anthracnose** (*Colletotrichum* spp.) Make the first application during early flowering and repeat using a 7-10 day retreatment interval if conditions remain favourable for disease. Do not apply more than 2 consecutive applications before applying at least the same number of sprays of another fungicide from an alternate mode of action group. Maximum of 4 applications per season.	R3
Fludioxonil + Azoxystrobin (Graduate A+) Syngenta	12+11	Protectant / Post-harvest treatment	NR	A	ALL	Registered in avocados as a post-harvest treatment for control of **Anthracnose** (*Colletotrichum* spp.) and Stem End Rot. Apply as a dip, drench or flood spray. Ensure fruit is immersed in dip or exposed to solution for a minimum of 30 seconds and up to 60 seconds. Do not apply to avocados if a Group 11 was the final pre-harvest spray.	R3
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative	3 NG	A	ALL	Registered in avocados for control of **Anthracnose** (*Colletotrichum* spp.) and Stem End Rot. Apply in a preventative fungicide program using a retreatment interval of 14-21 days. Maximum of 3 applications per season.	-
Prochloraz (Sportak)	3	Protectant	NR	A	QLD, NSW, WA & NT	Registered in avocado as a post-harvest treatment for control of **Anthracnose** and Stem End Rot. Spray fruit for 30 seconds. Use in a non-recirculating spray system only. Do not use on avocado cultivar Rincon.	R3
Thiram	M3	Protectant	7	A	ALL	Registered in avocados for control of **Anthracnose** and Stem End Rot. Apply foliar spray every 30 days from flowering to harvest. During extended wet periods reduce the interval to 14 days. Treatments per season not limited.	R2
Aureobasidium pullulans Strain DSM 14940 & DSM 14941 (Botector) Nufarm	-	Biological / Protectant	NR	P	ALL	Registered for control of Botrytis and other diseases in grapes, berries and fruiting vegetables, including the suppression of **Anthracnose Fruit Rot** in berries.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Registered for control of various diseases in various fruit and vegetable crops, tree nuts and pyrethrum. Pending registration in Tropical & Subtropical Fruit (Inedible Peel). US registration for control of **Anthracnose** in almonds, cucurbits and tree nuts.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Benzovindiflupyr + Propiconazole (Elatus) Syngenta	7+3	Protectant & Curative		P		Registered for control of various disease in wheat and barley. US registration for **Anthracnose** in sweet corn.	R3
BLAD (Problad Plus)	BM 01	Biological		P		Registered in stone fruit for suppression of Brown Rot. US registration for control of **Anthracnose** in grapes and strawberries.	-
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered in almonds, cherries and macadamia for control of various leaf diseases. Registered for control of **Anthracnose** in almonds. US registration for control of Leaf Spot, Powdery Mildew, **Anthracnose** and Grey Mould in strawberries. US registration for control of Grey Mould, Powdery Mildew and **Anthracnose** in strawberries.	-
Isofetamid (Kenja) ISK / AgNova	7	Protectant & Curative	NR	P	ALL	Registered in strawberries for control of Botrytis Grey Mould. US registration for control of Grey Mould, Powdery Mildew and **Anthracnose** in low-growing berries.	-
Mefentrifluconazole (Belanty) BASF	3	Protectant & Curative		P		Registered for control of Powdery Mildew in grapes, control of Black Spot and Powdery Mildew and suppression of Alternaria in apples, control of Blossom Blight and suppression of Leaf Rust, Shot Hole and Hull Rot in almonds, control of Husk Spot in macadamias, control of Powdery Mildew and Gummy Stem Blight in cucurbits, and control of Powdery Mildew and Target Spot in fruiting vegetables. US registration for control of **Anthracnose** in fruiting vegetables and tree nuts.	-
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Protectant / Curative	1 NG	P	ALL	Registered for control of various diseases in grapes, berries, leafy vegetables, lettuce and potato. US registration for control of **Anthracnose** in grape and small fruit vine climbing (except fuzzy kiwifruit), lemon & lime, low-growing berries, specific tree nuts, almonds and bushberries.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Stem End Rot (*Dothiorella dominicana*, *Phomopsis* spp., *Botryodiplodia theobromae* & *Lasiodiplodia theobromae*) **Priority: Moderate**							
Rated as a high priority in QLD, and as a low priority in NSW & WA. Stem End Rot symptoms only appear after harvest, but the infection occurs before harvest. A combination of in-crop management and post-harvest treatments is required to maintain fruit quality. Pre-harvest fungicides treatments to control bacterial black spot or anthracnose may reduce the incidence of stem-end rot in fruit. Prune trees to improve ventilation and spray penetration. Remove dead branches from trees. Avoid harvesting immature fruit. Use appropriate registered fungicides for post-harvest treatment to help to control the disease and cool fruit immediately after harvest and store in well-ventilated containers.							
Azoxystrobin (Amistar)	11	Protectant & Curative	7	A	ALL	Registered in avocados for control of Anthracnose and **Stem End Rot**. Apply one application during early fruit set. Follow with applications of an approved fungicide from a different chemical group. Apply 2 final applications of azoxystrobin at 14-28 day intervals with the final spray applied 7 days prior to harvest. DO NOT use more than 3 applications per season. DO NOT use curatively and do not start disease control program with azoxystrobin.	-
Bacillus amyloliquefaciens Strain QST 713 (Serenade Opti) Bayer	BM01	Biological	NR	A	ALL	Registered in avocados for control of Anthracnose and suppression of **Stem End Rot**. Use preventatively before disease symptoms appear. Begin applications as soon as crop development has reached susceptible stages for anthracnose infections to occur. Rotate with other registered fungicides and repeat every 7-21 days, use the shorter interval when conditions are very favourable for infection. Treatments per season not limited.	-
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime) Bayer PER93515	BM01	Biological	NR	A	QLD	Permitted in avocado for control of Anthracnose (*Colletotrichum* spp.) and suppression of **Stem End Rot**. Apply preventatively before disease symptoms appear. Apply first treatment over flowering then fortnightly or monthly. Rotate applications with other registered fungicides every 7-21 days. Minimum retreatment interval 14 days. Maximum number of applications per season not specified.	-
Bromo Chloro Methyl Hydantoin (BCDMH) Sanitiser		Sanitiser / Post-harvest treatment	NR	A	ALL	Registered as a post-harvest treatment for **external rot causing organisms**. Post-harvest spray or dip. Minimum contact time 60 seconds. Can also be used as a general disinfectant for equipment.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Chlorine	-	Sanitiser / Post-harvest treatment	NR	A	ALL	Registered as a post-harvest treatment for bacteria and **fungi**. Post-harvest spray. Must make contact with the fruit for at least 30 seconds. Can also be used as a general disinfectant for equipment.	-
Didecyl Dimethyl Ammonium Chloride	-	Sanitiser / Post-harvest treatment	NR	A	ALL	Registered in assorted tropical & subtropical fruit (inedible peel) as a sanitiser for post-harvest diseases.	-
Fludioxonil + Azoxystrobin (Graduate A+) Syngenta	12+11	Protectant / Post-harvest treatment	NR	A	ALL	Registered in avocados as a post-harvest treatment for Anthracnose and **Stem End Rot**. Apply as a dip, drench or flood spray. Ensure fruit is immersed in dip or exposed to solution for a minimum of 30 seconds and up to 60 seconds. DO NOT apply to avocados if a Group 11 fungicide was the final pre-harvest spray.	R3
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative	3 NG	A	ALL	Registered in avocados for control of Anthracnose (*Colletotrichum* spp.) and **Stem End Rot**. Apply in a preventative fungicide program using a retreatment interval of 14-21 days. Maximum of 3 applications per season.	-
Peroxyacetic Acid	-	Sanitiser / Post-harvest treatment	NR	A	ALL	Registered as a post-harvest treatment for bacteria. Post-harvest spray or dip. Ensure a minimum of 45 seconds contact time.	-
Prochloraz (Sportak)	3	Protectant / Post Harvest Treatment	NR	A	QLD, NSW, WA & NT	Registered in avocados as a post-harvest treatment for Anthracnose and **Stem End Rot**. Spray fruit for 30 seconds. Use in a non-recirculating spray system only. Do not use on avocado cultivar Rincon.	R3
Thiram	M3	Protectant	7	A	ALL	Registered in avocados for control of Anthracnose and **Stem End Rot**. Apply foliar spray every 30 days from flowering to harvest. During extended wet periods reduce the interval to 14 days. Treatments per season not limited.	R2
Fludioxonil (Scholar) Syngenta	12	Protectant / Post-Harvest Treatment		P		Registered as a post-harvest treatment on **Stem End Rot** in citrus.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Thiabendazole (Tecto) Syngenta	1	Protectant / Post-Harvest Treatment		P		Registered as a post-harvest treatment on **Stem End Rot** in citrus.	-
Verticillium Wilt (*Verticillium dahliae*) **Priority: Low**							
Rated as a moderate priority in QLD, and as a low priority in NSW & WA. Verticillium Wilt is a sporadic, soil borne disease which results in rapid wilting of young trees, or single branches in older trees, followed by desiccation of leaves. Young trees may die. There are no effective fungicide treatments available for managing the disease. Remove dead limbs from infected trees, or remove the whole tree, and remove completely from the orchard. Do not chip and use as mulch.							
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime) Bayer	BM01	Biological	NR	P-A	ALL	Available in tree crops for application to soil to improve bioavailability of soil resources to horticultural crops. Registered for suppression of soil-borne diseases such as Black Scurf in potatoes and Pineapple Disease in sugarcane.	-
Sunblotch (Avocado sunblotch viroid (ASBVd)) **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. Incidence of this disease is low. A test is available to assist in identifying symptomless planting materials.							
No control measures available.							
Sooty Blotch (various, including *Stomiopeltis citri Bitanc*) **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. Sooty Blotch affects the surface of the fruit and may result in marketability problems. Fungicide program for Anthracnose should keep the disease in check.							
Copper (Cu) present as Copper Ammonium Acetate	M1	Protectant	1	A	QLD, NSW, VIC, SA & WA	Registered in avocados for control of Anthracnose, Cercospora Spot, **Sooty Blotch** and Phytophthora Stem Canker. Spray every 4 weeks from the end of flowering to harvest. During extended wet weather, spray every 14 days. Treatments per season not limited.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Brown Root Rot *(Phellinus noxius)* **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. This is a serious soil-borne pathogen although infections are generally infrequent. Once the disease is present in an orchard the focus needs to be on preventing the spread between trees. It can spread via root-to-root contact, but spores are not thought to be air-borne.							
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime) Bayer	BM01	Biological	NR	P-A	ALL	Available in tree crops for application to soil to improve bioavailability of soil resources to horticultural crops. Registered for suppression of soil-borne diseases such as Black Scurf in potatoes and Pineapple Disease in sugarcane.	-
Soft Rot of Fruit (*Erwinia* spp.) **Priority: Low**							
Rated as a moderate priority in QLD, and as a low priority in NSW and WA. This is a bacterial disease that can enter through wounds in conditions of high humidity. It is relatively infrequent but can be difficult to control under conditions that are conducive to infection.							
Bacillus amyloliquefaciens Strain QST 713 (Serenade Opti) Bayer	BM01	Biological	NR	P-A	ALL	Registered in avocados for control of Anthracnose and suppression of Stem End Rot.	-
Black Root Rot (*Calonectria ilicicola*) **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. Incidence of this disease is low. There is no treatment available for infected trees apart from removing and mulching dead limbs.							
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime) Bayer	BM01	Biological	NR	P-A	ALL	Available in tree crops for application to soil to improve bioavailability of soil resources to horticultural crops. Registered for suppression of soil-borne diseases such as Black Scurf in potatoes and Pineapple Disease in sugarcane.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Cercospora Leaf Spot (*Pseudocercospora purpurea*) **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. Fungal disease that is rarely seen in orchards. Infected trees develop dark brown lesions on the leaves and fruit.							
Copper (Cu) Present as Copper Ammonium Acetate	M1	Protectant	1	A	ALL	Registered in avocados for control of Anthracnose, **Cercospora Spot**, Sooty Blotch and Phytophthora Stem Canker. Spray every 4 weeks from the end of flowering to harvest. During extended wet weather, spray every 14 days. Start use preferably during low infestation and preferably as a last spray in a spray program. Treatments per season not limited.	-

4.2 Insect and other pests of Avocados

4.2.1 Insect and other pest priorities

Insects and Other Pests	Priority
Fruit Spotting Bug (*Amblypelta nitida*)	H
Banana Spotting Bug (*Amblypelta lutescens*)	H
Queensland Fruit Fly (*Bactrocera tryoni*)	M
Red-Shouldered Leaf Beetle (*Monolepta australis*)	M
Ectropis Looper (*Ectropis sabulosa*)	M
Tea Red Spider Mite (*Oligonychus coffeae*)	M
Leafhoppers / Jassids (Cicadellidae)	M
Citrus Blossom Bug (*Austropeplus* spp.)	L
Two Spotted Mite (*Tetranychus urticae*)	L
Avocado Leafroller (*Homona spargotis*)	L
Greenhouse Thrips (*Heliothrips haemorrhoidalis*)	L
Six-Spotted Mite (*Eotetranychus sexmaculatus*)	L
Mediterranean Fruit Fly (*Ceratitis capitata*)	L
Ivy Leafroller (*Cryptoptila immersana*)	L
Latania Scale (*Hemiberlesia lataniae*)	L
Red-Banded Thrips (*Selenothrips rubrocinctus*)	L
Flower-Eating Caterpillar (including Homoeosoma vagella and *Xanthodes congenita*)	L
Swarming Leaf Beetle (*Rhyparida* spp.)	L
Rutherglen Bug (*Nysius vinitor*)	L

Avocados are impacted by a wide variety of insect and other pests, with Fruit Spotting Bug and Banana Spotting Bug the high priority pests on a national basis. These are closely related pests that cause significant crop damage by piercing the fruit and sucking the juice from the tissue.

It is important to take an Integrated Pest Management (IPM) Approach to pest control in avocados. The diversity of insects that will attack these crops mean that a planned, strategic approach is required. A range of control measures should be used, including cultural controls, biological controls and insecticides. Beneficial insects such as predators, parasitoids and pollinators should be encouraged and can be introduced artificially if required. Insecticide choice should be made with regard to preserving the beneficial insects that play an important role in the crop.

Bees also play an important role as pollinators of avocados. Extra care should be taken with insect control measures used at flowering time, to avoid impacting on pollinators. Always refer to the pesticide label for guidance about preserving bees.

The diverse range of insect and mite pests in avocados necessitates careful planning with resistance management. Growers should refer to resistance management strategies available on the CropLife website[6].

[6] www.croplife.org.au/resources/programs/resistance-management/

4.2.2 Available and potential products for priority insects and other pests

TABLE KEY: Note that blank fields in the table indicate no information has been provided.

Availability		Regulatory risk (refer to Appendix 6)	
A	Available via either registration or permit approval	R1	Short-term: Critical concern over retaining access
P	Potential - a possible candidate to pursue for registration or permit	R2	Medium-term: Maintaining access of significant concern
P-A	Potential, already approved in the crop for another use	R3	Long-term: Potential issues associated with use - Monitoring required
Withholding Period (WHP) – Number of days from last treatment to harvest (H) or Grazing (G)			
Harvest	H	Not Required when used as directed	NR
Grazing	G	No Grazing Permitted	NG
IPM – indicative overall impact on beneficials (based on the Cotton Pest Management Guide 2019-20 and cotton use patterns)			
VL – Very low; L – Low; M – Moderate; H – High; VH – Very High; - not specified			

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Fruit Spotting Bug *(Amblypelta nitida)* **Banana Spotting Bug** *(Amblypelta lutescens)* **Priority: High**								
Fruit Spotting Bug is rated as a high priority in QLD & NSW, and as a low priority in WA, and Banana Spotting Bug is rated as a moderate priority in QLD, as a high priority in NSW, and as a low priority in WA. Both species are found in all QLD and NSW avocado growing areas. These are serious pests which sting the fruit at all stages from fruit set until picking. Damage caused affects the marketability of fruit. An insecticide program is required to protect the developing fruit. It may be possible to identify and treat hot-spots in the orchard.								
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Ingestion / IGR	28	A	ALL	Registered in avocados for control of **Banana Spotting Bug, Fruit Spotting Bug**, Oleander Scale, Pink Wax Scale, Queensland Fruit Fly and Mediterranean Fruit Fly. Apply up to 2 applications per season as part of a monitoring and spray program for the management of fruit spotting bugs. Apply post-flowering when monitoring indicates pest is becoming active in the crop. If additional insecticide treatments are required, apply an alternative mode of action product after a minimum 14 day spray interval and prior to applying a second Trivor application.	M Bee:H	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Beta-Cyfluthrin (Bulldock)	3A	Contact	7	A	ALL	Registered in avocados for control of **Fruit Spotting Bug**. Spray when numbers exceed threshold. Apply a maximum of 4 sprays with a minimum of 21 days between consecutive applications.	VH Bee:H	-
Beta-Cyfluthrin + Piperonyl Butoxide	3A	Contact	7	A	ALL	Registered in avocados for control of **Fruit Spotting Bug**. Spray when numbers exceed threshold. Retreatment interval and maximum number of applications not specified.	VH Bee:H	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion	1 NG	A	ALL	Registered in avocados for control of **Banana Spotting Bug** (*Amblypelta lutescens*), **Fruit Spotting Bug** (*Amblypelta nitida*), Green Planthopper and Mango Planthopper. Apply as a foliar spray when pest threshold is reached. Minimum retreatment interval of 14 days. Maximum of 2 applications per season, with no more than 1 application during flowering.	L Bee:L	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	7	A	ALL	Registered in avocados for control of **Banana Spotting Bug** and **Fruit Spotting Bug.** Apply as part of a season long spray programme targeting pests when active in the crop. DO NOT use more than 4 applications per season. DO NOT reapply before 21 days after each application.	M Bee:VH	-
Tetraniliprole (Vayego) Bayer PER93099	28	Ingestion	7 NG	A	ALL (excl. VIC)	Permitted in avocados for control of **Fruit Spotting Bug** (*Amblypelta* spp.), Garden Weevil (*Phlyctinus callosus*) and Lepidopteran pests including Loopers & Leaf Rollers (Geometridae, Tortricidae). Apply as a foliar spray when pest threshold is reached. Do not apply before or during flowering. Minimum retreatment interval of 14 days. Maximum of 2 applications per season.	L-M Bee:VH	-
Trichlorfon (Lepidex)	1B	Contact	2	A	QLD, NSW & NT	Registered in avocados for control of **Fruit Spotting Bug** and Monolepta Beetle. Apply when pests are first seen. Number of applications not limited, use spray intervals of 7-10 days.	H Bee:H	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Diamond Back Moth, Cabbage White Butterfly and suppression of Heliothis in brassica vegetables and brassica leafy vegetables, suppression of Onion Thrips and Plague Thrips in bulb vegetables, control of Two Spotted Mite and Cucumber Moth and suppression of Broad Mite, Bean Red Spider Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in cucurbits, and control of Two Spotted Mite and Broad Mite and suppression of Tomato Russet Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in fruiting vegetables. No current registrations for control of Hemiptera but there is international research that indicates some activity on bug species.	H Bee:VH	-
Queensland Fruit Fly *(Bactrocera tryoni)* **Mediterranean Fruit Fly** *(Ceratitis capitata)* **Priority: Moderate**								
Queensland Fruit Fly is rated as a moderate priority in QLD, and as a low priority in NSW & WA, and Mediterranean Fruit Fly is rated as a low priority in QLD & NSW, and as a high priority in WA. Fruit Flies frequent avocado crops, but they cause limited economic damage in crop. Mediterranean Fruit Fly is of greater concern to WA growers as they need to pick fruit green to comply with interstate quarantine requirements. Post-harvest treatments for Fruit Fly are required as a biosecurity measure for interstate and overseas exports.								
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Ingestion / IGR	28	A	ALL	Registered in avocados for control of Banana Spotting Bug, Fruit Spotting Bug, Oleander Scale, Pink Wax Scale, **Queensland Fruit Fly** and **Mediterranean Fruit Fly**. Apply when monitoring indicates fruit fly activity. Apply in rotation with insecticides from a different mode of action using a 7 day spray interval. DO NOT use more than 2 applications per season.	M Bee:H	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Chlorpyrifos (Lorsban)	1B	Contact	7	A	QLD & NSW	Registered in avocados for control of Avocado Leafroller, Ivy Leafroller, Latania Scale, Hairy Caterpillars, Light Brown Apple Moth, Red Shouldered Leaf Beetle and **Queensland Fruit Fly**. Apply weekly as a strip or a patch low on the tree. Avoid contact with fruit. Treatments per season not limited. NOTE: The APVMA has published its proposed decision for reconsideration of label uses for chlorpyrifos. They are still receiving submissions but at this stage they are not supporting the continued use of chlorpyrifos in avocados.	H Bee:H	R1
Dimethoate	1B	Contact	7	A	QLD & WA	Registered in avocados for control of **Queensland Fruit Fly**. Apply when pests first appear and repeat as necessary. Treatments per season not limited.	H Bee:H	R1
Dimethoate PER13859	1B	Contact	NR	A	ALL	Permitted in non-bearing fruit fly host crops for control of **Fruit Fly**. Apply as a foliar and/or ground cover spray to both fallen and retained fruit after final harvest. Do not use more than 2 applications per season.	H Bee:H	R1
Spinosad (Naturalure) Corteva	5	Bait / Ingestion	NR	A	ALL	Registered in tree crops for control of Fruit Flies including **Queensland Fruit Fly** and Mediterranean Fruit Fly. Apply as either a band or a spot spray to the lower canopy of fruiting plants. Begin applications as soon as monitoring traps indicate flies are present and fruit is at a susceptible stage. Repeat applications every 7 days, re-applying sooner if rain washes off the deposit. Avoid spraying the fruit as phytotoxicity may occur.	L Bee:H	-
Trichlorfon (Lepidex) (PER12450)	1B	Contact	2	A	ACT, NSW, NT, QLD, SA & WA	Permitted in avocados for control of **Queensland Fruit Fly** and **Mediterranean Fruit Fly**. Apply as a cover spray. Repeat at half concentration every 7-10 days. Apply a maximum of 4 applications per season.	H Bee:H	R2
Abamectin	6	Contact & Ingestion	14 NG	P-A	ALL	Registered in avocados for control of Tea Red Spider Mite and Six Spotted Mite. Registered for control of **Queensland Fruit Fly** in citrus, blueberries, blackberries and raspberries.	M Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spinetoram (Success Neo) Corteva	5	Ingestion	NR	P-A	ALL	Registered in avocados for control of Avocado Leafroller, Ivy Leafroller, Light Brown Apple Moth, Loopers, Flower Eating Caterpillars, Leafrollers & Loopers, Yellow Peach Moth, Red-Banded Thrips and Sorghum Head Caterpillar. Permitted for suppression of **Queensland Fruit Fly** and **Mediterranean Fruit Fly** in berries, pome fruit and stone fruit.	M Bee:VH	-
Tetraniliprole (Vayego) Bayer PER93099	28	Ingestion	7 NG	P-A	ALL (excl. VIC)	Permitted in avocados for control of Fruit Spotting Bug (*Amblypelta* spp.), Garden Weevil (*Phlyctinus callosus*) and Lepidopteran pests including Loopers & Leaf Rollers (Geometridae, Tortricidae). Registered for control of **Mediterranean Fruit Fly** in stone fruit.	L-M Bee:VH	-
Red Shouldered Leaf Beetle *(Monolepta australis)* **Priority: Moderate**								
Rated as a low priority in QLD & WA, and as a high priority in NSW. Monolepta is present in all growing regions but is only a major problem in some seasons. Feeding damage can occur with leaves and flowers, which affects fruit set and fruit development. The pest tends to swarm in big numbers which can rapidly lead to significant crop damage.								
Carbaryl (Bugmaster)	1A	Contact	3	A	ALL	Registered in avocados for control of **Red Shouldered Leaf Beetle** and Wingless Grasshoppers. Apply when infestation is first observed and repeat as swarms re-infest. Treatments per season not limited.	H Bee:H	R2
Chlorpyrifos (Lorsban)	1B	Contact	7	A	QLD & NSW	Registered in avocados for control of Avocado Leafroller, Ivy Leafroller, Latania Scale, Hairy Caterpillars, Light Brown Apple Moth, **Red Shouldered Leaf Beetle** and Queensland Fruit Fly. Apply when populations indicate treatment is required. Spot spray affected trees only. Repeat as necessary. Treatments per season not limited. NOTE: The APVMA has published its proposed decision for reconsideration of label uses for chlorpyrifos. They are still receiving submissions but at this stage they are not supporting the continued use of chlorpyrifos in avocados.	H Bee:H	R1
Trichlorfon (Lepidex)	1B	Contact	2	A	QLD, NSW & NT	Registered in avocados for control of Fruit Spotting Bug and **Monolepta Beetle**. Apply when pests are first seen. Number of applications not limited, use spray intervals of 7-10 days.	H Bee:H	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Tetraniliprole (Vayego) Bayer PER93099	28	Ingestion	7 NG	P-A	ALL (excl. VIC)	Permitted in avocados for control of Fruit Spotting Bug (*Amblypelta* spp.), Garden Weevil (*Phlyctinus callosus*) and Lepidopteran pests including Loopers & Leaf Rollers (Geometridae, Tortricidae). Registered for control of Carpophilus Beetle in almonds, Macadamia Seed Weevil in macadamia, Weevils, Codling Moth and Light Brown Apple Moth in pome fruit and Dried Fruit Beetle, Oriental Fruit Moth, Mediterranean Fruit Fly and Weevils in stone fruit.	L-M Bee:VH	-
Indoxacarb (Avatar) FMC	22A	Contact & Ingestion		P		Registered (Steward EC) for control of **Monolepta Beetle** in adzuki beans, mungbeans and soybeans.	L-M Bee:H	R3
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Diamond Back Moth, Cabbage White Butterfly and suppression of Heliothis in brassica vegetables and brassica leafy vegetables, suppression of Onion Thrips and Plague Thrips in bulb vegetables, control of Two Spotted Mite and Cucumber Moth and suppression of Broad Mite, Bean Red Spider Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in cucurbits, and control of Two Spotted Mite and Broad Mite and suppression of Tomato Russet Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in fruiting vegetables. No current registrations for control of Coleoptera but there is international research that indicates activity on beetle species.	H Bee:VH	-
Ectropis Looper *(Ectropis sabulosa)* **Priority: Moderate**								
Rated as a moderate priority in QLD & NSW, and as a low priority in WA. Loopers are voracious leaf feeders in their larval stage. Trees can sustain a reasonable level of leaf damage but the pest will require control if feeding occurs on the fruit.								
Chlorantraniliprole (Altacor) FMC (PER81560)	28	Ingestion	3	A	NSW, Qld & WA	Permitted in avocados for control of Lepidopteran Pests, including **Ectropis Looper** and Avocado Leaf Roller. Apply at first sign of insect pest infestation. For looper control, apply post-harvest and post-pruning before flush and flowering occurs. Apply a maximum of 3 applications per season, with a 21 – 28 day interval between consecutive foliar treatments.	L Bee:VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Methomyl (Lannate) (PER14597)	1A	Contact	3	A	NSW & QLD	Permitted in avocados for control of **Ectropis Looper**. Use as a cover spray as required. Treatments per season not limited.	H Bee:H	R2
Spinetoram (Success Neo) Corteva	5	Ingestion	NR	A	ALL	Registered in avocados for control of Avocado Leafroller, Ivy Leafroller, Light Brown Apple Moth, **Loopers**, Flower Eating Caterpillars, Leafrollers & Loopers, Yellow Peach Moth, Red-Banded Thrips and Sorghum Head Caterpillar. Target applications against mature eggs and newly hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur. Maximum of 4 applications per season.	M Bee:VH	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	NR	A	ALL	Registered in avocado for control of Avocado Leafroller, Ivy Leafroller, Light Brown Apple Moth and **Loopers**. Target applications against mature eggs and newly hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur. Maximum of 4 applications per season.	L Bee:L	-
Tetraniliprole (Vayego) Bayer PER93099	28	Ingestion	7 NG	A	ALL (excl. VIC)	Permitted in avocados for control of Fruit Spotting Bug (*Amblypelta* spp.), Garden Weevil (*Phlyctinus callosus*) and Lepidopteran pests including **Loopers** & Leaf Rollers (Geometridae, Tortricidae). Apply as a foliar spray when pest threshold is reached. Do not apply before or during flowering. Minimum retreatment interval of 14 days. Maximum of 2 applications per season.	L-M Bee:VH	-
Methoxyfenozide (Prodigy) Corteva	18	Ingestion	14	A	ALL	Registered in avocados for control of Avocado Leafroller. Registered for control of **Loopers** in apples and pears (and other pome fruit).	VL Bee:VL	-
Tebufenozide (Mimic) Corteva	18	Ingestion / IGR	14	P-A	ALL	Registered in avocados for control of Avocado Leafroller. Registered for control of Pear Looper in pears.	L Bee:L	-
Bacillus thuringiensis (DiPel)	11	Ingestion		P		Registered for control of various Lepidoptera including **Loopers** in various crops.	VL Bee:VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Diafenthiuron + Cyantraniliprole (Minecto Forte) Syngenta	12A+28	Ingestion & Contact		P		Registered for control of various pests including Lepidoptera in cucurbits and fruiting vegetables.	M Bee:VH	-
Emamectin (Proclaim) Syngenta	6	Ingestion		P		Registered for control of **Loopers** in brassica vegetables, root & tuber vegetables (except potato), leafy vegetables & brassica leafy vegetables (except lettuce), strawberries and legume vegetables.	M Bee:H	-
Indoxacarb + Novaluron (Plemax) Adama	22A+15	Ingestion		P		Registered for control of various pests including Lepidoptera in turf. Registration pending for control of various Lepidoptera in avocados.	M Bee:H	R3
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Diamond Back Moth, Cabbage White Butterfly and suppression of Heliothis in brassica vegetables and brassica leafy vegetables, suppression of Onion Thrips and Plague Thrips in bulb vegetables, control of Two Spotted Mite and Cucumber Moth and suppression of Broad Mite, Bean Red Spider Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in cucurbits, and control of Two Spotted Mite and Broad Mite and suppression of Tomato Russet Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in fruiting vegetables.	H Bee:VH	-
Tea Red Spider Mite *(Oligonychus coffeae)* **Priority: Moderate**								
Rated as a moderate priority in QLD, and as a low priority in NSW & WA. Feeding damage to leaves can reduce general tree health and in severe cases can lead to significant leaf drop. Incidence is sporadic as the pest prefers warm temperatures and extended periods of dry weather.								
Abamectin	6	Contact & Ingestion	14 NG	A	ALL	Registered in avocados for control of **Tea Red Spider Mite** and Six Spotted Mite. Apply as a foliar spray at the first signs of infection and before severe infestation. For good control apply in early spring. Do not apply more than 2 applications per crop. Applications should be applied 14-28 days apart.	M Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Abamectin PER14618	6	Contact & Ingestion	14 NG	A	ALL (excl. VIC)	Permitted in avocados for control of **Tea Red Spider Mite** and Six Spotted Mite. Apply maximum 2 applications per crop. Applications should be applied 14 - 28 days apart. Apply with summer oil. Apply at the first signs of infection and before severe infestation. For good control apply in early spring. Use now registered by APVMA permit to label project.	M Bee:H	-
Bifenazate (Acramite) PER89167	20D	Contact & Ingestion	7 G:28	A	ALL (excl. VIC)	Permitted in avocado for control of **Tea Red Spider Mite** (*Oligonychus coffeae*) and Six-Spotted Mite (*Eotetranychus sexmaculatus*). Apply as a foliar spray as soon as mites appear, ideally at nymph stage. Maximum of 1 application per season.	L Bee:H	-
Fenbutatin Oxide (Torque)	12A	Contact	14	A	QLD, NSW, & WA	Registered in avocados for control of **Tea Red Spider Mite** and Six Spotted Mite. Apply at first sign of mite activity and repeat as infestations indicate. Spot spray individual trees only. Two applications 14 days apart is normally adequate to control these pests.	L Bee:L	R2
Potassium Salts of Fatty Acid (Natrasoap)		Contact	NR	A	ALL	Registered in fruit trees for control of Aphids, Thrips, Mealybug, Two-Spotted Mite, **Spider Mite** and Whitefly. Apply as a cover spray. Treatments per season not limited.	L Bee:L	-
Etoxazole (Paramite) Sumitomo	10B	Contact / IGR	14 NG	P-A	WA	Permitted in avocados for control of Six-Spotted Mite.	L Bee:VL	-
Acequinocyl (Kanemite) UPL	20B	Contact & Ingestion		P		Registered for control of Two-Spotted Mite in pome fruit and stone fruit.	L Bee:L	-
Beauveria bassiana (Velifer) BASF	UN			P		Registered for suppression of Onion Thrips and Western Flower Thrips in protected vegetables and ornamentals and has activity on Thrips, Aphids, Whitefly and Mites.	L Bee:L	-
Cyflumetofen (Danisaraba) BASF	25A	Contact		P		Registered for control of various mites in pome fruit, almonds, citrus, grapes, strawberry, fruiting vegetables and ornamentals.	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Diafenthiuron + Cyantraniliprole (Minecto Forte) Syngenta	12A+28	Ingestion & Contact		P		Registered for control of various pests including Two Spotted Mite in cucurbits and fruiting vegetables.	M Bee:VH	-
Hexythiazox (Calibre) Nufarm	10A	Contact / IGR		P		Registered for control of various mites in pome fruit, stone fruit, strawberries and ornamentals.	L Bee:L	-
Spiromesifen (Oberon) Bayer	23	Ingestion		P		Registration pending for control of Mites in various crops. Hort Innovation is undertaking data generation projects across multiple commodities for a new label registration in Australia. US registration for control mites in various crops.	M Bee:VL	-
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Diamond Back Moth, Cabbage White Butterfly and suppression of Heliothis in brassica vegetables and brassica leafy vegetables, suppression of Onion Thrips and Plague Thrips in bulb vegetables, control of Two Spotted Mite and Cucumber Moth and suppression of Broad Mite, Bean Red Spider Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in cucurbits, and control of Two Spotted Mite and Broad Mite and suppression of Tomato Russet Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in fruiting vegetables.	H Bee:VH	-
Leafhoppers / Jassids (Cicadellidae) **Priority: Moderate**								
Rated as a moderate priority in QLD, and as a low priority in NSW & WA. Occur frequently in avocados but are incidentally controlled with insecticides used for other pests. Sucking pest causes direct feeding damage to leaves and can mark the developing fruit.								
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Ingestion / IGR	28	P-A	ALL	Registered in avocados for control of Banana Spotting Bug, Fruit Spotting Bug, Oleander Scale, Pink Wax Scale, Queensland Fruit Fly and Mediterranean Fruit Fly. Permitted for control of **Leafhoppers** in lychee, papaya, passionfruit, blackberries & raspberries.	M Bee:H	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Dimethoate	1B	Contact	7 NR	P-A	QLD & WA	Registered in avocados for control of Queensland Fruit Fly. Registered for control of **Leafhoppers / Jassids** in tomatoes, zucchini, capsicum, asparagus, melons, onions, rhubarb, beans, peas, beetroot, eggplant, potatoes, sweet potatoes, turnip, ornamentals and berries	H Bee:H	R1
Petroleum Oil		Contact	1	P-A	QLD, NSW, ACT & WA	Registered in avocados for control of Scale Insects. Will provide suppression of **Leafhoppers** if applied early to developing populations.	L Bee:L	-
Buprofezin (Applaud) Corteva	16	Ingestion / IGR		P		Registered for control of **Leafhoppers** in citrus.	M Bee:L	-
Flonicamid (Mainman) UPL	29	Ingestion		P		Registered for control of Aphids and Mealybug in apples, pears and nursery stock, Aphids and Silverleaf Whitefly in cucurbits, Aphids in potatoes, Whitefly in tomatoes and Aphids, Whiteflies and Green Mirids in strawberries. Permitted for control of **Jassids** / **Leafhoppers** in blackberries & raspberries.	M Bee:VL	-
Avocado Leafroller (*Homona spargotis*) **Ivy Leafroller** (*Cryptoptila immersana*) **Flower-Eating Caterpillar** (including *Homoeosoma vagella* & *Xanthodes congenita*) **Priority: Moderate**								
Avocado Leafroller is rated a moderate priority in QLD & NSW, and as a low priority in WA, Ivy Leafroller and Flower-Eating Caterpillar are rated as a low priority in QLD, NSW & WA. Avocado Leafroller is an occasional pest in Far North QLD, and although it can be found in other parts of QLD it causes relatively little damage in the more southern regions. The larvae roll and web leaves together and can also web the leaves to the developing fruit. Direct feeding damage to the fruit can allow infection by Anthracnose or it may cause fruit to drop. Ivy Leafroller is an infrequent pest in most growing regions. Flower-Eating Caterpillar is an infrequent pest that is controlled incidentally with insecticides targeting loopers and Avocado Leafroller.								
Chlorantraniliprole (Altacor) FMC (PER81560)	28	Ingestion	3	A	NSW, QLD & WA	Permitted in avocados for control of Lepidopteran Pests, including Ectropis Looper and **Avocado Leaf Roller**. Apply at first sign of insect pest infestation. Apply a maximum of 3 applications per season, with a 21 – 28 day interval between consecutive foliar treatments.	L Bee:VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Chlorpyrifos (Lorsban)	1B	Contact	7	A	QLD & NSW	Registered in avocados for control of **Avocado Leafroller**, Ivy Leafroller, Latania Scale, Hairy Caterpillars, Light Brown Apple Moth, Red Shouldered Leaf Beetle and Queensland Fruit Fly. Apply at first sign of pest activity before larvae move to fruit. Treatments per season not limited. NOTE: The APVMA has published its proposed decision for reconsideration of label uses for chlorpyrifos. They are still receiving submissions but at this stage they are not supporting the continued use of chlorpyrifos in avocados.	H Bee:H	R1
Methoxyfenozide (Prodigy) Corteva	18	Ingestion	14	A	ALL	Registered in avocados for control of **Avocado Leafroller**. Commence monitoring from pre-bloom and apply at first sign of pest incidence and target eggs and newly hatched larvae. Additional applications may be required if reinfestation occurs. Treatments per season not limited.	VL Bee:VL	-
Spinetoram (Success Neo) Corteva	5	Ingestion	NR	A	ALL	Registered in avocados for control of **Avocado Leafroller**, Ivy Leafroller, Light Brown Apple Moth, Loopers, Flower Eating Caterpillars, Leafrollers & Loopers, Yellow Peach Moth, Red-Banded Thrips and Sorghum Head Caterpillar. Target applications against mature eggs and newly-hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur. Maximum of 4 applications per season.	M Bee:VH	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	NR	A	ALL	Registered in avocado for control of **Avocado Leafroller**, Ivy Leafroller, Light Brown Apple Moth and Loopers. Target applications against mature eggs and newly hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur. Maximum of 4 applications per season.	L Bee:L	-
Tebufenozide (Mimic)	18	Ingestion / IGR	14	A	ALL	Registered in avocados for control of **Avocado Leafroller.** Commence monitoring from pre-bloom and apply at first sign of pest incidence. Additional applications may be required if reinfestation occurs. Treatments per season not limited.	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Tetraniliprole (Vayego) Bayer PER93099	28	Ingestion	7 NG	A	ALL (excl. VIC)	Permitted in avocados for control of Fruit Spotting Bug (*Amblypelta* spp.), Garden Weevil (*Phlyctinus callosus*) and Lepidopteran pests including Loopers & **Leaf Rollers** (Geometridae, Tortricidae). Apply as a foliar spray when pest threshold is reached. Do not apply before or during flowering. Minimum retreatment interval of 14 days. Maximum of 2 applications per season.	L-M Bee:VH	-
Bacillus thuringiensis (DiPel)	11	Ingestion		P		Registered for control of various Lepidoptera in various crops.	VL Bee:VL	-
Diafenthiuron + Cyantraniliprole (Minecto Forte) Syngenta	12A+28	Ingestion & Contact		P		Registered for control of various pests including Mites in cucurbits and fruiting vegetables.	M Bee:VH	-
Emamectin (Proclaim) Syngenta	6	Ingestion		P		Registered for control of Lepidoptera in various fruit and vegetable crops.	M Bee:H	-
Indoxacarb + Novaluron (Plemax) Adama	22A+15	Ingestion		P		Registered for control of various pests including Lepidoptera in turf. Registration pending for control of various Lepidoptera in avocados.	M Bee:H	R3
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Diamond Back Moth, Cabbage White Butterfly and suppression of Heliothis in brassica vegetables and brassica leafy vegetables, suppression of Onion Thrips and Plague Thrips in bulb vegetables, control of Two Spotted Mite and Cucumber Moth and suppression of Broad Mite, Bean Red Spider Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in cucurbits, and control of Two Spotted Mite and Broad Mite and suppression of Tomato Russet Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in fruiting vegetables.	H Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Citrus Blossom Bug (*Austropeplus* spp.) **Rutherglen Bug** (*Nysius vinitor*) **Priority: Low**								
Citrus Blossom Bug is rated as a low priority in QLD & WA, and as a moderate priority in NSW. Rutherglen Bug is rated as a low priority in QLD, NSW & WA. The impact of Citrus Blossom Bug is not well understood in avocados. Current research is investigating whether it affects flowering and fruit set. Rutherglen Bug is a seasonal pest that can develop into large infestations. It can reduce fruit set and cause direct feeding damage to developing fruit.								
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Ingestion / IGR	28	P-A	ALL	Registered in avocados for control of Fruit Spotting Bugs, Oleander Scale, Pink Wax Scale, Mediterranean Fruit Fly and Queensland Fruit Fly.	M Bee:H	R2
Beta-Cyfluthrin (Bulldock)	3A	Contact	7	P-A	ALL	Registered in avocados for control of Fruit Spotting Bug.	VH Bee:H	-
Beta-Cyfluthrin + Piperonyl Butoxide	3A	Contact	7	P-A	ALL	Registered in avocados for control of Fruit Spotting Bug.	VH Bee:H	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion	1 NG	P-A	ALL	Registered in avocados for control of Banana Spotting Bug (*Amblypelta lutescens*), Fruit Spotting Bug (*Amblypelta nitida*), Green Planthopper and Mango Planthopper.	L Bee:L	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	7	P-A	ALL	Registered in avocados for control of Banana Spotting Bug and Fruit Spotting Bug.	M Bee:VH	-
Tetraniliprole (Vayego) Bayer PER93099	28	Ingestion	7 NG	P-A	ALL (excl. VIC)	Permitted in avocados for control of Fruit Spotting Bug (*Amblypelta* spp.), Garden Weevil (*Phlyctinus callosus*) and Lepidopteran pests including Loopers & Leaf Rollers (Geometridae, Tortricidae).	L-M Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Diamond Back Moth, Cabbage White Butterfly and suppression of Heliothis in brassica vegetables and brassica leafy vegetables, suppression of Onion Thrips and Plague Thrips in bulb vegetables, control of Two Spotted Mite and Cucumber Moth and suppression of Broad Mite, Bean Red Spider Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in cucurbits, and control of Two Spotted Mite and Broad Mite and suppression of Tomato Russet Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in fruiting vegetables. No current registrations for control of Hemiptera but there is international research that indicates some activity on bug species.	H Bee:VH	-
Two Spotted Mite *(Tetranychus urticae)* **Priority: Low**								
Rated as a low priority in QLD & WA, and as a moderate priority in NSW. Widespread pest with a broad host range, although damage is generally minor and infrequent in avocados. Biological and cultural controls play an effective part in managing mite populations. Preservation of beneficial populations through avoiding the use of disruptive insecticides should keep mite populations in check such that they do not require specific control measures.								
Potassium Salts of Fatty Acid (Natrasoap)		Contact	NR	A	ALL	Registered in fruit trees for control of Aphids, Thrips, Mealybug, **Two-Spotted Mite**, Spider Mite and Whitefly. Apply as a cover spray. Treatments per season not limited.	L Bee:L	-
Abamectin	6	Contact & Ingestion	14 NG	P-A	ALL	Registered in avocados for control of Tea Red Spider Mite and Six Spotted Mite.	M Bee:H	-
Bifenazate (Acramite) PER89167	20D	Contact & Ingestion	7 G:28	P-A	ALL (excl. VIC)	Permitted in avocado for control of Tea Red Spider Mite (*Oligonychus coffeae*) and Six-Spotted Mite (*Eotetranychus sexmaculatus*).	L Bee:H	-
Etoxazole (Paramite) PER85167	10B	Contact / IGR	14 NG	P-A	WA	Permitted in avocados for control of Six-Spotted Mite. Registered for control of **Two Spotted Mite** in various crops.	L Bee:VL	-
Fenbutatin Oxide (Torque)	12A	Contact	14	P-A	QLD, NSW, & WA	Registered in avocados for control of Tea Red Spider Mite and Six Spotted Mite.	L Bee:L	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Acequinocyl (Kanemite) UPL	20B	Contact & Ingestion		P		Registered for control of **Two-Spotted Mite** in pome fruit and stone fruit.	L Bee:L	-
Beauveria bassiana (Velifer) BASF	UN			P		Registered for suppression of Onion Thrips and Western Flower Thrips in protected vegetables and ornamentals and has activity on Thrips, Aphids, Whitefly and Mites.	L Bee:L	-
Cyflumetofen (Danisaraba) BASF	25A	Contact		P		Registered for control of various mites in pome fruit, almonds, citrus, grapes, strawberry, fruiting vegetables and ornamentals.	L Bee:L	-
Diafenthiuron + Cyantraniliprole (Minecto Forte) Syngenta	12A+28	Ingestion & Contact		P		Registered for control of various pests including **Two Spotted Mite** in cucurbits and fruiting vegetables.	M Bee:VH	-
Hexythiazox (Calibre) Nufarm	10A	Contact / IGR		P		Registered for control of various mites in pome fruit, stone fruit, strawberries and ornamentals.	L Bee:L	-
Spiromesifen (Oberon) Bayer	23	Ingestion		P		Registration pending for control of Mites in various crops. Hort Innovation is undertaking data generation projects across multiple commodities for a new label registration in Australia. US registration for control mites in various crops.	M Bee:VL	-
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Diamond Back Moth, Cabbage White Butterfly and suppression of Heliothis in brassica vegetables and brassica leafy vegetables, suppression of Onion Thrips and Plague Thrips in bulb vegetables, control of **Two Spotted Mite** and Cucumber Moth and suppression of Broad Mite, Bean Red Spider Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in cucurbits, and control of **Two Spotted Mite** and Broad Mite and suppression of Tomato Russet Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in fruiting vegetables.	H Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Six-Spotted Mite *(Eotetranychus sexmaculatus)* **Priority: Low**								
Rated as a low priority in QLD & NSW, and as a moderate priority in WA. Six-Spotted Mite can defoliate avocado trees in the lower south-west of Western Australia. Avocados are particularly susceptible to the mite and low numbers can defoliate trees, exposing fruit to sunburn. The use of miticides has been required to prevent defoliation by Six-Spotted Mite. The use of predatory mite releases has proven unsuccessful in controlling Six-Spotted Mite.								
Abamectin	6	Contact & Ingestion	14 NG	A	ALL	Registered in avocados for control of Tea Red Spider Mite and **Six Spotted Mite**. Apply as a foliar spray at the first signs of infection and before severe infestation. For good control apply in early spring. Do not apply more than 2 applications per crop. Applications should be applied 14-28 days apart.	M Bee:H	-
Abamectin PER14618	6	Contact & Ingestion	14 NG	A	ALL (excl. VIC)	Permitted in avocados for control of Tea Red Spider Mite and **Six Spotted Mite**. Apply maximum 2 applications per crop. Applications should be applied 14 - 28 days apart. Apply with summer oil. Apply at the first signs of infection and before severe infestation. For good control apply in early spring. Use now registered by APVMA permit to label project.	M Bee:H	-
Etoxazole (Paramite) PER85167	10B	Contact / IGR	14 NG	A	WA	Permitted in avocados for control of **Six Spotted Mite**. Apply as foliar cover spray when mites first appear to prevent defoliation. DO NOT apply more than 1 application per season.	L Bee:VL	-
Fenbutatin Oxide (Torque)	12A	Contact	14	A	QLD, NSW & WA	Registered in avocados for control of Tea Red Spider Mite and **Six Spotted Mite**. Apply at first sign of mite activity and repeat as infestations indicate. Spot spray individual trees only. Two applications 14 days apart is normally adequate to control these pests.	L Bee:L	R2
Potassium Salts of Fatty Acid (Natrasoap)		Contact	NR	A	ALL	Registered in fruit trees for control of Aphids, Thrips, Mealybug, Two-Spotted Mite, **Spider Mite** and Whitefly. Apply as a cover spray. Treatments per season not limited.	L Bee:L	-
Bifenazate (Acramite) PER89167	20D	Contact & Ingestion	7 G:28	P-A	ALL (excl. VIC)	Permitted in avocado for control of Tea Red Spider Mite (*Oligonychus coffeae*) and Six-Spotted Mite (*Eotetranychus sexmaculatus*).	L Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Acequinocyl (Kanemite) UPL	20B	Contact & Ingestion		P		Registered for control of Two-Spotted Mite in pome fruit and stone fruit.	L Bee:L	-
Beauveria bassiana (Velifer) BASF	UN			P		Registered for suppression of Onion Thrips and Western Flower Thrips in protected vegetables and ornamentals and has activity on Thrips, Aphids, Whitefly and Mites.	L Bee:L	-
Cyflumetofen (Danisaraba) BASF	25A	Contact		P		Registered for control of various mites in pome fruit, almonds, citrus, grapes, strawberry, fruiting vegetables and ornamentals.	L Bee:L	-
Diafenthiuron + Cyantraniliprole (Minecto Forte) Syngenta	12A+28	Ingestion & Contact		P		Registered for control of various pests including Two Spotted Mite in cucurbits and fruiting vegetables.	M Bee:VH	-
Hexythiazox (Calibre) Nufarm	10A	Contact / IGR		P		Registered for control of various mites in pome fruit, stone fruit, strawberries and ornamentals.	L Bee:L	-
Spiromesifen (Oberon) Bayer	23	Ingestion		P		Registration pending for control of Mites in various crops. Hort Innovation is undertaking data generation projects across multiple commodities for a new label registration in Australia. US registration for control mites in various crops.	M Bee:VL	-
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Diamond Back Moth, Cabbage White Butterfly and suppression of Heliothis in brassica vegetables and brassica leafy vegetables, suppression of Onion Thrips and Plague Thrips in bulb vegetables, control of Two Spotted Mite and Cucumber Moth and suppression of Broad Mite, Bean Red Spider Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in cucurbits, and control of Two Spotted Mite and Broad Mite and suppression of Tomato Russet Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in fruiting vegetables.	H Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Greenhouse Thrips (*Heliothrips haemorrhoidalis*) **Red-Banded Thrips** (*Selenothrips rubrocinctus*) **Priority: Low**								
Rated as a low priority in QLD, NSW & WA. Thrips are a sporadic pest that can cause direct feeding damage to fruit as it matures.								
Potassium Salts of Fatty Acid (Natrasoap)		Contact	NR	A	ALL	Registered in fruit trees for control of Aphids, **Thrips**, Mealybug, Two-Spotted Mite, Spider Mite and Whitefly. Apply as a cover spray. Treatments per season not limited.	L Bee:L	-
Pyrethrins (Pyganic)	3A	Contact	NR	A	ALL	Registered in avocados for control of **Greenhouse Thrips**. Control may be expected to last 24-72 hours only. Treat when pest first observed on fruit. Repeat applications may be necessary. Treatments per season not limited.	VH Bee:H	-
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Ingestion / IGR	28	P-A	ALL	Registered in avocados for control of Fruit Spotting Bugs, Oleander Scale, Pink Wax Scale, Mediterranean Fruit Fly and Queensland Fruit Fly. Registered for control of Kellys Citrus Thrips in citrus.	M Bee:H	R2
Spinetoram (Success Neo) Corteva	5	Ingestion	NR	P-A	ALL	Registered in avocados for control of Avocado Leafroller, Ivy Leafroller, Light Brown Apple Moth and Loopers. Registered for control of thrips in various crops.	M Bee:VH	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	NR	P-A	ALL	Registered in avocado for control of Avocado Leafroller, Ivy Leafroller, Light Brown Apple Moth and Loopers. Registered for control of thrips in various crops.	L Bee:L	-
Beauveria bassiana (Velifer) BASF	UN			P		Registered for suppression of Onion Thrips and Western Flower Thrips in protected vegetables and ornamentals.	L Bee:L	-
Diafenthiuron + Cyantraniliprole (Minecto Forte) Syngenta	12A+28	Ingestion & Contact		P		Registered for control of various pests including suppression of Western Flower Thrips, Tomato Thrips and Plague Thrips in cucurbits and fruiting vegetables.	M Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Diamond Back Moth, Cabbage White Butterfly and suppression of Heliothis in brassica vegetables and brassica leafy vegetables, suppression of Onion Thrips and Plague Thrips in bulb vegetables, control of Two Spotted Mite and Cucumber Moth and suppression of Broad Mite, Bean Red Spider Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in cucurbits, and control of Two Spotted Mite and Broad Mite and suppression of Tomato Russet Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in fruiting vegetables.	H Bee:VH	-
Latania Scale *(Hemiberlesia lataniae)* **Priority: Low**								
Rated as a low priority in QLD, NSW & WA. Infrequent pest but large outbreaks have the potential to causes substantial damage to foliage and fruit. Preservation of beneficial populations through avoiding the use of disruptive insecticides should keep Scale in check such that it does not require specific control measures.								
Chlorpyrifos (Lorsban)	1B	Contact	7	A	QLD & NSW	Registered in avocados for control of Avocado Leafroller, Ivy Leafroller, **Latania Scale**, Hairy Caterpillars, Light Brown Apple Moth, Red Shouldered Leaf Beetle and Queensland Fruit Fly. Apply when populations indicate treatment is required. Spot spray affected trees only. Repeat as necessary. Treatments per season not limited. NOTE: The APVMA has published its proposed decision for reconsideration of label uses for chlorpyrifos. They are still receiving submissions but at this stage they are not supporting the continued use of chlorpyrifos in avocados.	H Bee:H	R1
Petroleum Oil		Contact	1	A	QLD, NSW, ACT & WA	Registered in avocados for control of **Scale Insects**. Apply when heavy scale populations occur on stem, foliage or fruit. Do not apply if trees need watering. Application is most effective against young crawler stages. Treatments per season not limited.	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Ingestion / IGR	28	P-A	ALL	Registered in avocados for control of Fruit Spotting Bugs, Oleander Scale, Pink Wax Scale, Mediterranean Fruit Fly and Queensland Fruit Fly. Registered for control of scale insects in citrus, grapes, macadamia and mango.	M Bee:H	R2
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion	1 NG	P-A	ALL	Registered in avocados for control of Banana Spotting Bug (*Amblypelta lutescens*), Fruit Spotting Bug (*Amblypelta nitida*), Green Planthopper and Mango Planthopper. Registered for control of Black Scale in olives.	L Bee:L	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	7	P-A	ALL	Registered in avocados for control of Fruit Spotting Bugs. Registered for control of various scale insects in citrus.	M Bee:VH	-
Buprofezin (Applaud) Corteva	16	IGR / Ingestion		P		Registered for control of Scale Insects in citrus, custard apples, grapes, mangoes, passionfruit and persimmons.	M Bee:L	-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered for control of Scale Insects in blueberries, citrus, grapes, mangoes, passionfruit, pome fruit and stone fruit.	M Bee:L	-
Swarming Leaf Beetle (*Rhyparida* spp.) **Priority: Low**								
Rated as a low priority in QLD, NSW & WA. Swarming Leaf Beetles are commonly observed in tropical areas although they tend not to cause extensive damage to avocados. Swarms of the pest can damage the terminals during growth flushes.								
Tetraniliprole (Vayego) Bayer PER93099	28	Ingestion	7 NG	P-A	ALL (excl. VIC)	Permitted in avocados for control of Fruit Spotting Bug (*Amblypelta* spp.), Garden Weevil (*Phlyctinus callosus*) and Lepidopteran pests including Loopers & Leaf Rollers (Geometridae, Tortricidae). Registered for control of Carpophilus Beetle in almonds, Macadamia Seed Weevil in macadamia, Weevils, Codling Moth and Light Brown Apple Moth in pome fruit and Dried Fruit Beetle, Oriental Fruit Moth, Mediterranean Fruit Fly and Weevils in stone fruit.	L-M Bee:VH	-
Indoxacarb (Avatar) FMC	22A	Contact & Ingestion		P		Registered in pome and stone fruit for control of Curculio Beetle and control of various weevils in asparagus, celery, grapes, pome and stone fruit and strawberries.	L-M Bee:H	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Diamond Back Moth, Cabbage White Butterfly and suppression of Heliothis in brassica vegetables and brassica leafy vegetables, suppression of Onion Thrips and Plague Thrips in bulb vegetables, control of Two Spotted Mite and Cucumber Moth and suppression of Broad Mite, Bean Red Spider Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in cucurbits, and control of Two Spotted Mite and Broad Mite and suppression of Tomato Russet Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in fruiting vegetables. No current registrations for control of Coleoptera but there is international research that indicates activity on beetle species.	H Bee:VH	-

4.3 Weeds of Avocados

4.3.1 Weed priorities

Weeds	Priority
Flaxleaf Fleabane (*Conyza bonariensis*)	H
Nutgrass (*Cyperus rotundus*)	M
Bellvine (*Ipomoea plebeia*)	M
Moth Vine / Wild Choko Vine (*Araujia sericifera*)	L
Blackberry Nightshade (*Solanum nigrum*)	L
Feathertop Rhodes Grass (*Chloris virgata*)	L
Crowsfoot Grass (*Dactyloctenium aegyptium*)	L
Johnson Grass (*Sorghum halepense*)	L
Marshmallow (*Malva parviflora*)	L
Couch Grass (*Cynodon dactylon*)	L
Barnyard Grass (*Echinochloa colona*)	L
Sowthistle (*Sonchus oleraceus*)	L
Fat Hen (*Chenopodium album*)	L
Liverseed Grass (*Eurochloa* spp.)	L
Pigweed (*Portulaca* spp.)	L
Green Amaranth (*Amaranthus viridis*)	L
Paspalum (Pa*spalum dilatatum*)	L

Weed priorities can vary substantially between regions, and weed management generally is guided more by cultural methods than by specific problem weed species. Avocados have numerous surface roots that are prone to damage from herbicide contact. An integrated weed management program incorporating mulch and inter-row grass cover should be used to reduce the need for herbicides in orchards. Our industry consultation identified Flaxleaf Fleabane as a high priority weed and Nutgrass as a moderate priority species. These are both invasive species which are difficult to kill and must be managed using a sustained management program incorporating multiple control measures.

The risk of herbicide resistance should also be considered in devising a weed management program. In the case of Sowthistle, there has been confirmed cases of herbicide resistance to Groups 2, 4 and 9, and Blackberry Nightshade has confirmed resistance to Group 22[7].

Specific resistance management strategies for high resistance risk (1 and 2) and moderate resistance risk (3, 4, 6, 9, 10, 12, 13, 14, 15, 18, 19, 22, 23, 27, 29, 30 and 31) herbicide modes of action are available on the CropLife Australia webpage.

[7] https://www.croplife.org.au/resources/programs/resistance-management/

4.3.2 Available and potential products for weed control

TABLE KEY: Note that blank fields in the table indicate no information has been provided.

Availability			
A	Available via either registration or permit approval		
P	Potential – a possible candidate to pursue for registration or permit		
P-A	Potential, already approved in the crop for another use		
Resistance risk		**Regulatory risk (refer to Appendix 6)**	
		R1	Short-term: Critical concern over retaining access
**	Moderate resistance risk	R2	Medium-term: Maintaining access of significant concern
***	High resistance risk	R3	Long-term: Potential issues associated with use - Monitoring required
Withholding Period (WHP) – Number of days from last treatment to harvest (H) or Grazing (G)			
Harvest	H	Not Required when used as directed	NR
Grazing	G	No Grazing Permitted	NG

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Flaxleaf Fleabane (*Conyza bonariensis*) **Priority: High**							
Rated as a high priority in QLD, as a moderate priority in NSW, and as a low priority in WA. Flaxleaf Fleabane is a widespread weed that is difficult to control with herbicides. It seeds prolifically and can germinate year-round. Weed control should be targeted at small, actively growing weeds and usually multiple applications will be required. A combination of residual and knockdown herbicides should form part of an integrated approach to managing Flaxleaf Fleabane.							
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds. Spread granules evenly over the soils of area to be treated.	NR NG	A	ALL	-
Flumioxazin (Chateau) Sumitomo	14**	Avocado / Directed Spray / Residual Weed Control	Registered in avocados for control of various grass and broadleaf weeds, including **Flaxleaf Fleabane**.	98 G:28	A	ALL	-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Glufosinate (Basta)	10**	Avocado / directed or shielded spray	Registered in avocados for control of various grass and broadleaf weeds, including **Flaxleaf Fleabane**. Do not allow spray to contact any part of the tree, including the trunk.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Avocados / Over 3 Years Old / Directed Spray, Shielded Spray or Wick Wiper	Registered in avocados for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerilla) Imtrade	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of **Flaxleaf Fleabane**. Apply as a directed spray and avoid contact with crop foliage.	NR G:1	A	ALL	R3
Paraquat + Diquat (SpraySeed)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:7	A	ALL	R3
Carfentrazone-Ethyl + Glufosinate (Hellcat) AgNova	14** + 10**	Avocado / Directed or Shielded Spray	Registered in avocado for control of grass and broadleaf weeds. Registered for control of **Flaxleaf Fleabane** in summer fallows.	NR G:56	P-A	ALL	R3
Saflufenacil (Sharpen) BASF	14**		Registered for control of grass and broadleaf weeds, including **Flaxleaf Fleabane,** in citrus, pome and almond orchards.		P		-
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds in Brassica vegetables, Brassica leafy vegetables, sweet potatoes, spring onions, shallots, spinach, silverbeet, rhubarb, culinary herbs and beans.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Nutgrass (*Cyperus rotundus*) **Priority: Moderate**							
Rated as a moderate priority in QLD & NSW, and as a low priority in WA. Prefers damp, water-logged soils but the nuts can survive for years underground during dry times. Herbicide options are limited and unreliable. Improve soil drainage if possible.							
Glyphosate (Roundup)	9**	Avocado / directed spray, shielded spray or wick wiper	Registered in avocados for control of various grass and broadleaf weeds and **Nutgrass**. Do not allow spray to contact any part of the tree, including the trunk. Time application to flowering nutgrass. Multiple applications will be required.	NR	A	ALL	R3
Dimethenamid-P (Outlook) BASF	15**		Registered for control of grass and broadleaf weeds in sweet corn, beans, peas, pumpkins and kabocha. Permitted in bulb onions for suppression of **Nutgrass** and other *Cyperus* species.		P		-
Norflurazon (Zoliar) AgNova	12**		Registered for control of **Nutgrass** in asparagus.		P		-
Bellvine (*Ipomoea plebeia*) **Priority: Moderate**							
Rated as a moderate priority in QLD, and as a low priority in NSW & WA. Bellvine is an invasive and fast growing weed that can be difficult to remove once it is established.							
Carfentrazone-Ethyl + Glufosinate (Hellcat) AgNova	14** + 10**	Avocado / Directed or Shielded Spray	Registered in avocado for control of grass and broadleaf weeds, including **Bellvine**. Apply as a directed or shielded spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:56	A	ALL	R3
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds. Spread granules evenly over the soils of area to be treated.	NR NG	A	ALL	-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Glufosinate (Basta)	10**	Avocado / Directed or Shielded Spray	Registered in avocado for control of Grass and Broadleaf Weeds, including **Bellvine**. Apply as a directed or shielded spray. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	NSW, QLD, NT, VIC, SA & WA	R3
Glyphosate (Roundup)	9**	Avocados / Over 3 Years Old / Directed Spray, Shielded Spray or Wick Wiper	Registered in avocados for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Oxyflourfen (Goal)	14**	Avocado / Directed Spray	Registered in avocado for control of Broadleaf Weeds, including **Bellvine**. If weeds are already present, use as a spike in a mixture with glyphosate or paraquat.	NR NG	A	ALL	-
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerilla) Imtrade	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray and avoid contact with crop foliage.	NR G:1	A	ALL	R3
Paraquat + Diquat (SpraySeed)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:7	A	ALL	R3
Fluroxypyr (Starane)	4**		Registered for control of *Ipomoea sp.* in sorghum and fallows.		P		-
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds in Brassica vegetables, Brassica leafy vegetables, sweet potatoes, spring onions, shallots, spinach, silverbeet, rhubarb, culinary herbs and beans.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Moth Vine / Wild Choko Vine (*Araujia sericifera*) **Priority: Low**							
Rated as a low priority in QLD & WA, and as a moderate priority in NSW. Moth Vine is an aggressive perennial that can climb up to 7m. It smothers crops with thick, tangled growth and exudes a smelly, milky latex that may cause allergic reactions in farm workers.							
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds. Spread granules evenly over the soils of area to be treated.	NR NG	A	ALL	-
Glyphosate (Roundup)	9**	Avocados / Over 3 Years Old / Directed Spray, Shielded Spray or Wick Wiper	Registered in avocados for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerilla) Imtrade	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray and avoid contact with crop foliage.	NR G:1	A	ALL	R3
Paraquat + Diquat (SpraySeed)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:7	A	ALL	R3
Fluroxypyr (Starane)	4**		Permitted for control of **Moth Vine** in non-agricultural areas.		P		-
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds in Brassica vegetables, Brassica leafy vegetables, sweet potatoes, spring onions, shallots, spinach, silverbeet, rhubarb, culinary herbs and beans.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Blackberry Nightshade (*Solanum nigrum*) **Priority: Low**							
Rated as a low priority in QLD & WA, and as a moderate priority in NSW. Blackberry Nightshade is a competitive weed that is widespread in all regions. Herbicide control is effective but requires timely application and avoidance of seed set over several years to bring the soil seed bank down.							
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds. Spread granules evenly over the soils of area to be treated.	NR NG	A	ALL	-
Flumioxazin (Chateau)	14**	Avocado / Directed Spray / Residual Weed Control	Registered in avocados for control of various grass and broadleaf weeds, including **Blackberry Nightshade**. Apply to bare soil using a directed spray at the base of the trees. Requires at least 15mm of irrigation or rain to activate.	98 G:28	A	ALL	-
Glyphosate (Roundup)	9**	Avocados / Over 3 Years Old / Directed Spray, Shielded Spray or Wick Wiper	Registered in avocados for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Oryzalin	3**	Avocado / Non-Bearing Fruit / directed spray	Registered in non-bearing fruit trees for control of grass and broadleaf weeds, including **Blackberry Nightshade**. Apply to bare soil using a directed spray at the base of the trees. Requires at least 15mm of irrigation or rain to activate.	NR	A	ALL	-
Oxyfluorfen (Goal)	14**	Avocado / Directed Spray	Registered in avocados for control of various grass and broadleaf weeds, including **Blackberry Nightshade**. If weeds are already present, use as a spike in a mixture with glyphosate or paraquat.	NR NG	A	ALL	-
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	1 G:7	A	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Paraquat + Amitrole (Guerilla) Imtrade	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray and avoid contact with crop foliage.	NR G:1	A	ALL	R3
Paraquat + Diquat (SpraySeed)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:7	A	ALL	R3
Pendimethalin (Stomp)	3**	Avocado / Directed Spray / Residual Weed Control	Registered in avocados for control of various grass and broadleaf weeds and registered for suppression of Blackberry Nightshade in several crops.	NR	P-A	ALL	-
Fluroxypyr (Starane)	4**		Registered for control of **Blackberry Nightshade** in sweet corn and sugarcane.		P		-
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds in Brassica vegetables, Brassica leafy vegetables, sweet potatoes, spring onions, shallots, spinach, silverbeet, rhubarb, culinary herbs and beans.		P		-
Feathertop Rhodes Grass (*Chloris virgata*) **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. Feathertop Rhodes Grass is an aggressive grass weed that is difficult to control with herbicides. Multiple applications are required.							
Clethodim (Select)	1***	Non-Bearing Fruit Trees	Registered in non-bearing fruit trees for control of grass weeds. Apply as a directed spray to young, actively growing weeds	NR	A	ALL	R3
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds. Spread granules evenly over the soils of area to be treated.	NR NG	A	ALL	-
Fluazifop-P (Fusilade)	1***	Avocados / Directed Spray	Registered in avocados as a directed spray for the control of grass weeds, including **Feather Top Rhodes Grass**.	14	A	NSW, QLD, NT & WA	-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Flumioxazin (Chateau)	14**	Avocado / Directed Spray / Residual Weed Control	Registered in avocados for control of various grass and broadleaf weeds, including **Feather Top Rhodes Grass**. Apply to bare soil using a directed spray at the base of the trees. Requires at least 15mm of irrigation or rain to activate.	98 G:28	A	ALL	-
Glufosinate (Basta)	10**	Non-Bearing Fruit Trees / Directed or Shielded Spray	Registered in non-bearing fruit trees for control of various grass and broadleaf weeds. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Avocados / Over 3 Years Old / Directed Spray, Shielded Spray or Wick Wiper	Registered in avocados for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Haloxyfop (Verdict)	1***	Avocados / Directed Spray or Spot Spray	Registered in avocados for control of grass weeds. Apply as a directed spray.	NR	A	ALL	-
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerrilla)	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual weeds. Avoid contact with crop foliage.	NR G:1	A	ALL	R3
Paraquat + Diquat (SpraySeed)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of various annual grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	G:1	A	ALL	R3
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds in Brassica vegetables, Brassica leafy vegetables, sweet potatoes, spring onions, shallots, spinach, silverbeet, rhubarb, culinary herbs and beans.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Crowsfoot Grass (*Dactyloctenium aegyptium*) **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. Crowsfoot Grass is a summer-growing, annual grass that is difficult to control with herbicides and tolerates low mowing heights.							
Carfentrazone-Ethyl + Glufosinate (Hellcat) AgNova	14** + 10**	Avocado / Directed or Shielded Spray	Registered in avocado for control of grass and broadleaf weeds, including **Crowsfoot Grass**. Apply as a directed or shielded spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:56	A	ALL	R3
Clethodim (Select)	1***	Non-Bearing Fruit Trees	Registered in non-bearing fruit trees for control of grass weeds. Apply as a directed spray to young, actively growing weeds	NR	A	ALL	R3
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds. Spread granules evenly over the soils of area to be treated.	NR NG	A	ALL	-
Fluazifop-P (Fusilade)	1***	Avocados / Directed Spray	Registered in avocados as a directed spray for the control of grass weeds, including **Crowsfoot Grass**.	14	A	NSW, QLD, NT & WA	-
Flumioxazin (Chateau)	14**	Avocado / Directed Spray / Residual Weed Control	Registered in avocados for control of various grass and broadleaf weeds, including **Crowsfoot Grass**. Apply to bare soil using a directed spray at the base of the trees. Requires at least 15mm of irrigation or rain to activate.	98 G:28	A	ALL	-
Glufosinate (Basta)	10**	Non-Bearing Fruit Trees / Directed or Shielded Spray	Registered in non-bearing fruit trees for control of various grass and broadleaf weeds. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Avocados / Over 3 Years Old / Directed Spray, Shielded Spray or Wick Wiper	Registered in avocados for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Haloxyfop (Verdict)	1***	Avocados / Directed Spray or Spot Spray	Registered in avocados for control of grass weeds. Apply as a directed spray.	NR	A	ALL	-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Oxyfluorfen (Goal)	14**	Avocado / Directed Spray	Registered in avocados for control of various grass and broadleaf weeds, including **Crowsfoot Grass**. If weeds are already present, use as a spike in a mixture with glyphosate or paraquat.	NR NG	A	ALL	-
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerrilla)	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual weeds. Avoid contact with crop foliage.	NR G:1	A	ALL	R3
Paraquat + Diquat (SpraySeed)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of various annual grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	G:1	A	ALL	R3
Pendimethalin (Stomp)	3**	Avocado / Directed Spray / Residual Weed Control	Registered in avocados for control of various grass and broadleaf weeds, including **Crowsfoot Grass**. Apply to soil surface that is free of weeds, surface litter and clods, and ensure incorporation by a minimum of 5mm of rainfall or spray irrigation within 10 days.	NR	A	ALL	-
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds in Brassica vegetables, Brassica leafy vegetables, sweet potatoes, spring onions, shallots, spinach, silverbeet, rhubarb, culinary herbs and beans.		P		-
Johnson Grass (*Sorghum halepense*) **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. Johnson Grass is a large, summer growing perennial that is difficult to eradicate with herbicides.							
Clethodim (Select)	1***	Non-Bearing Fruit Trees	Registered in non-bearing fruit trees for control of grass weeds. Apply as a directed spray to young, actively growing weeds	NR	A	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds. Spread granules evenly over the soils of area to be treated.	NR NG	A	ALL	-
Fluazifop-P (Fusilade)	1***	Avocados / Directed Spray	Registered in avocados as a directed spray for the control of grass weeds, including **Johnson Grass**.	14	A	NSW, QLD, NT & WA	-
Glufosinate (Basta)	10**	Non-Bearing Fruit Trees / Directed or Shielded Spray	Registered in non-bearing fruit trees for control of various grass and broadleaf weeds. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Avocados / Over 3 Years Old / Directed Spray, Shielded Spray or Wick Wiper	Registered in avocados for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Haloxyfop (Verdict)	1***	Avocados / Directed Spray or Spot Spray	Registered in avocados for control of grass weeds. Apply as a directed spray.	NR	A	ALL	-
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds in Brassica vegetables, Brassica leafy vegetables, sweet potatoes, spring onions, shallots, spinach, silverbeet, rhubarb, culinary herbs and beans.		P		-
Marshmallow (*Malva parviflora*) **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. Marshmallow is adapted to a wide variety of environments and highly competitive weed. Control with knockdown herbicides can be unreliable.							
Carfentrazone-Ethyl (Spotlight)	14**	Avocado / directed spray or spot spray	Registered in avocado for control of grass & broadleaf weeds, including **Marshmallow**. If weeds are already present, use as a spike in a mixture with glyphosate or paraquat.	NR	A	ALL	-
Carfentrazone-Ethyl + Glufosinate (Hellcat) AgNova	14** + 10**	Avocado / Directed or Shielded Spray	Registered in avocado for control of grass and broadleaf weeds, including **Marshmallow**. Apply as a directed or shielded spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:56	A	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds. Spread granules evenly over the soils of area to be treated.	NR NG	A	ALL	-
Flumioxazin (Chateau)	14**	Avocado / Directed Spray / Residual Weed Control	Registered in avocados for control of various grass and broadleaf weeds, including **Marshmallow**. Apply to bare soil using a directed spray at the base of the trees. Requires at least 15mm of irrigation or rain to activate.	98 G:28	A	ALL	-
Glyphosate (Roundup)	9**	Avocados / Over 3 Years Old / Directed Spray, Shielded Spray or Wick Wiper	Registered in avocados for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Oxyfluorfen (Goal)	14**	Avocado / Directed Spray	Registered in avocados for control of various grass and broadleaf weeds, including **Marshmallow**. If weeds are already present, use as a spike in a mixture with glyphosate or paraquat.	NR NG	A	ALL	-
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerrilla)	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual weeds. Avoid contact with crop foliage.	NR G:1	A	ALL	R3
Paraquat + Diquat (SpraySeed)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of various annual grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	G:1	A	ALL	R3
Fluroxypyr (Starane) Corteva	4**		Registered for control of **Small Flowered Mallow** in fallows.		P		-
Isoxaben (Gallery) Corteva	29**		Registered for control of **Small Flowered Mallow** in non-crop, forests, fencelines, tree fruit & nut orchards, vineyards, nursery & amenity tree plantings and pyrethrum.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Couch Grass (*Cynodon dactylon*) **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. Couch Grass is a widespread, perennial weed that grows year-round in most areas. Herbicide control is effective provided it is targeted to young, actively growing weeds. Multiple applications are usually required.							
Clethodim (Select)	1***	Non-Bearing Fruit Trees	Registered in non-bearing fruit trees for control of grass weeds. Apply as a directed spray to young, actively growing weeds	NR	A	ALL	R3
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds. Spread granules evenly over the soils of area to be treated.	NR NG	A	ALL	-
Glufosinate (Basta)	10**	Non-Bearing Fruit Trees / Directed or Shielded Spray	Registered in non-bearing fruit trees for control of various grass and broadleaf weeds. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Avocados / Over 3 Years Old / Directed Spray, Shielded Spray or Wick Wiper	Registered in avocados for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Haloxyfop (Verdict)	1***	Avocados / Directed Spray or Spot Spray	Registered in avocados for control of grass weeds. Apply as a directed spray.	NR	A	ALL	-
Fluazifop-P (Fusilade)	1***	Avocados / Directed Spray	Registered in avocados as a directed spray for the control of grass weeds. Registered for control of **Couch Grass** in various crops.	14	P-A	NSW, QLD, NT & WA	-
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds in Brassica vegetables, Brassica leafy vegetables, sweet potatoes, spring onions, shallots, spinach, silverbeet, rhubarb, culinary herbs and beans.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Barnyard Grass (*Echinochloa colona*) **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. Barnyard Grass is a summer annual grass weed that is a prolific seeder, is highly competitive and is difficult to control with herbicides. It is prone to development of herbicide resistance, with confirmed cases of resistance to Group 9 and Group 5 herbicides.							
Carfentrazone-Ethyl + Glufosinate (Hellcat) AgNova	14** + 10**	Avocado / Directed or Shielded Spray	Registered in avocado for control of grass and broadleaf weeds, including **Barnyard Grass**. Apply as a directed or shielded spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:56	A	ALL	R3
Clethodim (Select)	1***	Non-Bearing Fruit Trees	Registered in non-bearing fruit trees for control of grass weeds. Apply as a directed spray to young, actively growing weeds	NR	A	ALL	R3
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds. Spread granules evenly over the soils of area to be treated.	NR NG	A	ALL	-
Fluazifop-P (Fusilade)	1***	Avocados / Directed Spray	Registered in avocados as a directed spray for the control of grass weeds, including **Barnyard Grass**.	14	A	NSW, QLD, NT & WA	-
Flumioxazin (Chateau)	14**	Avocado / Directed Spray / Residual Weed Control	Registered in avocados for control of various grass and broadleaf weeds, including **Barnyard Grass**. Apply to bare soil using a directed spray at the base of the trees. Requires at least 15mm of irrigation or rain to activate.	98 G:28	A	ALL	-
Glufosinate (Basta)	10**	Non-Bearing Fruit Trees / Directed or Shielded Spray	Registered in non-bearing fruit trees for control of various grass and broadleaf weeds. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Avocados / Over 3 Years Old / Directed Spray, Shielded Spray or Wick Wiper	Registered in avocados for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Haloxyfop (Verdict)	1***	Avocados / Directed Spray or Spot Spray	Registered in avocados for control of grass weeds. Apply as a directed spray.	NR	A	ALL	-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Oryzalin	3**	Avocado / Non-Bearing Fruit / directed spray	Registered in non-bearing fruit trees for control of grass and broadleaf weeds, including **Barnyard Grass**. Apply to bare soil using a directed spray at the base of the trees. Requires at least 15mm of irrigation or rain to activate.	NR	A	ALL	-
Oxyfluorfen (Goal)	14**	Avocado / Directed Spray	Registered in avocados for control of various grass and broadleaf weeds, including **Barnyard Grass**. If weeds are already present, use as a spike in a mixture with glyphosate or paraquat.	NR NG	A	ALL	-
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerilla) Imtrade	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray and avoid contact with crop foliage.	NR G:1	A	ALL	R3
Paraquat + Diquat (SpraySeed)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:7	A	ALL	R3
Pendimethalin (Stomp)	3**	Avocado / Directed Spray / Residual Weed Control	Registered in avocados for control of various grass and broadleaf weeds, including **Barnyard Grass**. Apply to soil surface that is free of weeds, surface litter and clods, and ensure incorporation by a minimum of 5mm of rainfall or spray irrigation within 10 days.	NR	A	ALL	-
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds in Brassica vegetables, Brassica leafy vegetables, sweet potatoes, spring onions, shallots, spinach, silverbeet, rhubarb, culinary herbs and beans.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Sowthistle (*Sonchus oleraceus*) **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. Sowthistle is an annual broadleaf weed, that can germinate year-round, is prolific and widespread in all regions and it is also prone to development of herbicide resistance.							
Carfentrazone-Ethyl + Glufosinate (Hellcat) AgNova	14** + 10**	Avocado / Directed or Shielded Spray	Registered in avocado for control of grass and broadleaf weeds, including **Sowthistle**. Apply as a directed or shielded spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:56	A	ALL	R3
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds. Spread granules evenly over the soils of area to be treated.	NR NG	A	ALL	-
Flumioxazin (Chateau)	14**	Avocado / Directed Spray / Residual Weed Control	Registered in avocados for control of various grass and broadleaf weeds, including **Sowthistle**. Apply to bare soil using a directed spray at the base of the trees. Requires at least 15mm of irrigation or rain to activate.	98 G:28	A	ALL	-
Glufosinate (Basta)	10**	Non-Bearing Fruit Trees / Directed or Shielded Spray	Registered in non-bearing fruit trees for control of various grass and broadleaf weeds. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Avocados / Over 3 Years Old / Directed Spray, Shielded Spray or Wick Wiper	Registered in avocados for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Oryzalin	3**	Avocado / Non-Bearing Fruit / directed spray	Registered in non-bearing fruit trees for control of grass and broadleaf weeds, including **Sowthistle**. Apply to bare soil using a directed spray at the base of the trees. Requires at least 15mm of irrigation or rain to activate.	NR	A	ALL	-
Oxyfluorfen (Goal)	14**	Avocado / Directed Spray	Registered in avocados for control of various grass and broadleaf weeds, including **Sowthistle**. If weeds are already present, use as a spike in a mixture with glyphosate or paraquat.	NR NG	A	ALL	-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerilla) Imtrade	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray and avoid contact with crop foliage.	NR G:1	A	ALL	R3
Paraquat + Diquat (SpraySeed)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:7	A	ALL	R3
Pendimethalin (Stomp)	3**	Avocado / Directed Spray / Residual Weed Control	Registered in avocados for control of various grass and broadleaf weeds, including **Sowthistle**. Apply to soil surface that is free of weeds, surface litter and clods, and ensure incorporation by a minimum of 5mm of rainfall or spray irrigation within 10 days.	NR	A	ALL	-
Isoxaben (Gallery) Corteva	29**		Registered for control of **Sowthistle** in non-crop, forests, fencelines, tree fruit & nut orchards, vineyards, nursery & amenity tree plantings.		P		-
Napropamide (Devrinol)	0**		Registered for control of **Sowthistle** in almonds, grapevines, stone fruit, tomatoes and canola.		P		-
Nonanoic Acid (Beloukha)	-		Registered for control of **Sowthistle** in non-crop areas, turf, orchards & vineyards, fallow and forestry.		P		-
Norflurazon (Zoliar) Agnova	12**		Registered for control of grass and broadleaf weeds including **Sowthistle** in citrus, grapes, almonds, stone & pome fruits.		P		-
Saflufenacil (Sharpen) BASF	14**		Registered for control of grass and broadleaf weeds, including **Sowthistle** in cereal crops.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds, including **Sowthistle**, in Brassica vegetables, green beans, navy beans and sugar cane.		P		-
Fat Hen (*Chenopodium album*) **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. Fat Hen is a summer-growing, annual broadleaf weed. Herbicide control can be difficult and targeting weeds at early growth stages is critical.							
Carfentrazone-Ethyl (Spotlight)	14**	Avocado / directed spray or spot spray	Registered in avocado for control of grass & broadleaf weeds, including **Fat Hen**. If weeds are already present, use as a spike in a mixture with glyphosate or paraquat.	NR	A	ALL	-
Carfentrazone-Ethyl + Glufosinate (Hellcat) AgNova	14** + 10**	Avocado / Directed or Shielded Spray	Registered in avocado for control of grass and broadleaf weeds, including **Fat Hen**. Apply as a directed or shielded spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:56	A	ALL	R3
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds. Spread granules evenly over the soils of area to be treated.	NR NG	A	ALL	-
Flumioxazin (Chateau)	14**	Avocado / Directed Spray / Residual Weed Control	Registered in avocados for control of various grass and broadleaf weeds, including **Fat Hen**. Apply to bare soil using a directed spray at the base of the trees. Requires at least 15mm of irrigation or rain to activate.	98 G:28	A	ALL	-
Glufosinate (Basta)	10**	Non-Bearing Fruit Trees / Directed or Shielded Spray	Registered in non-bearing fruit trees for control of various grass and broadleaf weeds. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Avocados / Over 3 Years Old / Directed Spray, Shielded Spray or Wick Wiper	Registered in avocados for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Oryzalin	3**	Avocado / Non-Bearing Fruit / directed spray	Registered in non-bearing fruit trees for control of grass and broadleaf weeds, including **Fat Hen**. Apply to bare soil using a directed spray at the base of the trees. Requires at least 15mm of irrigation or rain to activate.	NR	A	ALL	-
Oxyfluorfen (Goal)	14**	Avocado / Directed Spray	Registered in avocadosfor control of various grass and broadleaf weeds, including **Fat Hen**. If weeds are already present, use as a spike in a mixture with glyphosate or paraquat.	NR NG	A	ALL	-
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerilla) Imtrade	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray and avoid contact with crop foliage.	NR G:1	A	ALL	R3
Paraquat + Diquat (SpraySeed)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:7	A	ALL	R3
Pendimethalin (Stomp)	3**	Avocado / Directed Spray / Residual Weed Control	Registered in avocados for control of various grass and broadleaf weeds, including **Fat Hen**. Apply to soil surface that is free of weeds, surface litter and clods, and ensure incorporation by a minimum of 5mm of rainfall or spray irrigation within 10 days.	NR	A	ALL	-
Aclonifen (Emerger) Bayer	32**	Pre-Emergence	Bayer is expected to seek registration for pre-emergent control of grass and broadleaf weeds in various vegetable crops. Registered in Europe for use in potatoes, legume vegetables and cereals. **Fat-Hen** is listed as susceptible.		P		-
Isoxaben (Gallery) Corteva	29**		Registered for control of **Fat-Hen** in non-crop, forests, fencelines, tree fruit & nut orchards, vineyards, nursery & amenity tree plantings and pyrethrum.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Nonanoic Acid (Beloukha)	-		Registered for control of **Fat Hen** in non-crop areas, turf, orchards & vineyards, fallow and forestry.		P		-
Saflufenacil (Sharpen) BASF	14**		Registered for control of grass and broadleaf weeds, including **Fat Hen,** in citrus, pome and almond orchards.		P		-
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds, including **Fat Hen** in Brassica vegetables, Brassica leafy vegetables, sweet potatoes, spring onions, shallots, spinach, silverbeet, rhubarb, culinary herbs and beans.		P		-
Liverseed Grass (*Eurochloa* spp.) **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. Liverseed Grass is a common, summer-growing annual grass weed.							
Carfentrazone-Ethyl + Glufosinate (Hellcat) AgNova	14** + 10**	Avocado / Directed or Shielded Spray	Registered in avocado for control of grass and broadleaf weeds, including **Liverseed Grass**. Apply as a directed or shielded spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:56	A	ALL	R3
Clethodim (Select)	1***	Non-Bearing Fruit Trees	Registered in non-bearing fruit trees for control of grass weeds. Apply as a directed spray to young, actively growing weeds	NR	A	ALL	R3
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds. Spread granules evenly over the soils of area to be treated.	NR NG	A	ALL	-
Glufosinate (Basta)	10**	Non-Bearing Fruit Trees / Directed or Shielded Spray	Registered in non-bearing fruit trees for control of various grass and broadleaf weeds. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Avocados / Over 3 Years Old / Directed Spray, Shielded Spray or Wick Wiper	Registered in avocados for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Haloxyfop (Verdict)	1***	Avocados / Directed Spray or Spot Spray	Registered in avocados for control of grass weeds. Apply as a directed spray.	NR	A	ALL	-
Oxyfluorfen (Goal)	14**	Avocado / Directed Spray	Registered in avocados for control of various grass and broadleaf weeds, including **Liverseed Grass**. If weeds are already present, use as a spike in a mixture with glyphosate or paraquat.	NR NG	A	ALL	-
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerilla) Imtrade	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray and avoid contact with crop foliage.	NR G:1	A	ALL	R3
Paraquat + Diquat (SpraySeed)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:7	A	ALL	R3
Fluazifop-P (Fusilade)	1***	Avocados / Directed Spray	Registered in avocados as a directed spray for the control of grass weeds. Registered for control of **Liverseed Grass** in various crops.	14	P-A	NSW, QLD, NT & WA	-
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds in Brassica vegetables, Brassica leafy vegetables, sweet potatoes, spring onions, shallots, spinach, silverbeet, rhubarb, culinary herbs and beans.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Pigweed (*Portulaca* spp.) **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. Summer growing broadleaf weed that competes aggressively and can be difficult to control with herbicides.							
Carfentrazone-Ethyl + Glufosinate (Hellcat) AgNova	14** + 10**	Avocado / Directed or Shielded Spray	Registered in avocado for control of grass and broadleaf weeds, including **Pigweed**. Apply as a directed or shielded spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:56	A	ALL	R3
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds. Spread granules evenly over the soils of area to be treated.	NR NG	A	ALL	-
Flumioxazin (Chateau)	14**	Avocado / Directed Spray / Residual Weed Control	Registered in avocados for control of various grass and broadleaf weeds, including **Pigweed**. Apply to bare soil using a directed spray at the base of the trees. Requires at least 15mm of irrigation or rain to activate.	98 G:28	A	ALL	-
Glufosinate (Basta)	10**	Non-Bearing Fruit Trees / Directed or Shielded Spray	Registered in non-bearing fruit trees for control of various grass and broadleaf weeds. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Avocados / Over 3 Years Old / Directed Spray, Shielded Spray or Wick Wiper	Registered in avocados for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Oryzalin	3**	Avocado / Non-Bearing Fruit / directed spray	Registered in non-bearing fruit trees for control of grass and broadleaf weeds, including **Pigweed**. Apply to bare soil using a directed spray at the base of the trees. Requires at least 15mm of irrigation or rain to activate.	NR	A	ALL	-
Oxyfluorfen (Goal)	14**	Avocado / Directed Spray	Registered in avocados for control of various grass and broadleaf weeds, including **Pigweed**. If weeds are already present, use as a spike in a mixture with glyphosate or paraquat.	NR NG	A	ALL	-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerilla) Imtrade	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray and avoid contact with crop foliage.	NR G:1	A	ALL	R3
Paraquat + Diquat (SpraySeed)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:7	A	ALL	R3
Pendimethalin (Stomp)	3**	Avocado / Directed Spray / Residual Weed Control	Registered in avocados for control of various grass and broadleaf weeds, including **Pigweed**. Apply to soil surface that is free of weeds, surface litter and clods, and ensure incorporation by a minimum of 5mm of rainfall or spray irrigation within 10 days.	NR	A	ALL	-
Fluroxypyr (Starane)	4**		Registered for control of broadleaf weeds, including **Pigweed** in sorghum, maize, millets, sweet corn, fallow and lucerne.		P		-
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds in Brassica vegetables, Brassica leafy vegetables, sweet potatoes, spring onions, shallots, spinach, silverbeet, rhubarb, culinary herbs and beans.		P		-
Green Amaranth (*Amaranthus viridis*) **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. Green Amaranth is a short-lived, summer-growing annual broadleaf weed that is a prolific seed producer.							
Carfentrazone-Ethyl + Glufosinate (Hellcat) AgNova	14** + 10**	Avocado / Directed or Shielded Spray	Registered in avocado for control of grass and broadleaf weeds, including **Amaranth**. Apply as a directed or shielded spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:56	A	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds. Spread granules evenly over the soils of area to be treated.	NR NG	A	ALL	-
Glufosinate (Basta)	10**	Non-Bearing Fruit Trees / Directed or Shielded Spray	Registered in non-bearing fruit trees for control of various grass and broadleaf weeds. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Avocados / Over 3 Years Old / Directed Spray, Shielded Spray or Wick Wiper	Registered in avocados for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerilla) Imtrade	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray and avoid contact with crop foliage.	NR G:1	A	ALL	R3
Paraquat + Diquat (SpraySeed)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk.	NR G:7	A	ALL	R3
Pendimethalin (Stomp)	3**	Avocado / Directed Spray / Residual Weed Control	Registered in avocados for control of various grass and broadleaf weeds, including **Amaranth**. Apply to soil surface that is free of weeds, surface litter and clods, and ensure incorporation by a minimum of 5mm of rainfall or spray irrigation within 10 days.	NR	A	ALL	-
Clomazone	13**		Registered for control of broadleaf weeds including suppression of **Amaranth** in beans, poppies, potato and tobacco transplants.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Dimethenamid-P (Outlook) BASF	15**		Registered for control of grass and broadleaf weeds, including **Amaranth** in sweet corn, beans, peas, pumpkins and kabocha.		P		-
Fluroxypyr (Starane)	4**		Registered for control of broadleaf weeds, including **Amaranth** in sorghum, maize, sweet corn and millet.		P		-
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds, including **Amaranth** in Brassica vegetables and beans.		P		-
Paspalum (*Paspalum dilatatum*) **Priority: Low**							
Rated as a low priority in QLD, NSW & WA. Paspalum is a perennial grass weeds that forms clumps that are tough to control. They are aggressive and fast-growing and ongoing control measures are required to keep them in check. Spot spraying can be effective, but it is important to target newly germinated weeds to achieve effective control.							
Clethodim (Select)	1***	Non-Bearing Fruit Trees	Registered in non-bearing fruit trees for control of grass weeds. Apply as a directed spray to young, actively growing weeds	NR	A	ALL	R3
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds. Spread granules evenly over the soils of area to be treated.	NR NG	A	ALL	-
Fluazifop-P (Fusilade)	1***	Avocados / Directed Spray	Registered in avocados as a directed spray for the control of grass weeds, including **Paspalum**.	14	A	NSW, QLD, NT & WA	-
Glufosinate (Basta)	10**	Non-Bearing Fruit Trees / Directed or Shielded Spray	Registered in non-bearing fruit trees for control of various grass and broadleaf weeds. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Avocados / Over 3 Years Old / Directed Spray, Shielded Spray or Wick Wiper	Registered in avocados for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Haloxyfop (Verdict)	1***	Avocados / Directed Spray or Spot Spray	Registered in avocados for control of grass weeds. Apply as a directed spray.	NR	A	ALL	-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Norflurazon (Zoliar)	12**		Registered for control of **Paspalum** in citrus, grapes, almonds, pome fruit and stone fruit.		P		-
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds in Brassica vegetables, Brassica leafy vegetables, sweet potatoes, spring onions, shallots, spinach, silverbeet, rhubarb, culinary herbs and beans.		P		-

4.4 Plant Growth Regulators in Avocados

4.4.1 Plant Growth Regulator Priorities

PGR Issue	Priority
Control of vegetative growth	H
Fruit drop control	M

Plant Growth Regulators (PGRs) play an important role in managing avocado orchards. Avocados will experience rapid growth during vegetative flushes that occur during the warmer months. The first spring flush occurs shortly after flowering and fruit set. Competition between the newly set fruit and developing leaf flush has been suggested as being involved in poor fruit set. The use of PGRs is common to limit the spring flush and promote trees to retain and grow the fruit.

Our industry consultation identified Control of Vegetative Growth as a high priority for PGRs. PGRs are not the only management technique available to limit vegetative growth. Delaying or reducing nitrogen application during flowering, removing the apical bud and girdling are also used in orchards.

4.4.2 Available and Potential Plant Growth Regulators

TABLE KEY: Note that blank fields in the table indicate no information has been provided.

Availability		Regulatory risk (refer to Appendix 7)	
A	Available via either registration or permit approval	R1	Short-term: Critical concern over retaining access
P	Potential - a possible candidate to pursue for registration or permit	R2	Medium-term: Maintaining access of significant concern
P-A	Potential, already approved in the crop for another use	R3	Long-term: Potential issues associated with use - Monitoring required
Withholding Period (WHP) – Number of days from last treatment to harvest (H) or Grazing (G)			
Harvest	H	Not Required when used as directed	NR
Grazing	G	No Grazing Permitted	NG

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Control of vegetative growth **Priority: High**							
Rated as a high priority in QLD, NSW and WA.							
Paclobutrazol	PGR	Avocado	Registered in avocado for **vegetative growth control** and fruit drop control. Apply as a foliar spray when crop is in full flower.	90	A	ALL	-
Paclobutrazol PER85877	PGR	Avocado orchards / High Density Plantings Only	Permitted in avocado orchards (high density plantings) for **vegetative growth management**. Apply to trees less than 2.5 m high as a soil drench around the base of each tree trunk, after removal of organic material (mulch, leaf litter) from the application area. Rain or irrigation is needed after treatment to obtain required effects. Apply in spring or early summer, or at an early vegetative flush state. Maximum of 1 application per season.	NR NG	A	ALL (excl. VIC)	-
Uniconazole-P (Sunny)	PGR	Avocados	Registered in avocados to enhance fruit shape and increase fruit size and to **reduce vegetative growth**. Apply as a foliar spray at mid bloom.	14	A	ALL	-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Fruit drop control **Priority: Moderate**							
Rated as a moderate priority in QLD & NSW, and as a high priority in WA.							
Paclobutrazol	PGR	Avocado	Registered in avocado for vegetative growth control and **fruit drop control**. Apply as a foliar spray when crop is at fruit set stage. Do not apply when mature fruit are on the tree.	90	A	ALL	-

5. References

5.1 Information:

AgChem Access Priority Access Forum	https://www.agrifutures.com.au/national-rural-issues/agvet-chemicals/
Australian Pesticide and Veterinary Medicines Authority	www.apvma.gov.au
APVMA Chemical review	https://apvma.gov.au/chemicals-and-products/chemical-review/listing
APVMA MRLs	www.legislation.gov.au/Details/F2023L01350
APVMA Permit search	Agricultural And Veterinary Permits Search - portal.apvma.gov.au
APVMA Product search	Public Chemical Registration Information System Search - portal.apvma.gov.au
Codex MRL database	http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/
Cotton Pest Management Guide 2023-24	https://www.cottoninfo.com.au/publications/cotton-pest-management-guide
CropLife Australia	https://www.croplife.org.au/
Hort Innovation	www.horticulture.com.au

5.2 Abbreviations and Definitions:

APVMA	Australian Pesticides and Veterinary Medicines Authority
IPM	Integrated pest management
LOQ	Limit of quantification
MRL	Maximum residue limit (mg/kg or ppm)
Pesticides	Plant protection products (fungicide, insecticide, herbicide, nematicides, rodenticides, etc.).
Plant pests	Diseases, insects, nematodes, rodents, viruses, weeds, etc.
SARP	Strategic Agrichemical Review Process
TBC	To be confirmed
WHP	Withholding Period

5.3 Acknowledgements:

Thanks go to the many industry people who contributed information and collaborated on the review of this report.

6. Appendices

Appendix 1. Products available for disease control in avocado
Appendix 2. Products available for control of insects and other pests in avocado
Appendix 3. Products available for weed control in avocado
Appendix 4. Plant Growth Regulators available in avocado
Appendix 5. Current permits for use in avocado
Appendix 6. Avocado Maximum Residue Limits (MRLs)
Appendix 7. Avocado regulatory risk assessment

Appendix 1. Products available for disease control in avocados

Active Ingredient (Trade Name)	Chemical group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Azoxystrobin (Amistar)	11	Avocado	Anthracnose Stem End Rot	ALL	7	-
Bacillus amyloliquefaciens Strain QST 713 (Serenade Opti) Bayer	BM01	Avocado	Anthracnose (*Colletotrichum* spp.) Suppression of: Stem End Rot	ALL	NR	-
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime) Bayer	BM01	Tree Crops	For soil application to improve bioavailability of soil resources for horticultural crops	ALL	NR	-
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime) Bayer PER93515	BM01	Avocado	Anthracnose (*Colletotrichum* spp.) Suppression of: Stem End Rot	QLD	NR	-
Bromo Chloro Dimethyl Hydatoin (BCDMH)		Sanitiser / Post-Harvest Treatment	External Rot Causing Organisms	ALL	NR	-
Chlorine		Sanitiser / Post-Harvest Treatment	Bacteria and Fungi	ALL	NR	-
Copper (Cu) Present as Copper Ammonium Acetate	M1	Avocado	Anthracnose Cercospora Spot Sooty Blotch Phytophthora Stem Canker	ALL	1	-
Copper (Cu) present as copper oxychloride	M1	Avocado	Anthracnose	ALL	1	-
Copper (Cu) present as cuprous oxide	M1	Avocado	Anthracnose Phytophthora Stem Canker	ALL	1	-

Active Ingredient (Trade Name)	Chemical group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Copper (Cu) Present as Cupric Hydroxide	M1	Avocado	Anthracnose Phytophthora Stem Canker	ALL	1	-
Copper (Cu) Present as Tribasic Copper Sulphate	M1	Avocado	Anthracnose Phytophthora Stem Canker	ALL	1	-
Didecyl Dimethyl Ammonium Chloride		Assorted Tropical & Subtropical Fruit (Inedible Peel) / Sanitiser (Post-harvest)	Post-Harvest Diseases	ALL	NR	-
Difenoconazole, Cyprodinil & Fludioxonil (Score, Switch) PER94009	3+9+12	Avocado	Anthracnose (*Colletotrichum* spp.)	ALL	NR NG	R3
Fludioxonil + Azoxystrobin (Graduate A+) Syngenta	12+11	Avocado / Post-harvest dip, drench or spray	Anthracnose Stem End Rot	ALL	NR	R3
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Avocado	Anthracnose (*Colletotrichum* spp.) Stem End Rot	ALL	3 NG	-
Fosetyl Aluminium	33	Avocado	Phytophthora Root Rot	QLD, NSW, SA, VIC & WA	1	-
Iodine		Tropical & Subtropical Fruit / Post-Harvest Sanitiser	Bacteria & Fungi	ALL	NR	-
Metalaxyl-M (Ridomil Gold) Syngenta	4	Avocado	Phytophthora Root Rot	QLD, NSW, SA & WA	7	R3
Peroxyacetic Acid		Sanitiser / Post-Harvest Treatment	Bacteria	ALL	NR	-

Active Ingredient (Trade Name)	Chemical group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Phosphorous Acid	33	Avocado	Phytophthora Root Rot	QLD, NSW, SA, VIC & WA	G:14	-
Prochloraz (Sportak)	3	Avocado / Post-Harvest	Anthracnose Stem End Rot	QLD, NSW, WA & NT	NR	R3
Thiram	M3	Avocado	Anthracnose Stem End Rot	ALL	7	R2

Appendix 2. Products available for control of insects and other pests in avocados

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Abamectin	6	Avocado	Tea Red Spider Mite (*Olygnychus coffeae*) Six Spotted Mite (*Eotetranychus sexmaculatus*)	ALL	14 NG	-
Abamectin PER14618	6	Avocado	Tea Red Spider Mite (*Olygnychus coffeae*) Six Spotted Mite (*Eotetranychus sexmaculatus*)	ALL (excl. VIC)	14 NG	-
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Avocado	Banana Spotting Bug Fruit Spotting Bug Oleander Scale Pink Wax Scale Queensland Fruit Fly Mediterranean Fruit Fly	ALL	28	R2
Beta-Cyfluthrin (Bulldock)	3A	Avocado	Fruit Spotting Bug	ALL	7	-
Beta-Cyfluthrin + Piperonyl Butoxide	3A	Avocado	Fruit Spotting Bug	ALL	7	-
Bifenazate (Acramite) PER89167	20D	Avocado	Tea Red Spider Mite (*Oligonychus coffeae*) Six-Spotted Mite (*Eotetranychus sexmaculatus*)	ALL (excl. VIC)	7 G:28	-
Carbaryl (Bugmaster)	1A	Avocado	Redshouldered Leaf Beetle Wingless Grasshoppers	ALL	3	R2
Chlorantraniliprole (Altacor) FMC PER81560	28	Avocado	Lepidopteran Pests including: Ectropis looper Avocado leaf roller	NSW, QLD & WA	3	-

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Chlorpyrifos (Lorsban)	1B	Avocado	Avocado Leafroller Ivy Leafroller Latania Scale Hairy Caterpillars Light Brown Apple Moth Redshouldered Leaf Beetle Queensland Fruit Fly	QLD, WA, NSW & ACT	7	R1
Deltamethrin (MagMED) PER92548	3A	Tropical Fruit / Trap	Mediterranean Fruit Fly (*Ceratitis capitata*)	WA	NR	-
Dimethoate	1B	Avocado	Queensland Fruit Fly	QLD & WA	7	R1
Dimethoate PER13859	1B	Fruit Fly Host Crops / Orchard Cleanup	Fruit Fly	ALL	NR	R1
Etoxazole (Paramite) PER85167	10B	Avocado	Six Spotted Mite	WA	14 NG	-
Fenbutatin Oxide (Torque)	12A	Avocado	Tea Red Spider Mite Six Spotted Mite	QLD, NSW & WA	14	R2
Fipronil (Monarch) PER86492	2B	Orchards / Bait	European Wasp (*Vespula germanica*) Common Wasp (*Vespula vulgaris*)	ALL	NR	R3
Flupyradifurone (Sivanto Prime) Bayer	4D	Avocado	Banana Spotting Bug (*Amblypelta lutescens*) Fruit Spotting Bug (*Amblypelta nitida*) Green Planthopper Mango Planthopper	ALL	1 NG	-
Methomyl (Lannate) PER14597	1A	Avocado	Ectropis Looper	NSW &QLD	3	R2

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Methoxyfenozide (Prodigy) Corteva	18	Avocado	Avocado Leafroller	ALL	14	-
Petroleum Oil		Avocado	Scale Insects	QLD, NSW & WA	1	-
Potassium Salts of Fatty Acid (Natrasoap)		Fruit Trees	Aphids Thrips Mealybug Two-Spotted Mite Spider Mite Whitefly	ALL	NR	-
Pyrethrins (Pyganic)	3A	Avocado	Greenhouse Thrips	ALL	NR	-
Pyriproxyfen (Distance Ant Bait) Sumitomo	7C	Tropical Fruit Plantation / Ant Bait	Invasive and Nuisance Ants	ALL	NR	-
Spinetoram (Success Neo) Corteva	5	Avocado	Avocado Leafroller Ivy Leafroller Light Brown Apple Moth Loopers	ALL	NR	-
		Tropical & Sub-Tropical Fruit Crops (inedible peel)	Flower Eating Caterpillars Leafrollers & Loopers Yellow Peach Moth Red-Banded Thrips Sorghum Head Caterpillar			

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Spinosad (Entrust Organic) Corteva	5	Avocado	Avocado Leafroller Ivy Leafroller Light Brown Apple Moth Loopers	ALL	NR	-
		Tropical & Sub-Tropical Fruit Crops (inedible peel)	Flower Eating Caterpillars Leafrollers & Loopers Yellow Peach Moth Red-Banded Thrips Sorghum Head Caterpillar			
Spinosad (Naturalure) Corteva	5	Tree, Fruit, Nut, Vine & Vegetable Crops / Fruit Fly Bait	Queensland Fruit Fly *(Bactrocera tryoni)* Mediterranean Fruit Fly *(Ceratitis capitata)*	ALL	NR	-
Sulfoxaflor (Transform) Corteva	4C	Avocado	Banana Spotting Bug Fruit Spotting Bug	ALL	7	-
Tebufenozide (Mimic)	18	Avocado	Avocado Leafroller	ALL	14	-
Tetraniliprole (Vayego) Bayer PER93099	28	Avocado	Fruit Spotting Bug (*Amblypelta* spp.) Garden Weevil (*Phlyctinus callosus*) Lepidopteran pests including Loopers & Leaf Rollers (Geometridae, Tortricidae)	ALL (excl. VIC)	7 NG	-
Trichlorfon (Lepidex)	1B	Avocado	Fruit Spotting Bug Monolepta Beetle	QLD, NSW & NT	2	R2
Trichlorfon (Lepidex) PER12450	1B	Avocado	Queensland Fruit Fly Mediterranean Fruit Fly	ACT, NSW, NT, QLD, SA & WA	7	R2

Appendix 3. Products available for weed control in avocados

Active ingredient (Trade Name)	Chemical Group	Situation	Comment / Use / Weed	WHP (days)	States	Regulatory risk
Carfentrazone-Ethyl (Spotlight)	14**	Avocado / directed spray or spot spray	Grass & Broadleaf Weeds. If weeds are already present, use as a spike in a mixture with glyphosate or paraquat.	NR	ALL	-
Carfentrazone-Ethyl + Glufosinate (Hellcat) AgNova	14** + 10**	Avocado / Directed or Shielded Spray	Grass & Broadleaf Weeds	NR G:56	ALL	R3
Clethodim (Select)	1***	Non-Bearing Fruit Trees	Grass Weeds	NR	ALL	-
Dichlobenil (Casoran)	29**	Orchards / Residual weed control	Annual grass and broadleaf weeds	NR NG	ALL	-
Fluazifop-P (Fusilade)	1***	Avocado / directed spray	Grass Weeds	NR	NSW, QLD, NT & WA	-
Flumioxazin (Chateau) Sumitomo	14**	Avocado / directed spray / Residual Weed Control	Grass and Broadleaf Weeds	98 G:28	ALL	-
Glufosinate (Basta)	10**	Avocado / directed or shielded spray	Do not allow spray to contact any part of the tree, including the trunk. Grass and broadleaf weeds	NR G:56	ALL	R3
Glyphosate (Roundup)	9**	Avocado / directed spray, shielded spray or wick wiper	Do not allow spray to contact any part of the tree, including the trunk. Grass and broadleaf weeds.	NR	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Situation	Comment / Use / Weed	WHP (days)	States	Regulatory risk
Haloxyfop (Verdict)	1***	Avocado / directed spray or spot spray	Grass weeds	NR	ALL	-
Oryzalin	3**	Avocado / Non-Bearing Fruit / directed spray	Grass and broadleaf weeds	NR	ALL	-
Oxyfluorfen (Goal)	14**	Avocado / directed spray	Grass and broadleaf weeds. If weeds are already present, use as a spike in a mixture with glyphosate or paraquat.	NR NG	ALL	-
Paraquat (Gramoxone)	22**	Orchards / directed spray or spot spray	Annual Grass and broadleaf weeds	1 G:7	ALL	R3
Paraquat + Amitrole (Guerilla) Imtrade	22** + 34**	Orchards / Directed Spray	Annual grass and broadleaf weeds Flaxleaf Fleabane	NR G:1	ALL	R3
Paraquat + Diquat (SpraySeed)	22**	Avocado / directed spray or spot spray	Grass and Broadleaf Weeds	G:1	ALL	R3
Pendimethalin (Stomp)	3**	Avocado / directed spray / Residual Weed Control	Do not allow spray to contact any part of the tree, including the trunk. Grass and broadleaf weeds.	NR	ALL	-

Chemical Group Resistance Risk: ** Moderate, *** High

Appendix 4. Plant Growth Regulators available in avocados

Active ingredient (Trade Name)	Chemical Group	Situation	Comment / Use	WHP (days)	States	Regulatory risk
1-Methylcyclopropene	PGR	Avocado / Post-Harvest	Post-harvest treatment for improved quality after shipping, storage and handling	NR	ALL	-
Paclobutrazol	PGR	Avocado	Vegetative Growth Control Fruit Drop Control	90	ALL	-
Paclobutrazol PER85877	PGR	Avocado orchards / High Density Plantings Only	Vegetative Growth Management	NR NG	ALL (excl. VIC)	-
Uniconazole-P (Sunny)	PGR	Avocados	Enhance Fruit Shape and Increase Fruit Size Reduce Vegetative Growth	14	ALL	-

Appendix 5. Current permits for use in avocados

Permit ID	Description	Date Issued	Expiry Date	Permit holder
PER94009 Version 2	Difenoconazole, Cyprodinil & Fludioxonil / Avocado / Anthracnose (Emergency Use Permit)	28-Nov-23	30-Nov-25	Hort Innovation
PER93515	Bacillus Amyloliquefaciens Strain Qst 713 (Serenade Prime) / Avocado / Stem End Rot & Anthracnose	21-Jul-23	31-Jul-25	Sunnyspot Farms
PER85877 Version 2	Paclobutrazol / Avocados / Vegetative Growth Management	29-Aug-18	31-May-26	Hort Innovation
PER93099	Tetraniliprole (Vayego) / Avocado / Fruit Spotting Bugs, Garden Weevil & Lepidopteran Pests	8-Jun-23	30-Jun-26	Hort Innovation
PER81560 Version 3	Chlorantraniliprole (Altacor) / Avocado / Lepidoptera	13-May-16	28-Feb-26	Hort Innovation
PER14597 Version 3	Methomyl (Lannate) / Avocado / Ectropis Looper	1-Apr-14	31-Mar-27	Hort Innovation
PER13859 Version 2	Dimethoate / Orchard Cleanup Fruit Fly Host Crops / Fruit Fly	09-Feb-15	31-Jul-24	Hort Innovation
PER12450 Version 7	Trichlorfon / Avocado / Fruit Fly	6-Oct-11	30-Nov-25	Hort Innovation
PER89167	Bifenazate (Acramite) / Avocado / Mites	10-May-21	31-May-24	Hort Innovation
PER85167 Version 3	Etoxazole (ParaMite) / Avocados / Six-Spotted Mite & Tea Red Spider Mite	26 Sep-17	31-May-26	Hort Innovation
PER14618 Version 4	Abamectin / Avocado / Tea Red Spider Mite & Six Spotted Mite	9-Feb-15	30-Jun-25	Hort Innovation
PER86492 Version 4	Fipronil (Monarch) / Orchards, Vineyards and Berry Farms / European Wasp	14-Sep-18	31-Aug-26	NSW Dept of Primary Industries
PER92548	Deltamethrin (MagMED) / Tropical Fruit / Mediterranean Fruit Fly	7-Sep-22	30-Sep-25	Sustainable Ventures Pty Ltd

Appendix 6. Avocado Maximum Residue Limits (MRLs)

CODEX commodity groupings of avocados and subgroups:

	Fruits
FI 0030	Tropical & Subtropical fruit – Inedible Peel
FI 2022	Tropical & Subtropical, Inedible Smooth Peel - Large
FI 0326	Avocado

Note: Export volumes have remained steady with 11,611 tonnes in 2021/22 and 10,672 tonnes in 2022/23. This represents 9.25% of Australia's total production for the year ending June 2023. Exports are focused into South-East Asia, with 48% going to Hong Kong, 32% to Singapore and 16% to Malaysia. Available information indicates that in the absence of specific limits in legislation, that some countries defer to Codex, followed by EU MRL standards, or apply a 0.01ppm default value. Food exported to New Zealand from Australia may be legally sold if it complies with Australian requirements. MRLs and legislation are subject to change; the values presented should not be relied on.

Chemical	Codex Code	Description	APVMA MRL mg/kg	Codex MRL mg/kg
2,2-DPA	FI 0326	Avocado	*0.1	-
Abamectin	FI 0326	Avocado	0.05	0.01
Acetamiprid	FI 0030	Tropical & Subtropical fruit – Inedible Peel	0.2	-
Aldrin and Dieldrin		Fruits	E0.05	-
Amitrole	FI 0326	Avocado	*0.01	-
Azoxystrobin	FI 0326	Avocado	3	-
Bifenazate	FI 0326	Avocado	T2	-
Bifenthrin	FI 0326	Avocado	T0.1	-
Buprofezin	FI 0326	Avocado	-	0.1
Carbaryl	FI 0326	Avocado	2	-
Carfentrazone-ethyl	FI 0030	Tropical & Subtropical fruit – Inedible Peel	*0.05	-
Chlorantraniliprole	FI 0326	Avocado	T2	-
Chlorpyrifos	FI 0326	Avocado	0.5	-
Clothianidin (see also thiamethoxam)	FI 0326	Avocado	-	0.03
Cyfluthrin	FI 0326	Avocado	0.1	-
Cypermethrin	FI 0326	Avocado	T0.2	-
Cyprodinil	FI 0326	Avocado	-	1
Diazinon		Fruit	0.5	-
DDT		Fruits	E1	-
Dicofol		Fruit {except strawberry}	5	-
Didecyl Dimethyl Ammonium Chloride	FI 0030	Tropical & Subtropical fruit – Inedible Peel	20	-
Difenoconazole	FI 0326	Avocado	0.5	0.6
Dimethoate	FI 0326	Avocado	3	-
Diquat		Fruit	*0.05	-
Dithianon		Fruits {except blueberries}	2	-
Dithiocarbamates	FI 0326	Avocado	7	-

Chemical	Codex Code	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Endosulfan	FI 0326	Avocado	-	0.5
Epoxiconazole	FI 0326	Avocado	0.5	-
Etoxazole	FI 0326	Avocado	T0.1	-
Fenbutatin oxide	FI 0030	Tropical & Subtropical fruit – Inedible Peel	5	-
Fenpyroximate	FI 0326	Avocado	-	0.2
Fipronil	FI 0030	Tropical & Subtropical fruit – Inedible Peel	T*0.01	-
Fluazifop-p-butyl	FI 0326	Avocado	*0.02	-
Fludioxonil	FI 0326	Avocado	2	1.5
Flumioxazin	FI 0326	Avocado	*0.02	-
Fluopyram	FI 0030	Tropical & Subtropical fruit – Inedible Peel	2	-
Flupyradifurone	FI 0030	Tropical & Subtropical fruit – Inedible Peel	1.5	-
	FI 0326	Avocado	-	0.6
Fosetyl Al	FI 0326	Avocado	5	20
Glufosinate and Glufosinate-ammonium	FI 0030	Tropical & Subtropical fruit – Inedible Peel	0.2	0.1
Glyphosate	FI 0326	Avocado	*0.05	-
Haloxyfop	FI 0030	Tropical & Subtropical fruit – Inedible Peel	*0.05	-
Imidacloprid	FI 0326	Avocado	0.2	-
Inorganic bromide	FI 0326	Avocado	75	-
Isoxaben	FI 0030	Tropical & Subtropical fruit – Inedible Peel	*0.01	-
Lindane		Fruit {except Apple, Cherries, Cranberry, Grapes, Peach, Pineapple, Plums, Strawberry}	E0.5	-
Malathion / Maldison		Fruits {except Berries and other small fruits; Citrus fruits; Dried fruits; Stone fruits}	2	-
Metalaxyl	FI 0326	Avocado	0.5	0.2
Metaldehyde		Fruit	1	-
Methiocarb		Fruit {except citrus fruits, grapes}	T0.1	-
Methomyl	FI 0326	Avocado	*0.1	-
Methoxyfenozide	FI 0326	Avocado	0.5	0.7
Methyl bromide		Fruit {except jackfruit, litchi, mango, papaya}	T*0.05	-
Omethoate	FI 0326	Avocado	0.1	-
Oryzalin		Fruit	0.1	-
Oxyfluorfen	FI 0030	Tropical & Subtropical fruit – Inedible Peel	*0.01	-
Paclobutrazol	FI 0326	Avocado	0.1	-
Paraquat		Fruits {except olives}	*0.05	-
	FI 0030	Tropical & Subtropical fruit – Inedible Peel	-	*0.01
Pendimethalin	FI 0030	Tropical & Subtropical fruit – Inedible Peel	*0.05	-
Phosphine	FI 0030	Tropical & Subtropical fruit – Inedible Peel	T*0.01	-
Phosphorous Acid	FI 0326	Avocado	500	-
Piperonyl butoxide		Fruit	8	-
Pirimicarb		Fruit {except blackberries}	0.5	-
Prochloraz	FI 0326	Avocado	5	-
	FI 0030	Tropical & Subtropical fruit – Inedible Peel	-	Po7

Chemical	Codex Code	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Propiconazole	FI 0326	Avocado	*0.02	-
Pyraclostrobin	FI 0326	Avocado	-	0.2
Pyrethrins		Fruit	1	-
Pyriproxyfen	FI 0030	Tropical & Subtropical fruit – Inedible Peel	0.3	-
Simazine		Fruit	*0.1	-
Spinetoram	FI 0030	Tropical & Subtropical fruit – Inedible Peel	0.3	-
	FI 0326	Avocado	-	0.3
Spinosad	FI 0030	Tropical & Subtropical fruit – Inedible Peel	0.3	-
Spirodiclofen	FI 0326	Avocado	-	0.9
Spirotetramat	FI 0326	Avocado	-	0.4
Sulfoxaflor	FI 0030	Tropical & Subtropical fruit – Inedible Peel	0.5	-
	FI 0326	Avocado	-	0.15
Tebuconazole	FI 0326	Avocado	0.2	-
Tebufenozide	FI 0326	Avocado	0.5	1
Thiabendazole	FI 0326	Avocado	-	Po15
Thiamethoxam	FI 0326	Avocado	-	0.5
Trichlorfon	FI 0030	Tropical & Subtropical fruit – Inedible Peel	T3	-
Trifloxystrobin	FI 0030	Tropical & Subtropical fruit – Inedible Peel	2	-
Trifluralin		Fruit	*0.05	-
Uniconazole-p	FI 0326	Avocado	0.5	-

NOTE: MRLs are constantly under review and subject to change. Check for current MRLs and do not rely on the values stated above.
Note: Available information indicates that in the absence of specific limits in legislation, some countries defer to Codex, followed by EU MRL standards or apply a 0.01ppm default value. Food exported to New Zealand from Australia may be legally sold if it complies with Australian requirements. MRLs and legislation are subject to change; the values presented should not be relied on.

* Indicates that an MRL is at the Limit of Quantitation (LOQ)
T = Temporary MRL
E = The MRL is based on extraneous residues
Po = The MRL accommodates post-harvest treatment of the commodity

Sources:
APVMA MRLs: Agricultural and Veterinary Chemicals Code (MRL Standard) Instrument 2023. Compilation 2. Prepared 7 December 2023.
CODEX MRLs: CODEX Alimentarius International Food Standards database (January 2024), http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/

Appendix 7. Avocado regulatory risk assessment

Avocado
Agrichemical Regulatory
Risk Assessment

September 2023

Regulatory pressures on agrichemicals are increasing globally, with many being either restricted or withdrawn from use. For older agrichemicals these pressures are often the result of reconsiderations involving new or refined risk assessment methodologies that requiring the generation of new data. A consequence of which can be that many of these agrichemicals are not meeting contemporary risk assessment standards as the necessary data is unavailable, or where data is available, the risk posed is considered unacceptable.

The use of agrichemicals can also be impacted through differences in standards between trading partners. The lack of an appropriate pesticide maximum residue limit (MRL) in an importing country can, for practical purposes, effectively prohibit use in the exporting country so as to ensure compliance, as a MRL breach would adversely affect market access.

The effects of the above are greater regulatory pressure placed on the use of individual agrichemicals or chemical groups. As a consequence it is possible that the number of approved agrichemical options could be adversely impacted.

To assist strategic planning, with respect to future pest management options, the following tables have been developed to highlight the regulatory threats to agrichemicals currently approved for the management of the pests and diseases in avocados as well as current initiatives aimed at addressing identified pest management deficiencies.

Avocado Agrichemical Regulatory Risk Assessment

R1	**Short-term: Critical concern over retaining access**
R2	**Medium-term: Maintaining access of significant concern**
R3	**Long-term: Potential issues associated with use - Monitoring required**

Active Constituents	Chemical Group	Problem	Comments
INSECT AND OTHER PESTS			
Abamectin	**6**	Tea red spider mite(PER14618)	EU: Restricted use to permanent greenhouses
Acetamiprid + pyriproxyfen	**4A + 7C**	Banana/Fruit-spotting bugs	Acetamiprid APVMA: Under review EU: Under review
		Fruit flies	
		Oleander scale	
		Pink wax scale	
Beta-cyfluthrin	**3A**	Banana/Fruit-spotting bugs	EU: No authorisation in place
		Swarming leaf beetle	
Bifenazate	**20D**	Six-spotted mite(PER89167)	Canada: Under review EU: Use restricted to non-edible crops in permanent greenhouses
		Tea red spider mite(PER89167)	
Carbaryl	**1A**	Red shouldered leaf beetle	Canada: Reviewed, large number of uses deleted Codex: Review scheduled, support uncertain EU: Authorisation not renewed USA: Under review
		Wingless grasshopper	
Chlorantraniliprole	**28**	Avocado leafroller(PER81560)	
		Caterpillars (PER81560)	
		Ectropis looper (PER81560)	
Chlorpyrifos	**1B**	Avocado leafroller	APVMA: Under review. Codex: All MRLs revoked Canada: Cancellation of all uses. EU: No authorisation in place USA: EPA decision to cancel use on food crops
		Fiorinia scale	
		Hairy leaf eating caterpillar	
		Ivy leafroller	
		Latania scale	
		Lightbrown apple moth	
		Red shouldered leaf beetle	
		Fruit flies(Bait spray)	

Avocado Agrichemical Regulatory Risk Assessment

Active Constituents	Chemical Group	Problem	Comment
Dimethoate	**1B**	Qld Fruit fly	Codex: MRL set at 2 mg/kg. EU: Not authorised
Etoxazole	**10B**	Six-spotted mite (PER85167)	EU: Only uses on greenhouse ornamentals approved & Candidate for substitution
Fenbutatin oxide	**12B**	Six-spotted mite Tea red spider mite	APVMA: nominated for review Codex: To be reviewed by JMPR. No supporting registrant EU: No authorisation in place
Flupyradifurone	**4D**	Banana/Fruit-spotting bugs Green plant hopper Mango plant hopper	
Lambda-cyhalothrin	**3A**	Fruit flies(PER12961 – SA Biosecurity) (Soil drench)	EU: Candidate for substitution
Methomyl	**1A**	Ectropis looper (PER14597)	APVMA: nominated for review Canada: Re-evaluation completed. Majority of uses removed EU: No authorisations in place USA: Under review
Methoxyfenozide	**18**	Avocado leafroller	EU: Proposed restricted authorisation & Candidate for substitution
Paraffinic/petroleum oil	**UNM**	Scale insects Fruit flies Greenhouse thrips	
Spinetoram	**5**	Avocado leafroller Ectropis looper Flower eating caterpillars Ivy leafroller Leafroller (Tortrix) caterpillars Lightbrown apple moth Loopers Redbanded thrips Sorghum head caterpillar Yellow peach moth	

Avocado Agrichemical Regulatory Risk Assessment

Active Constituents	Chemical Group	Problem	Comment
Spinosad	**5**	Avocado leafroller	
		Ectropis looper	
		Flower eating caterpillars	
		Ivy leafroller	
		Leafroller (Tortrix) caterpillars	
		Lightbrown apple moth	
		Loopers	
		Redbanded thrips	
		Sorghum head caterpillar	
		Yellow peach moth	
Sulfoxaflor	**4C**	Banana/Fruit-spotting bugs	USA: Pollinator concerns EU: Restricted to permanent glasshouses only
Tebufenozide	**18**	Leafroller (Tortrix) caterpillars	
Tetraniliprole	**28**	Fruit spotting bug (PER93099)	EU: No authorisation
		Garden weevil (PER93099)	
		Lepidoptera including Loopers and Leaf rollers (PER93099)	
Trichlorfon	**1B**	Banana/Fruit-spotting bugs	APVMA: nominated for review Codex: No MRLs EU: No authorisations USA: No MRLs
		Red shouldered leaf beetle	
		Fruit flies (Bait spray)	
		Fruit flies Cover spray (PER12450)	

Avocado Agrichemical Regulatory Risk Assessment

Active Constituents	Chemical Group	Problem	Comment
DISEASES			
Azoxystrobin	**11**	Anthracnose Stem-end rot	Canada: Review proposed
Azoxystrobin + fludioxonil	**11 + 12**	Side rot Stem-end rot	Fludioxonil Codex: MRL at 1.5 mg/kg EU: Under review/ Candidate for substitution
B. amyloliquefaciens Strain QST 713	**BM 02**	Anthracnose Stem-end rot	
Copper	**M1**	Anthracnose Cercospora spot Phytophthora stem rot Sooty blotch Trunk (Stem) canker	EU: Candidate for substitution
Didecyl dimethyl NH_4Cl	**-**	Sanitizer	EU: No authorisation in place
Fluopyram + trifloxystrobin	**7 + 11**	Anthracnose Stem-end rot	Trifloxystrobin Canada: Under review
Fosetyl-Al	**33**	Phytophthora root rot	Canada: Under review
Metalaxyl/metalaxyl-M	**4**	Phytophthora root rot	Metalaxyl EU: Candidate for substitution Metalaxyl-M EU: Restricted use approval
Phosphorous acid	**33**	Phytophthora root rot	
Prochloraz	**3**	Anthracnose Stem-end rot	Codex: Periodic re-evaluation scheduled EU: Not authorised
Thiram	**M3**	Anthracnose Stem-end rot	APVMA: nominated for review Canada: Cancelled all foliar uses (2021) Codex: To be reviewed 2024/25 EU: No authorisation in place

Active Constituents	Chemical Group	Comment
WEEDS		
Diquat	**22**	APVMA: Currently under review EU: Not authorised
Fluazifop	**1**	
Flumioxazin	**14**	EU: Candidate for substitution
Glufosinate	**10**	Canada: review proposed EU: No authorisations
Glyphosate	**9**	Ongoing issues internationally EU: Under review
Haloxyfop-P	**1**	EU: Not authorised
Oryzalin	**3**	EU: Not authorised
Oxyfluorfen	**14**	EU: Candidate for substitution USA: Interim review decision Label amendments proposed
Paraquat	**22**	APVMA: Currently under review Canada: Review initiated EU: No authorisation in place Rotterdam Convention - nomination
Pendimethalin	**3**	EU: Candidate for substitution
PLANT GROWTH REGULATORS		
1-methylcyclopropene (Po)	-	
Paclobutrazol (PER85877)		EU: Candidate for substitution
Uniconazole-P	**3**	Vegetative growth control

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Avocado Agrichemical Regulatory Risk Assessment

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