Custard Apple

Strategic Agrichemical Review Process
(SARP)

May 2022

Hort Innovation
Project – MT21005

Hort Innovation Project Number:
MT21005 –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 custard apple industry across Australia. The information in this report will assist the industry with its agrichemical selection and usage into the future.

Date of report:
May 2022

Disclaimer:
Hort Innovation makes no representations and expressly disclaims all warranties (to the extent permitted by law) about the accuracy, completeness, or currency of information in the Custard Apple SARP Report. Users of this material should take independent action before relying on its accuracy in any way.

Reliance on any information provided by Hort Innovation is entirely at your own risk. Hort Innovation is not responsible for, and will not be liable for, any loss, damage, claim, expense, cost (including legal costs) or other liability arising in any way (including from Hort Innovation or any other person's negligence or otherwise) from your use or non-use of the Custard Apple SARP Report, or from reliance on information contained in the material or that Hort Innovation provides to you by any other means.

Communications Manager
Hort Innovation
Level 7, 141 Walker Street
North Sydney NSW 2060
Australia
Email: communications@horticulture.com.au
Phone: 02 8295 2300

Hort Innovation Strategic levy investment | CUSTARD APPLE FUND

This project has been funded by Hort Innovation using the custard apple research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit horticulture.com.au

Table of Contents

1. Summary

A Strategic Agrichemical Review Process (SARP), through the process of a desktop audit and industry liaison;

(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 custard apple 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

There were no high priority diseases identified but the moderate priority diseases are:

Common Name	Scientific Name
Phytophthora Root Rot	*Phytophthora* spp.
Anthracnose / Pepper Spot	*Colletotrichum gloeosporioides*.
Pseudocercospora Spot	*Pseudocercospora annonicola*
Purple Blotch / Phytophthora Fruit Rot	*Phytophthora capsici*
Bacterial Wilt / Collar Rot	*Pseudomonas solanacearum*
Black Canker	*Phomopsis annonacearum*
Cylindrocladium Fruit Rot	*Cylindrocladium colhounii and Cylindrocladium scoparium*
Diplodia Fruit Rot	*Lasiodiplodia theobromae*

1.2 Insects and mites

The high priority insect and mite pests are:

Common Name	Scientific Name
Fruit Spotting Bug	*Amblypelta nitida*
Banana Spotting Bug	*Amblypelta lutescens*
Queensland Fruit Fly	*Bactrocera tryoni*

1.3 Weeds

There were no high priority weeds identified but the following were rated as a moderate priority:

Common name	Scientific name
Flaxleaf Fleabane	*Conyza bonariensis*
Couch Grass	*Cynodon dactylon*

1.4 Plant Growth Regulators

Plant Growth Regulator issue priorities were not determined.

2. The Australian Custard Apple Industry

Custard Apples are a tree fruit that are suited to growing in tropical and sub-tropical climates. The type of custard apple grown in Australia is unique in the world, known botanically as an atemoya.

Total production for the year ending June 2021 was 1,836 tonnes[1]. Wholesale value of fresh supply was $8.7 m, with $7.3 m distributed into retail and $1.5 m into food service.

Custard Apples are grown in Queensland and NSW, with the major growing regions being Atherton, Sunshine Coast and Lismore.

Custard Apple Seasonality by State

State	20/21 t	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
New South Wales	888												
Queensland	948												
Availability legend			High			Medium			Low			None	

The volume of custard apples that Australia imports and exports is negligible. Total exports account for just 5% of annual production with most of this going to Hong Kong and Singapore.

[1] Hort Innovation (2021). Australian Horticulture Statistics Handbook 2020/21. [online] Available at: https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/grower-resources/ha18002-assets/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 custard apple 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 custard apple industry regarding pesticide access, Hort Innovation undertook a review of the pesticide requirements via a Strategic Agrichemical Review Process (SARP) in 2014. The current project is to update the SARP with the latest information and progress.

The SARP process identifies diseases, insect pests and weeds of major concern to the custard apple 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 custard apple 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 custard apple but attempts to prioritise the major problems.

Exotic plant pests, not present in Australia, are not addressed in this document.

3.2 Minor use permits and registration

From a pesticide access perspective, the APVMA classifies Custard Apples as a minor crop. The crop fits within the APVMA crop group 006: Assorted Tropical and Sub-Tropical Fruits – Inedible Peel, Subgroup 006C, Assorted Tropical and Sub-Tropical, Inedible Rough or Hairy Peel - Large. Therefore, access to minor use permits can be relatively straight forward as long as a reasonable justification is provided in accordance with the APVMA's minor use guidance[2].

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 custard apple industry is for manufacturers to register new pesticides uses in the crop.

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

3.3 Methods

The current update of the Custard Apple Strategic Agrichemical Review Process (SARP), which was last updated in 2014, was conducted by desktop audit using industry information gathered during 2021-2022. The process included gathering, collating and confirming information:

Process of Review	Activity
Industry survey	Preparation and circulation of online industry survey to update priority pests and identify priority control gaps. Survey released: 17 November 2021 Survey closed: 28 February 2022
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

3.4 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 custard apple
Appendix 2. Products available for control of insects and mites in custard apple
Appendix 3. Products available for weed control in custard apple
Appendix 4. Plant growth regulators available in custard apple
Appendix 5. Current permits for use in custard apple
Appendix 6. Custard Apple Maximum Residue Limits (MRLs)
Appendix 7. Custard Apple Agrichemical Regulatory Risk Assessment

4. Diseases, Pests and Weeds of Custard Apples

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[3].

In Chapter 4 information on regulatory risk derived from project MT20007 (Regulatory support and coordination) has been incorporated.

Some of the suggested options have no overseas MRLs (see Appendix 6).

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.

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

4.1 Diseases of custard apples

4.1.1 Disease priorities

Common name	Scientific name
Moderate	
Phytophthora Root Rot	*Phytophthora* spp.
Anthracnose / Pepper Spot	*Colletotrichum gloeosporioides*
Pseudocercospora Spot	*Pseudocercospora annonicola*
Purple Blotch / Phytophthora Fruit Rot	*Phytophthora capsici*
Bacterial Wilt / Collar Rot	*Pseudomonas solanacearum*
Black Canker	*Phomopsis annonacearum*
Cylindrocladium Fruit Rot	*Cylindrocladium colhounii, Cylindrocladium scoparium*
Diplodia Rot	*Lasidiodiplodia theobromae*
Low	
Armillaria Root Rot	*Armillaria luteobubalina*
Pink Disease	*Erythricium salmonicolor*

There were no high priority diseases identified for the custard apple industry, although several were rated as moderate priority. The most significant of these were Phytophthora Root Rot, Anthracnose, Pseudocercospora Spot and Purple Blotch. Available and potential products for control of diseases are listed in Section 4.1.2.

Fungicides should be supplemented by cultural practices to increase airflow and minimise moisture in the plant canopy. This can include planting configuration and irrigation management. Other cultural controls include the use of disease-free seed and/or transplants, resistant varieties, and general farm hygiene including removal of crop residues and controlling weeds in and around crops.

Resistance Management

Resistance by fungal pathogens to fungicides usually evolves following the intensive use of fungicides for disease control. In any fungal population there are likely to be individuals that have some degree of natural resistance, and which are less susceptible to fungicides, even before the chemicals are used. Resistance arises mainly through the incorrect use of fungicides, which selects for the resistant individuals. Continued use of a fungicide or fungicide chemical group can result in a significant build-up of resistant individuals in the fungal population – to the point where that particular product, or other products from the same chemical group, is no longer effective. In some cases, removal of the selection pressure can result in the fungal population regaining its sensitivity to the fungicide group, but this is not always the case. The risk of fungicide resistance developing varies between different chemical groups and different

fungal pathogens, such that specific strategies are recommended for those situations considered to carry the highest risk[4].

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

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 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

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory Risk
Phytophthora Root Rot (*Phytophthora* spp.) **Priority: Moderate**							
Rated as a moderate priority in QLD and NSW. Phytophthora is a widespread soil-borne pathogen that thrives in poorly drained soil and warm temperatures. Young roots are especially susceptible to infection. 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.							
Phosphorous Acid PER13807	33	Protectant & Curative	NR	A	ALL (excl. VIC)	Permitted in custard apples for control of **Phytophthora**. Apply as a foliar spray, with a maximum of 8 applications per crop. Curative: Apply every 3 weeks until disease is under control. Preventative: Apply every 5-6 weeks.	-
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime) Bayer	BM 02	Biological Soil Ameliorant	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.	-
Copper	M1	Protectant	1	P-A	QLD & NSW	Registered in tropical fruit for control of **Phytophthora** Stem Canker.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory Risk
Mandipropamid (Revus) Syngenta	40	Protectant & Curative		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**.	-
Metalaxyl-M (Ridomil Gold 25G) Syngenta	4	Protectant & Curative		P		Registered for control of **Phytophthora Root Rot** in avocado, macadamia and peaches.	-
Oxathiapiprolin (Zorvec Enicade) Corteva	49	Protectant & Curative		P		Registered for control of Downy Mildew in bulb vegetables, brassica vegetables, cucurbits, leafy vegetables, brassica leafy vegetables and poppies. US registration for control of **Phytophthora** Canker and Brown Rot in citrus.	-
Streptomyces lydicus (Actinovate)	BM 02	Biological	NR	P		Registered for the suppression of Powdery Mildew and **Phytophthora** in strawberries.	-
Anthracnose / Pepper Spot (*Colletotrichum gloeosporioides*) **Priority: Moderate**							
Rated as a moderate priority in NSW and QLD. Disease is favoured by warm, humid conditions and requires both in-crop and post-harvest treatment to ensure good fruit quality. Infection generally occurs during flowering and fruit set although symptoms may not appear until after harvest. Good orchard hygiene is critical to support fungicide applications.							
Bromo Chloro Dimethyl Hydantoin (BCDMH)	-	Sanitiser / Post-Harvest Treatment	NR	A	ALL	Registered in fruit as a post-harvest treatment for control of External Rot Causing Organisms. Post-harvest spray or dip. Minimum contact time 60 seconds. Can also be used as a general disinfectant for equipment.	-
Chlorine	-	Sanitiser / Post-Harvest Treatment	NR	A	ALL	Registered in fruit as a post-harvest treatment for control of 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.	-
Copper PER11943	M1	Protectant	1	A	ALL (excl. VIC)	Permitted in custard apple for control of **Anthracnose**. Apply from flowering to harvest when conditions favour disease development. Do not use more than 6 applications per crop, with a retreatment interval of 14-28 days.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory Risk
Didecyl Dimethyl Ammonium Chloride (Sporekill)	-	Sanitiser / Post-Harvest Treatment	NR	A	ALL	Registered in tropical & sub-tropical fruit (inedible peel) as a post-harvest treatment for control of bacteria and fungi. Dip fruit for 3 minutes.	-
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative	3 NG	A	ALL	Registered in tropical and sub-tropical fruit (inedible peel) for control of **Anthracnose** and Stem End Rot. Do not use more than 3 applications per season, with a retreatment interval of 14-21 days.	-
Iodine	M	Tropical and Sub-Tropical Fruit / Post Harvest Dip	NR	A	ALL	Registered in tropical and sub-tropical fruit as a post-harvest dip for control of bacteria and fungi. Dip the fruit for a minimum of 1 minute.	-
Mancozeb PER11943	M3	Protectant	14	A	ALL (excl. VIC)	Permitted in custard apple for control of **Anthracnose**. Apply from flowering to harvest when conditions favour disease development. Do not use more than 6 applications per crop, with a retreatment interval of 7-28 days.	R2
Peroxyacetic Acid	M	Sanitiser / Post-Harvest Treatment	NR	A	ALL	Registered in fruit as a post-harvest treatment for bacteria. Post-harvest spray or dip. Ensure a minimum of 45 seconds contact time.	-
Prochloraz (Octave) PER83212	3	Protectant & Curative	NR NG	A	ALL (excl. VIC)	Permitted in custard apple for control of **Anthracnose**. Apply as a foliar application during flowering and early fruit set only. Apply at 21-28 day interval. In prolonged wet weather reduce the interval to 14 days. Do not apply more than 3 applications per crop, and no more than 2 consecutive applications.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory Risk
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Hort Innovation project ST16006 generated data to support a label registration for the control of **Anthracnose** in tropical and sub-tropical fruit (inedible peel). Bayer label extension was submitted to the APVMA on 15-Sep-21 and expected registration last quarter of 2022 Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of Powdery Mildew, Alternaria Leaf Spot, Gummy Stem Blight, Septoria, Botrytis, Cladosporium, Cercospora, Sclerotinia, Rust and **Anthracnose** and suppression of Rhizoctonia in almond, Brassica leafy vegetables, legume vegetables, melons and various fruit crops.	R3
Aureobasidium pullulans (Botector) Nufarm	BM 01	Biological	NR	P		Registered in grapes and berries for control of Botrytis and suppression of several other fungal pathogens (**Anthracnose**, Phomopsis and Rhizopus) in berries. US registration for control of **Anthracnose** in berries, stone fruit, almonds, fruiting vegetables, cucurbits, leafy vegetables, ornamentals and hops.	-
Bacillus amyloliquefaciens (Serenade Opti) Bayer	BM 02	Biological	NR	P		Registered for control of **Anthracnose** in avocado and several tropical fruits.	-
Bacillus amyloliquefaciens strain MBI 600 (Serifel) BASF	BM 02	Biological	NR	P		Registered for control of Botrytis in grapevines and strawberries. US registration for control of **Anthracnose** in artichoke, asparagus, berries, citrus, cucurbits, fruiting vegetables, pome fruit, stone fruit, tobacco, root and tuber vegetables (except sugar beet) and tree nuts.	-
BLAD (Problad Plus)	BM 01	Biological	NR	P		Registered in stone fruit for suppression of Brown Rot. US registration for control of **Anthracnose** in grapes and strawberries.	**-**
Florylpicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New active in development from Corteva with activity on Septoria, Powdery Mildew, Botrytis, **Anthracnose**, Alternaria, Scab, Monilinia, Rust and *Mycosphaerella* spp. Scheduled for JMPR evaluation in 2023.	-
Fludioxonil (Scholar) Syngenta	12	Protectant / Post-Harvest Treatment		P		Registered as a post-harvest dip or flood spray for control of **Anthracnose** in mangoes.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory Risk
Azoxystrobin + Fludioxonil (Graduate A+) Syngenta	11+12	Protectant / Post-Harvest Treatment		P		Registered as a post-harvest dip, drench or flood spray for control of Side Rot caused by **Anthracnose** and Stem End Rot in avocado.	R3
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Protectant & Curative		P		Registered for control of *Botrytis* in berries, grapes and strawberries and control of *Botrytis* and *Sclerotinia* in leafy vegetables, lettuce and potatoes. US registration for control of **Anthracnose** in berries and grape and small fruit vine climbing (except fuzzy Kiwifruit) and suppression of **Anthracnose** in lemon and lime.	R3
Pseudocercospora Spot *(Pseudocercospora annonicola)* **Priority: Moderate**							
Rated as a moderate priority in QLD and NSW. Favoured by wet conditions, infection causes significant reduction in fruit quality. A regular fungicide program is necessary to manage the disease in crop as well as using good orchard hygiene and canopy management.							
Copper Oxychloride	M1	Protectant	1	A	QLD & NSW	Registered in custard apples for control of **Massasso Spot** and Purple Blotch. Apply every 2 weeks when disease is present, or at the start of wet weather. Maximum number of treatments not specified.	-
Mancozeb	M3	Protectant	1	A	ALL	Registered in custard apple for control of **Pseudocercospora Fruit Spot**. Do not apply during flowering. Apply at 3–4-week intervals from first fruit set until harvest. Apply at 2-week intervals in wet, cloudy weather.	R2
Pyraclostrobin (Cabrio) PER13952	11	Protectant & Curative	3	A	NSW & QLD	Permitted in custard apple for control of **Pseudocercospora Fruit Spot** (*Pseudocercospora anonicola*). Do not use more than 3 applications per season, with a minimum retreatment interval of 7 days.	-
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative	3 NG	P-A	ALL	Registered for control of Anthracnose and Stem End Rot in tropical and sub-tropical fruit (inedible peel). US registration for control of *Cercospora* spp. in brassica vegetables, carrots, leafy greens and leaf petioles.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory Risk
Tebuconazole + Fluopyram (Luna Experience) Bayer	3+7	Protectant & Curative		P		Hort Innovation project ST16006 generated data to support a label registration for the control of Anthracnose in tropical and sub-tropical fruit (inedible peel). Bayer label extension was submitted to the APVMA on 15-Sep-21 and expected registration last quarter of 2022. Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of Powdery Mildew, Alternaria Leaf Spot, Gummy Stem Blight, Septoria, Botrytis, Cladosporium, Cercospora, Sclerotinia, Rust and Anthracnose and suppression of Rhizoctonia in almond, Brassica leafy vegetables, legume vegetables, melons and various fruit crops.	R3
Difenoconazole + Azoxystrobin (Amistar Top) Syngenta	3+11	Protectant & Curative		P		Registered for control of Leaf Blight (*Alternaria* and *Cercospora*) in carrots, and various leaf diseases in potatoes and carrots.	R3
Florylpicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New active in development from Corteva with activity on Septoria, Powdery Mildew, Botrytis, Anthracnose, Alternaria, Scab, Monilinia, Rust and *Mycosphaerella* spp. Scheduled for JMPR evaluation in 2023.	-
Penthiopyrad (Fontelis) Corteva	7	Protectant		P		Registered for control of Husk Spot (***Pseudocercospora* spp.**) in macadamia.	-
Fludioxonil + Pydiflumetofen (Miravis Prime) Syngenta	7+12	Protectant & Curative		P		Registered for control of *Botrytis* in berries, grapes and strawberries and control of *Botrytis* and *Sclerotinia* in leafy vegetables, lettuce and potatoes. US registration for control of ***Pseudocercospora* spp.** in grapes and small fruit climbing subgroup (except fuzzy kiwifruit).	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory Risk
Purple Blotch / Phytophthora Fruit Rot (*Phytophthora capsici*) **Priority: Moderate**							
Rated as a moderate priority in NSW and QLD. Infection causes discolouration of fruit both externally and internally, with affected fruit dropping readily. A small amount of infection in harvested fruit can spread through whole trays. Avoid the use of irrigation systems that throw water directly onto fruit, as this can be a source of infection.							
Copper Oxychloride	M1	Protectant	1	A	QLD & NSW	Registered in custard apples for control of Massasso Spot and **Purple Blotch**. Apply prior to heavy rains. After prolonged wet weather, apply a further treatment at the first fine weather. Spray the tree below 1.5m height, the trunk and surrounding ground area. Maximum number of treatments not specified.	-
Phosphorous Acid PER13807	33	Protectant & Curative	NR	A	ALL (excl. VIC)	Permitted in custard apple for control of **Phytophthora**. Apply as a foliar spray, with a maximum of 8 applications per crop. Curative: Apply every 3 weeks until disease in under control. Preventative: Apply every 5-6 weeks.	-
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime) Bayer	BM 02	Biological Soil Ameliorant	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.	-
Copper	M1	Protectant	1	P-A	QLD & NSW	Registered in tropical fruit for control of **Phytophthora** Stem Canker.	-
Mandipropamid (Revus) Syngenta	40	Protectant & Curative		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**.	-
Metalaxyl-M (Ridomil Gold 25G) Syngenta	4	Protectant & Curative		P		Registered for control of **Phytophthora Root Rot** in avocado, macadamia and peaches.	-
Oxathiapiprolin (Zorvec Enicade) Corteva	49	Protectant & Curative		P		Registered for control of Downy Mildew in bulb vegetables, brassica vegetables, cucurbits, leafy vegetables, brassica leafy vegetables and poppies. US registration for control of **Phytophthora** Canker and Brown Rot in citrus.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory Risk
Streptomyces lydicus (Actinovate)	BM 02	Biological	NR	P		Registered in strawberries for the suppression of Powdery Mildew and **Phytophthora**.	-
Bacterial Wilt (Collar Rot) (*Pseudomonas solanacearum*) **Priority: Moderate**							
Rated as a moderate priority QLD and as a low priority in NSW. Soil is the source of infection so avoid planting custard apples into areas that have recently grown susceptible vegetable crops. Maintain good drainage and select rootstocks that are less susceptible to the disease. Potential weed hosts should be removed from orchards (wild tobacco, cobblers pegs, night shade, blackberry & cape gooseberry.							
Copper Oxychloride	M1	Protectant	1	P-A	QLD & NSW	Registered in custard apples for control of Massasso Spot and Purple Blotch. Registered for control of ***Pseudomonas* spp.** in apricots, cherries, beans, brassicas, cucurbits, tomatoes and tobacco seed beds.	-
Acibenzolar-S-Methyl (Actigard Plant Activator) Syngenta	P01	Protectant		P		Registered for control of Powdery Mildew and Bacterial Spot in tomatoes.	-
Aureobasidium pullulans (Botector) Nufarm	BM 01	Biological	NR	P		Registered for control of *Botrytis* and suppression of several other fungal pathogens (*Anthracnose, Phomopsis* and *Rhizopus*) in grapes and berries.	-
Bacillus amyloliquefaciens (Serenade Opti) Bayer	BM 02	Biological	NR	P		Registered in grapes and strawberries for control of Botrytis, in tomatoes, capsicums and chillies for suppression of Bacterial Spot and in avocado, other tropical fruit crops (excluding banana) and mango for control of Anthracnose and suppression of Stem End Rot. US registration for control of ***Pseudomonas syringae*** in berries, cucurbits and stone fruit.	-
Bacillus amyloliquefaciens strain MBI 600 (Serifel) BASF	BM 02	Biological	NR	P		Registered for control of *Botrytis* in grapes and strawberries.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory Risk
Black Canker (*Phomopsis annonacearum*) **Priority: Moderate**							
Rated as a moderate priority in QLD and as low priority in NSW. Fungicide control is rarely required, provided that orchard hygiene and canopy airflow is well maintained.							
Copper	M1	Protectant	1	P-A	QLD & NSW	Registered in tropical fruit for control of Phytophthora Stem Canker. Registered for control of ***Phomopsis* spp.** in grapes.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Hort Innovation project ST16006 generated data to support a label registration for the control of Anthracnose in tropical and sub-tropical fruit (inedible peel). Bayer label extension was submitted to the APVMA on 15-Sep-21 and expected registration last quarter of 2022. Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for suppression of **Phomopsis** Cane and Leaf Spot in grapes, and in California for control of **Phomopsis** Canker and Blight in walnuts.	R3
Aureobasidium pullulans (Botector) Nufarm	BM 01	Biological	NR	P		Registered for control of *Botrytis* and suppression of several other fungal pathogens (*Anthracnose,* ***Phomopsis*** and *Rhizopus*) in grapes and berries.	-
Azoxystrobin (Amistar)	11	Protectant / Curative		P		Registered for control of **Phomopsis** in mangoes.	-
Mancozeb + Metalaxyl-M (Ridomil Gold MZ) Syngenta	M3+4	Protectant		P		Registered for control of **Phomopsis** Leaf Blight in strawberries.	R2
Cylindrocladium Fruit Rot (*Cylindrocladium colhounii and Cylindrocladium scoparium*) **Priority: Low**							
Rated as a moderate priority in QLD and as low priority in NSW. Infections are favoured by prolonged wet weather in autumn. Rarely requires specific control measures.							
Azoxystrobin (Amistar)	11	Protectant / Curative		P		US registration for control of ***Cylindrocladium* spp.** in peanuts.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory Risk
Bacillus amyloliquefaciens strain MBI 600 (Serifel) BASF	BM 02	Biological	NR	P		Registered for control of *Botrytis* in grapes and strawberries. US registration for control of **Cylindrocladium** Black Spot in oilseeds.	-
Penthiopyrad (Fontelis) Corteva	7	Protectant		P		US registration for control of **Cylindrocladium Black Rot** in peanuts.	-
Diplodia Fruit Rot (*Lasiodiplodia theobromae*.) **Priority: Low**							
Rated as a moderate priority in QLD and as low priority in NSW. Post-harvest treatments used for control of Anthracnose should also control Diplodia Fruit Rot. Reduce orchard crowding to reduce in-crop infections. Remove mummified fruit & dead twigs before fruiting commences in the orchard.							
Bromo Chloro Dimethyl Hydantoin (BCDMH)	-	Sanitiser / Post-Harvest Treatment	NR	A	ALL	Registered in fruit as a post-harvest treatment for control of External Rot Causing Organisms. Post-harvest spray or dip. Minimum contact time 60 seconds. Can also be used as a general disinfectant for equipment.	-
Chlorine	-	Sanitiser / Post-Harvest Treatment	NR	A	ALL	Registered in fruit as a post-harvest treatment for control of 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 (Sporekill)	-	Sanitiser / Post-Harvest Treatment	NR	A	ALL	Registered in tropical & sub-tropical fruit (inedible peel) as a post-harvest treatment for control of bacteria and fungi. Dip fruit for 3 minutes.	-
Iodine	M	Tropical and Sub-Tropical Fruit / Post Harvest Dip	NR	A	ALL	Registered in tropical and sub-tropical fruit as a post-harvest dip for control of bacteria and fungi. Dip the fruit for a minimum of 1 minute.	-
Fludioxonil (Scholar) Syngenta	12	Protectant / Post-Harvest Treatment		P		Registered as a post-harvest treatment for control of **Diplodia** Stem End Rot in citrus.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory Risk
Fludioxonil + Azoxystrobin (Graduate A+) Syngenta	12+11	Protectant / Post-Harvest Treatment		P		Registered as a post-harvest dip, drench or flood spray for control of ***Lasiodiplodia* sp.** in avocado.	R3
Armillaria Root Rot (*Armillaria* spp.) **Priority: Low**							
Rated as a low priority in QLD and NSW. Soil borne disease that occurs sporadically in older orchards. Consider soil preparation approaches prior to replanting into areas with a history of the disease.							
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime) Bayer	BM 02	Biological Soil Ameliorant	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.	-
Streptomyces lydicus (Actinovate)	BM 02	Biological	NR	P		Registered for the suppression of various diseases in strawberries, carrots, cucurbits and fruiting vegetables. US registration for control of **Armillaria Root Rot** in berries, olives, stone fruit, tree nuts, tropical & sub-tropical fruit (edible peel) and tropical & sub-tropical fruit (inedible peel).	-
Pink Disease (*Erythricium salmonicolor*) **Priority: Low**							
Rated as a low priority in QLD and NSW. Sporadic disease that only occurs in older trees under stress. Maintain air flow in the canopy and remove and burn any affected limbs.							
Copper	M1	Protectant	1	P-A	QLD & NSW	Registered in tropical fruit for control of Phytophthora Stem Canker. Registered for control of Pink Limb Blight (***Corticum salmonicolor***) in macadamia.	-

4.2 Insect and mite pests of custard apples

4.2.1 Insect and mite pest priorities

Common name	Scientific name
High	
Fruit Spotting Bug	*Amblypelta nitida*
Banana Spotting Bug	*Amblypelta lutescens*
Queensland Fruit Fly	*Bactrocera tryoni*
Moderate	
Mediterranean Fruit Fly	*Ceratitis capitata*
Lesser Queensland Fruit Fly	*Bactrocera neohumeralis*
Blue Triangle Butterfly	*Graphium sarpedon* ssp. *choredon*
Yellow Peach Moth	*Conogethes punctiferalis*
Fruit Piercing Moth	*Eudocima salaminia*
Citrus Mealybug	*Planococcus citri*
Scale Insects	Coccidae/Diaspididae/Eriococcidae
Two Spotted Mite	*Tetranychus urticae*
Banana Spider Mite	*Tetranychus lambi*
Strawberry Spider Mite	*Tetranychus turkestani*
Ants	Formicidae
Low	
Red Banded Thrips	*Selenothrips rubrocinctus*
Avocado Leaf Roller	*Homona spargotis*
Ivy Leaf Roller	*Cryptoptila immersana*
Light Brown Apple Moth	*Epiphyas postvittana*
Flowereating Caterpillars	Lepidoptera
Loopers	Geometridae
Fall Armyworm	*Spodoptera frugiperda*
Longicorn Trunk Borer	*Acalolepta mixtus*
Red Shouldered Leaf Beetle	*Monolepta australis*
Swarming Leaf Beetle	*Rhyparida* spp.

Common name	Scientific name
Flatid Planthopper	*Flatormenis* spp.
Green Vegetable Bug	*Nezara viridula*

The high priority insect pests identified by the survey were Fruit Spotting Bug, Banana Spotting Bug and Queensland Fruit Fly. Available and potential products for insect, mite and other pests are listed in Section 4.2.2.

Biological control involving other insects or fungal organisms in insect pest control is another option that need to be further evaluated. There are several identified biological control agents commercially available for pests in Australia.

Resistance Management

Insecticide resistance is a risk to effective control for some insect groups, particularly if there is an over-reliance on a limited number of insecticides. Growers should adhere to the resistance management strategies outlined on the CropLife website[5]. Growers should not exceed the maximum number of applications permitted on the insecticide label.

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

4.2.2 Available and potential products for priority insects and mites

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
IPM – indicative overall impact on beneficials (based on the Cotton Pest Management Guide 2018-19 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**								
Rated as a high priority in QLD and a moderate priority in NSW. 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 PER89943	4A+7C	Contact & Ingestion	28 NG	A	ALL (excl. VIC)	Pending Label Registration with ADAMA for the tropical inedible peel crop group. (Hort Innovation project ST16006). Permitted in custard apples for control of **Fruit Spotting Bugs** (*Amblypelta nitida*, *A.lutescens*), Mealybugs (Pseudococcidae), Scale Insects (Coccoidea) and Light Brown Apple Moth (*Epiphyas postvittana*) and suppression of Queensland Fruit Fly (*Bactrocera tryoni*) and Mediterranean Fruit Fly (*Ceratitis capitata*). Do not use more than 2 applications per season. Do not apply less than 14 days after the initial treatment.	M Bee:M	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Beta-Cyfluthrin (Bulldock) PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in custard apple (field grown) for control of **Fruit-Spotting Bug** (*Amblypelta nitida*), **Banana-Spotting Bug** (*Amblypelta lutescens*), Elephant or Rhino Beetle (*Xylotrupes gideon*), Red-Shouldered Leaf Beetle (*Monolepta australis*), Swarming Leaf Beetle (*Rhyparida* spp.), Longicorn Trunk Borer (*Acalolepta vastator*), Macadamia Nut Borer (*Cryptophlebia ombrodelta*), Mango Tip Borer (*Penicillaria jocosatrix*), Flatid Planthopper (Flatidae), Green Vegetable Bug (*Nezara viridula*), Lychee Stink Bug (*Tessaratoma papillosa*) and Yellow Peach Moth (*Conogethes punctiferalis*). Do not use at flowering. Do not use more than 4 applications per year with a minimum of 21 days between consecutive sprays.	VH Bee:H	-
Sulfoxaflor (Transform) Corteva PER86598	4C	Contact & Ingestion	1	A	ALL (excl. VIC)	Permitted in custard apple for control of Citrus Mealybug (*Planococcus citri*), **Fruit-Spotting Bug** (*Amblypelta nitida*) and **Banana-Spotting Bug** (*Amblypelta lutescens*). Apply a maximum of 2 foliar applications per season, with a 14-day re-treatment interval between consecutive sprays. Pending Label Registration (submitted Jul-21) with Corteva for the tropical inedible peel crop group. (Hort Innovation project ST16006)	M Bee:H	-
Trichlorfon PER14743	1B	Contact	7	A	ALL (excl. VIC)	Permitted in custard apple for control of Flatid Planthopper, Flower-Eating Caterpillar, Loopers, Yellow Peach Moth (*Conogethes punctiferalis*) and suppression of **Fruit-Spotting Bug** (*Amblypelta nitida*), **Banana-Spotting Bug** (*Amblypelta lutescens*), Green Vegetable Bug (*Nezara viridula*) and Lychee Stink Bug (*Lyramorpha rosea*). Do not use more than 6 applications per crop with a minimum re-treatment interval of 7-10 days between consecutive applications.	H Bee:H	R2
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion		P		Pending Label Registration with Bayer (submitted Dec-21) for the tropical inedible peel crop group. (Hort Innovation project ST19020). Registered for control of Fruit Spotting Bug in macadamias, avocados, mangoes and papaya.	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registration of isocycloseram submitted to the APVMA May-2020, for use in citrus and vegetables for control of various insect and mite pests, in conjunction with the approval of the active constituent isocycloseram. Hort Innovation project ST20006 will be undertaking efficacy trials for various pests including, Leafroller Moth /Lepidoptera pests.	-	-
Queensland Fruit Fly (*Bactrocera tryoni*) **Mediterranean Fruit Fly** (*Ceratitis capitata*) **Lesser Queensland Fruit Fly** (*Bactrocera neohumeralis*) **Priority: High**								
Queensland Fruit Fly is rated as a high priority in QLD and as a moderate priority in NSW. Mediterranean Fruit Fly is rated as a high priority in QLD a low priority in NSW. Lesser Queensland Fruit Fly is rated as a high priority in QLD a low priority in NSW. Queensland Fruit Fly lay eggs in ripening fruit, subsequently hatching maggots that cause feeding damage to the flesh. A range of control measures should be implemented in order to control the pest and avoid fruit damage.								
4-(P-Acetoxyphenyl)-2-Butanone + Malathion	1B	Contact	NR	A	ALL	Registered as a Lure Trap for control of **Queensland Fruit Fly**. For use as a monitoring tool in conjunction with a routine baiting program or cover sprays.	H Bee:H	R3
Acetamiprid + Pyriproxyfen (Trivor) Adama PER89943	4A+7C	Contact & Ingestion	28 NG	A	ALL (excl. VIC)	Pending Label Registration with ADAMA for the tropical inedible peel crop group. (Hort Innovation project ST16006). Permitted in custard apples for control of Fruit Spotting Bugs (*Amblypelta nitida*, *A.lutescens*), Mealybugs (Pseudococcidae), Scale Insects (Coccoidea) and Light Brown Apple Moth (*Epiphyas postvittana*) and suppression of **Queensland Fruit Fly** (*Bactrocera tryoni*) and **Mediterranean Fruit Fly** (*Ceratitis capitata*). Do not use more than 2 applications per season. Do not apply less than 14 days after the initial treatment.	M Bee:M	R2
Dimethoate	1B	Contact	NR	A	NSW, WA & NT	Registered in custard apples as a post-harvest dip for control of **Queensland Fruit Fly**. Dip the fruit for 1 minute and allow to drain before packing.	H Bee:H	R1

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
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
Dimethoate PER87164	1B	Contact	NR	A	ALL	Permitted in custard apples as a post-harvest treatment for control of **Fruit Fly**. Apply as either a dip by immersing fruit for 1 minute, or as a floodspray to provide coverage of fruit for a minimum of 10 seconds after which the fruit must remain wet for not less than 60 seconds.	H Bee:H	R1
Malathion	1B	Contact	3	A	ALL	Registered in fruit trees as a bait for control of **Fruit Fly**. Apply as a low pressure coarse foliar, strip or spot spray throughout the orchard or in Fruit Fly hot spots. Apply weekly from 6 weeks prior to harvest until 2 weeks after harvest. Do not apply directly to fruit.	H Bee:H	R3
Pyrethrins (Pyganic)	3A	Contact	1	A	ALL	Registered in sub-tropical fruit (inedible peel) as a clean-up spray just prior to harvest for control of **Fruit Fly**, Rutherglen Bug and Spiders. Maximum number of applications not specified.	VH Bee:H	-
Spinosad (Naturalure) Corteva	5	Ingestion	NR	A	ALL	Registered in tree crops as a bait application for the control of **Queensland Fruit Fly** and **Mediterranean Fruit Fly**. Apply as a band or a spot spray every 7 days. Maximum number of applications not specified.	L Bee:L	-
Trichlorfon (Lepidex) PER12450	1B	Contact	7 G:7	A	ALL (excl. VIC, TAS)	Permitted in custard apple for control of **Queensland Fruit Fly** and **Mediterranean Fruit Fly**. Apply a maximum of 4 applications per season with a retreatment interval 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
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion		P		Registered for control of Fruit Spotting Bug in macadamias, avocados, mangoes and papaya. Pending Label Registration with Bayer (submitted Dec-21) for the tropical inedible peel crop group. (Hort Innovation project ST19020). Registered for control of various sucking pests in macadamias, avocados, mangoes, papaya, cucurbits, eggplant, peppers, tomatoes, green beans, potatoes and sweet potatoes. Possible activity against fruit fly.	L Bee:L	-
Citrus Mealybug (*Planococcus citri*) **Priority: Moderate**								
Rated as a high priority in QLD and a low priority in NSW. Mealybug can cause cosmetic damage to trees and will excrete honeydew which promotes sooty mould outbreaks. Preserving beneficials will assist with management.								
Acetamiprid + Pyriproxyfen (Trivor) Adama PER89943	4A+7C	Contact & Ingestion	28 NG	A	ALL (excl. VIC)	Pending Label Registration with ADAMA for the tropical inedible peel crop group. (Hort Innovation project ST16006). Permitted in custard apples for control of Fruit Spotting Bugs (*Amblypelta nitida*, *A.lutescens*), **Mealybugs** (Pseudococcidae), Scale Insects (Coccoidea) and Light Brown Apple Moth (*Epiphyas postvittana*) and suppression of Queensland Fruit Fly (*Bactrocera tryoni*) and Mediterranean Fruit Fly (*Ceratitis capitata*). Do not use more than 2 applications per season. Do not apply less than 14 days after the initial treatment.	M Bee:M	R2
Buprofezin (Applaud) Corteva	16	Ingestion	14	A	ALL	Registered in custard apples for control of **Mealybug** and Scale Insects. Apply when the first batch of scale or mealybug crawlers appear after winter. Apply a maximum of 2 sprays per season, 14 days apart.	L Bee:L	-
Clothianidin (Samurai) PER84992	4A	Contact & Ingestion	NR NG	A	ALL (excl. VIC)	Permitted in custard apples for control of **Citrus Mealybug** (*Planococcus citri*). Apply as a soil drench in December at early flowering / fruit set. Do not apply after petal fall. Do not use more than 1 application per custard apple block per season.	M Bee:VH	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Potassium Salts of Fatty Acid (Natrasoap)	UNE	Contact	NR	A	ALL	Registered in fruit trees for control of Aphids, Thrips, **Mealybug**, Two Spotted Mites, Spider Mite, and Whitefly. Do not use during the hot part of the day. Use a retreatment interval of 5-7 days. Maximum number of applications not specified.	L Bee:L	-
Sulfoxaflor (Transform) Corteva PER86598	4C	Contact & Ingestion	1	A	ALL (excl. VIC)	Pending Label Registration (submitted Jul-21) with Corteva for the tropical inedible peel crop group. (Hort Innovation project ST16006). Permitted in custard apple for control of **Citrus Mealybug** (*Planococcus citri*), Fruit-Spotting Bug (*Amblypelta nitida*) and Banana-Spotting Bug (*Amblypelta lutescens*). Apply a maximum of 2 foliar applications per season, with a 14 day re-treatment interval between consecutive sprays.	M Bee:H	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion		P		Registered for control of various sucking pests in macadamias, avocados, mangoes, papaya, cucurbits, eggplant, peppers, tomatoes, green beans, potatoes and sweet potatoes. US registration for control of **Mealybug** in citrus and small fruit vine climbing (except Fuzzy Kiwifruit). Pending Label Registration with Bayer (submitted Dec-21) for the tropical inedible peel crop group for control of Fruit spotting bugs (Hort Innovation project ST19020)	L Bee:L	-
Flonicamid (Mainman) UPL	29	Ingestion		P		Registered for control of **Mealybugs** in apples and pears.	M Bee:VL	-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered for control of **Mealybugs** in citrus, grapes, mangoes, passionfruit, pome fruit, stone fruit and cotton.	M Bee:VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Two Spotted Mite (*Tetranychus urticae*) **Banana Spider Mite** (*Tetranychus lambi*) **Strawberry Spider Mite** (*Tetranychus turkestani*) **Priority: Moderate**								
Two Spotted Mite is rated as a high priority in QLD and a low priority in NSW. Banana Spider Mite and Strawberry Spider Mite are rated as a moderate priority in QLD and a low priority in NSW. Spider Mites damage the tree by causing leaves to turn brown and fall, leading to reduced yield and fruit quality. Management options include reducing dust in the orchard, promotion or introduction of predatory mites and judicious use of miticides while maintaining beneficial populations.								
Abamectin	6	Contact	14 NG	A	ALL	Registered in custard apple for control of **Two Spotted Mite** (*Tetranychus urticae*) and **Banana Spotted Mite** (*Tetranychus lambi*). Do not use more than 1 application per season.	M Bee:H	-
Etoxazole (Paramite) PER14227	10B	Contact & Ingestion	7 NG	A	NSW, NT, QLD & WA	Permitted in custard apple for control of **Two Spotted Mite** (*Tetranychus urticae*) and **Banana Spotted Mite** (*Tetranychus lambi*). Do not use more than 1 application per season.		-
Potassium Salts of Fatty Acid (Natrasoap)	UNE	Contact	NR	A	ALL	Registered in fruit trees for control of Aphids, Thrips, Mealybug, **Two Spotted Mites**, **Spider Mite**, and Whitefly. Do not use during the hot part of the day. Use a retreatment interval of 5-7 days. Maximum number of applications not specified.	L Bee:L	-
Petroleum Oil	UNM	Contact	1	P-A	QLD, NSW & WA	Registered in custard apples for control of Scale Insects. Registered for control of **Mites** in pome fruit, stone fruit and pecans.	VL Bee:L	-
Spiromesifen (Oberon) Bayer	23	Ingestion		P		Hort Innovation Data Generation Project ST20006 is undertaking trials to support a new Australian label registration for control of various **Mites** in custard apples. Contracted June 2021.	M Bee:VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Hort Innovation project ST20006 will be undertaking efficacy trials for various pests including, Leafroller Moth /Lepidoptera pests. Registration of isocycloseram submitted to the APVMA May-2020, for use in citrus and vegetables for control of various insect and mite pests, in conjunction with the approval of the active constituent isocycloseram.	-	-
Cyflumetofen (Danisaraba) BASF	25A	Contact		P		Registered for the control of various mite species in pome fruit, citrus, strawberries, grapes, fruiting vegetables, tree nuts and ornamentals. Species controlled are **Two Spotted Mite**, European Red Mite, Citrus Red Mite, Oriental Spider Mite and Bryobia Mite.	L Bee:L	-
Beauveria bassiana (Velifer) BASF	UNF	Biological	NR	P		Registered for suppression of **Two Spotted Spider Mite** in protected vegetables.	L Bee:L	-
Bifenazate (Acramite) UPL	20D	Contact & Ingestion		P		Registered for control of various **Mites** in almonds, pome fruit, stone fruit, fruiting vegetables, cucurbits, pawpaw and strawberries.	L Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Lepidoptera: **Yellow Peach Moth (Durian Fruit Borer/Castor Capsule Borer)** (*Conogethes punctiferalis*) **Fruit Piercing Moth** (*Eudocima salaminia*) **Blue Triangle Butterfly** (*Graphium sarpedon* ssp. *choredon*) **Priority: Moderate**								
Yellow Peach Moth, Fruit Piercing Moth & Blue Triangle Butterfly are rated as a moderate priority in QLD and a low priority in NSW. Sporadic pests that can cause substantial damage when present. Fruit Piercing Moths feed at night by penetrating the skin of the ripe or ripening fruit causing internal injury and secondary rots. Yellow Peach Moth and Blue Triangle Butterfly larvae feed on the fruit.								
Beta-Cyfluthrin (Bulldock) PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in custard apple (field grown) for control of Fruit-Spotting Bug (*Amblypelta nitida*), Banana-Spotting Bug (*Amblypelta lutescens*), Elephant or Rhino Beetle (*Xylotrupes gideon*), Red-Shouldered Leaf Beetle (*Monolepta australis*), Swarming Leaf Beetle (*Rhyparida* spp.), Longicorn Trunk Borer (*Acalolepta vastator*), Macadamia Nut Borer (*Cryptophlebia ombrodelta*), Mango Tip Borer (*Penicillaria jocosatrix*), Flatid Planthopper (Flatidae), Green Vegetable Bug (*Nezara viridula*), Lychee Stink Bug (*Tessaratoma papillosa*) and **Yellow Peach Moth** (*Conogethes punctiferalis*). Do not use at flowering. Do not use more than 4 applications per year with a minimum of 21 days between consecutive sprays.	VH Bee:H	-
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in fruit trees for control of Ants, Aphids, **Caterpillars**, Earwigs, Whitefly, Thrips and Leafhopper. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-
Methoxyfenozide (Prodigy) Corteva	18	Ingestion	7 NG	A	ALL	Registered in custard apples for control of **Yellow Peach Moth** (*Conogethes punctiferalis*). Do not use more than 3 applications per season.	VL Bee:VL	-
Spinetoram (Success Neo) Corteva	5	Ingestion	NR NG	A	ALL	Registered in tropical & sub-tropical fruit (inedible peel) for control of Flower-Eating Caterpillars, Leafrollers, Loopers, **Yellow Peach Moth**, Red-Banded Thrips and Sorghum Head Caterpillar. Do not use more than 4 applications per season. Use a re-treatment interval of 7-14 days.	M Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Spinosad (Entrust Organic) Corteva	5	Ingestion	NR G:14	A	ALL	Registered in tropical & sub-tropical fruit (inedible peel) for control of Flower-Eating Caterpillars, Leafrollers, Loopers, **Yellow Peach Moth**, Red-Banded Thrips and Sorghum Head Caterpillar. Do not use more than 4 applications per season. Use a re-treatment interval of 7-14 days.	L Bee:L	-
Tebufenozide (Mimic)	18	Ingestion	14	A	ALL	Registered in custard apple for control of **Yellow Peach Moth**. Do not use more than 3 applications per year.	L Bee:L	-
Trichlorfon PER14743	1B	Contact	7	A	ALL (excl. VIC)	Permitted in custard apple for control of Flatid Planthopper, Flower-Eating Caterpillar, Loopers, **Yellow Peach Moth** (*Conogethes punctiferalis*) and suppression of Fruit-Spotting Bug (*Amblypelta nitida*), Banana-Spotting Bug (*Amblypelta lutescens*), Green Vegetable Bug (*Nezara viridula*) and Lychee Stink Bug (*Lyramorpha rosea*). Do not use more than 6 applications per crop with a minimum re-treatment interval of 7-10 days between consecutive applications.	H Bee:H	R2
Tetraniliprole (Vayego) Bayer	28	Ingestion		P		ST17000 is generating data to support registration for control of **Yellow Peach Moth**, Leafroller Moths, Flower Eating Caterpillar, Looper, **Fruit Piercing Moth** and Elephant Weevil in tropical & sub-tropical fruit (inedible peel). Registered for control of Carob Moth in almonds, Codling Moth and Light Brown Apple Moth in pome fruit, and control of Oriental fruit Moth in stone fruit.	M Bee:VH	-
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Hort Innovation project ST20006 will be undertaking efficacy trials for various pests including, Leafroller Moth /Lepidoptera pests. Registration of isocycloseram submitted to the APVMA May-2020, for use in citrus and vegetables for control of various insect and mite pests, in conjunction with the approval of the active constituent isocycloseram.	-	-
Broflanilide (Vedira) BASF	30	Contact & Ingestion		P		Pending registration as an ant bait. It also has potential uses as a seed treatment for the control of Wireworms, and a foliar treatment for the control of chewing pests in various crops.	H Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Scale Insects (Coccidae/Diaspididae/Eriococcidae) **Priority: Moderate**								
Rated as a moderate priority in QLD and a low priority in NSW. Management of Scale should focus on preventing infestations and managing populations before they build up. Strategies include the promotion or introduction of beneficials along with judicious use of insecticides.								
Acetamiprid + Pyriproxyfen (Trivor) Adama PER89943	4A+7C	Contact & Ingestion	28 NG	A	ALL (excl. VIC)	Pending Label Registration with ADAMA for the tropical inedible peel crop group. (Hort Innovation project ST16006). Permitted in custard apples for control of Fruit Spotting Bugs (*Amblypelta nitida*, *A.lutescens*), Mealybugs (Pseudococcidae), **Scale Insects** (Coccoidea) and Light Brown Apple Moth (*Epiphyas postvittana*) and suppression of Queensland Fruit Fly (*Bactrocera tryoni*) and Mediterranean Fruit Fly (*Ceratitis capitata*). Do not use more than 2 applications per season. Do not apply less than 14 days after the initial treatment.	M Bee:M	R2
Buprofezin (Applaud) Corteva	16	Ingestion	14	A	ALL	Registered in custard apples for control of Mealybug and **Scale Insects**. Apply when the first batch of scale or mealybug crawlers appear after winter. Apply a maximum of 2 sprays per season, 14 days apart.	L Bee:L	-
Petroleum Oil	UNM	Contact	1	A	QLD, NSW & WA	Registered in custard apples for control of **Scale Insects**. Number of applications and re-treatment interval not specified.	L Bee:L	-
Sulfoxaflor (Transform) Corteva PER86598	4C	Contact & Ingestion	1	P-A	ALL (excl. VIC)	Permitted in custard apple for control of Citrus Mealybug, Fruit-Spotting Bug and Banana-Spotting Bug. Registered for control of **Scale** in citrus, pome fruit and nursery stock. Pending Label Registration (submitted Jul-21) with Corteva for the tropical inedible peel crop group. (Hort Innovation project ST16006)	M Bee:H	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion		P		Pending Label Extension with Bayer (submitted Dec-21) for the tropical inedible peel crop group for control of Fruit spotting bugs (Hort Innovation project ST19020). Registered for control of various sucking pests in macadamias, avocados, mangoes, papaya, cucurbits, eggplant, peppers, tomatoes, green beans, potatoes and sweet potatoes. US registration for control of **Scale** in citrus, pome fruit and stone fruit.	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Fenoxycarb (Insegar) Syngenta	7B	Contact & Ingestion		P		Registered for control of **Scale** in apples, pears and olives.	L Bee:VL	-
Pyriproxyfen (Admiral) Sumitomo	7C	IGR / Ingestion		P		Registered for control of **Scale** in citrus, mango and olives.	VL Bee:L	-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered for control of **Scale** in citrus, grapes, mangoes, passionfruit, pome fruit and stone fruit.	M Bee:VL	-
Ants (Formicidae) **Priority: Moderate**								
Rated as a low priority in QLD and NSW. The main species affecting custard apple are the Coastal Brown Ant (*Pheidole megacephala*) and the Black House Ant (*Iridomyrex glaber*). If ants can be properly managed, populations of scales and mealy bug can be reduced by 80%. Ants move pests around on the trees, but more importantly prevent natural parasites and predators from controlling pests. Removing ants allow the parasites and predators to do their job. Controlling ants can greatly reduce mealybug and scale populations. Ants promote soft scale infestations and Mealybugs are 'farmed' by ants and controlling ant activity in the tree is essential. Action should be taken to control ants if they are present on 50% or more of shoots examined for scales, mealybugs or other pests. Ants should also be controlled to prevent disease infested soil being carried into the orchard. (Reference CU13001)								
Fipronil PER87605	2B	Contact & Ingestion	NR NG	A	ALL (excl. VIC)	Permitted in custard apple for control of **Ants**. Apply as butt treatment and as a protective radial band treatment within 1.5 m circumference of tree trunks. Do not spray foliage or developing fruit directly or through spray drift. Use a maximum of 2 applications per crop, with a minimum of 14 days between consecutive applications.	M Bee:VH	R3
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in fruit trees for control of **Ants**, Aphids, Caterpillars, Earwigs, Whitefly, Thrips and Leafhopper. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-
Pyriproxifen (Distance Ant Bait)	7C	Ingestion	NR	A	ALL	Registered in tropical fruit plantations as a bait for control of **Invasive and Nuisance Ants**. Do not exceed 3 applications per year and a minimum of 3 months between each treatment.	VL Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Broflanilide (Vedira) BASF	30	Contact & Ingestion		P		Pending registration as an **Ant** bait.	H Bee:VH	-
Metaflumizone (Siesta Ant Bait) BASF	22B	Ingestion		P		Pending registration as an **Ant** bait.	M Bee:M	-
Avocado Leaf Roller (*Homona spargotis*) **Ivy Leaf Roller** (*Cryptoptila immersana*) **Light Brown Apple Moth** (*Epiphyas postvittana*) **Flowereating Caterpillars** (Lepidoptera) **Loopers** (Geometridae) **Priority: Low**								
Rated as a low priority in QLD and NSW. These caterpillar pests rarely warrant control measures.								
Acetamiprid + Pyriproxyfen (Trivor) Adama PER89943	4A+7C	Contact & Ingestion	28 NG	A	ALL (excl. VIC)	Pending Label Registration with ADAMA for the tropical inedible peel crop group. (Hort Innovation project ST16006). Permitted in custard apples for control of Fruit Spotting Bugs (*Amblypelta nitida*, *A.lutescens*), Mealybugs (Pseudococcidae), Scale Insects (Coccoidea) and **Light Brown Apple Moth** (*Epiphyas postvittana*) and suppression of Queensland Fruit Fly (*Bactrocera tryoni*) and Mediterranean Fruit Fly (*Ceratitis capitata*). Do not use more than 2 applications per season. Do not apply less than 14 days after the initial treatment.	M Bee:M	R2
Bacillus thuringiensis subsp Kurstaki Strain HD-1	11	Ingestion	NR	A	ALL	Registered in fruit for control of **Armyworm**, Cotton Bollworm, Native Budworm, Cabbage Moth, Cabbage White Butterfly, **Loopers**, **Light Brown Apple Moth** and **Vine Moth**. Apply to newly hatched larvae, late in the afternoon or early evening. Apply a minimum of 2 sprays separated by no more than 3 days initially, and then reapply at 3-5 day intervals. Maximum number of applications not specified.	VL Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in fruit trees for control of Ants, Aphids, Caterpillars, **Earwigs**, Whitefly, Thrips and Leafhopper. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-
Spinetoram (Success Neo) Corteva	5	Ingestion	NR NG	A	ALL	Registered in tropical & sub-tropical fruit (inedible peel) for control of **Flower-Eating Caterpillars**, **Leafroller**s, **Loopers**, Yellow Peach Moth, Red-Banded Thrips and **Sorghum Head Caterpillar**. Do not use more than 4 applications per season. Use a re-treatment interval of 7-14 days.	M Bee:H	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	NR G:14	A	ALL	Registered in tropical & sub-tropical fruit (inedible peel) for control of **Flower-Eating Caterpillars**, **Leafroller**s, **Loopers**, Yellow Peach Moth, Red-Banded Thrips and **Sorghum Head Caterpillar**. Do not use more than 4 applications per season. Use a re-treatment interval of 7-14 days.	L Bee:L	-
Trichlorfon PER14743	1B	Contact	7	A	ALL (excl. VIC)	Permitted in custard apple for control of Flatid Planthopper, **Flower-Eating Caterpillar**, **Loopers**, Yellow Peach Moth (*Conogethes punctiferalis*) and suppression of Fruit-Spotting Bug (*Amblypelta nitida*), Banana-Spotting Bug (*Amblypelta lutescens*), Green Vegetable Bug (*Nezara viridula*) and Lychee Stink Bug (*Lyramorpha rosea*). Do not use more than 6 applications per crop with a minimum re-treatment interval of 7-10 days between consecutive applications.	H Bee:H	R2
Methoxyfenozide (Prodigy) Corteva	18	Ingestion	7 NG	P-A	ALL	Registered in custard apples for control of Yellow Peach Moth. Registered for control of **Light Brown Apple Moth** in pome fruit, blueberry, citrus, grapevines and kiwifruit, control of **Avocado Leafroller** in avocado and coffee, control of **Loopers** in pome fruit, and control of Cluster Caterpillar in fruiting vegetables.	VL Bee:VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Tebufenozide (Mimic)	18	Ingestion	14	P-A	ALL	Registered in custard apple for control of Yellow Peach Moth. Registered for control of **Light Brown Apple Moth** in pome fruit, citrus, grapevines and kiwifruit, control of **Leafroller** in avocado, and control of **Loopers** in pears.	L Bee:L	-
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Hort Innovation project ST20006 will be undertaking efficacy trials for various pests including, Leafroller Moth /Lepidoptera pests. Registration of isocycloseram submitted to the APVMA May-2020, for use in citrus and vegetables for control of various insect and mite pests, in conjunction with the approval of the active constituent isocycloseram.	-	-
Tetraniliprole (Vayego) Bayer	28	Ingestion		P		ST17000 is generating data to support registration for control of Yellow Peach Moth, Leafroller Moths, Flower Eating Caterpillar, Looper, Fruit Piercing Moth and Elephant Weevil in tropical & sub-tropical fruit (inedible peel). Registered for control of Carob Moth in almonds, Codling Moth and **Light Brown Apple Moth** in pome fruit, and control of Oriental fruit Moth in stone fruit.	M Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Fig / Longicorn Trunk Borer (*Acalolepta mixtus*) **Red Shouldered Leaf Beetle** (*Monolepta australis*) **Swarming Leaf Beetle** (*Rhyparida* spp.) **Priority: Low**								
Rated as a low priority in QLD and NSW.								
Beta-Cyfluthrin (Bulldock) PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in custard apple (field grown) for control of Fruit-Spotting Bug (*Amblypelta nitida*), Banana-Spotting Bug (*Amblypelta lutescens*), **Elephant or Rhino Beetle** (*Xylotrupes gideon*), **Red-Shouldered Leaf Beetle** (*Monolepta australis*), **Swarming Leaf Beetle** (*Rhyparida* spp.), **Longicorn Trunk Borer** (*Acalolepta vastator*), Macadamia Nut Borer (*Cryptophlebia ombrodelta*), Mango Tip Borer (*Penicillaria jocosatrix*), Flatid Planthopper (Flatidae), Green Vegetable Bug (*Nezara viridula*), Lychee Stink Bug (*Tessaratoma papillosa*) and Yellow Peach Moth (*Conogethes punctiferalis*). Do not use at flowering. Do not use more than 4 applications per year with a minimum of 21 days between consecutive sprays.	VH Bee:H	-
Clothianidin (Samurai) PER84992	4A	Contact & Ingestion	NR NG	P-A	ALL (excl. VIC)	Permitted in custard apples for control of Citrus Mealybug. Registered for control of Fullers Rose Weevil in citrus.	M Bee:VH	R2
Tetraniliprole (Vayego) Bayer	28	Ingestion		P		Registered for control of **Weevils** in macadamia, pome fruit and stone fruit. Hort Innovation project ST17000 is generating data to support registration for control of Yellow Peach Moth, Leafroller Moths, Flower Eating Caterpillar, Looper, Fruit Piercing Moth and **Elephant Weevil** in tropical & sub-tropical fruit (inedible peel).	M Bee:VH	-
Indoxacarb (Avatar eVo) FMC	22A	Ingestion		P		Registered for control of various **Weevils** in asparagus, celery, pome fruit, stone fruit and grapes.	L Bee:H	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Flatid Planthopper (*Flatormenis* spp.) **Priority: Low**								
Rated as a low priority in QLD and NSW.								
Beta-Cyfluthrin (Bulldock) PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in custard apple (field grown) for control of Fruit-Spotting Bug (*Amblypelta nitida*), Banana-Spotting Bug (*Amblypelta lutescens*), Elephant or Rhino Beetle (*Xylotrupes gideon*), Red-Shouldered Leaf Beetle (*Monolepta australis*), Swarming Leaf Beetle (*Rhyparida* spp.), Longicorn Trunk Borer (*Acalolepta vastator*), Macadamia Nut Borer (*Cryptophlebia ombrodelta*), Mango Tip Borer (*Penicillaria jocosatrix*), **Flatid Planthopper** (Flatidae), Green Vegetable Bug (*Nezara viridula*), Lychee Stink Bug (*Tessaratoma papillosa*) and Yellow Peach Moth (*Conogethes punctiferalis*). Do not use at flowering. Do not use more than 4 applications per year with a minimum of 21 days between consecutive sprays.	VH Bee:H	-
Trichlorfon PER14743	1B	Contact	7	A	ALL (excl. VIC)	Permitted in custard apple for control of **Flatid Planthopper**, Flower-Eating Caterpillar, Loopers, Yellow Peach Moth (*Conogethes punctiferalis*) and suppression of Fruit-Spotting Bug (*Amblypelta nitida*), Banana-Spotting Bug (*Amblypelta lutescens*), Green Vegetable Bug (*Nezara viridula*) and Lychee Stink Bug (*Lyramorpha rosea*). Do not use more than 6 applications per crop with a minimum re-treatment interval of 7-10 days between consecutive applications.	H Bee:H	R2
Acetamiprid + Pyriproxyfen (Trivor) Adama PER89943	4A+7C	Contact & Ingestion	28 NG	P-A	ALL (excl. VIC)	Pending Label Registration with ADAMA for the tropical inedible peel crop group. (Hort Innovation project ST16006). Permitted in custard apples for control of Fruit Spotting Bugs, Mealybugs, Scale Insects and Light Brown Apple Moth and suppression of Queensland Fruit Fly and Mediterranean Fruit Fly. Hort Innovation project ST16006 is generating data for a label extension to control hoppers and bugs in *Rubus* spp.	M Bee:M	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Petroleum Oil	UNM	Contact	1	P-A	QLD, NSW & WA	Registered in custard apples for control of Scale Insects. Registered for control of **Leafhoppers** in mangoes, asparagus, beans, beet, corn, cucurbits, peppers, radish, squash and tomatoes.	VL Bee:L	-
Sulfoxaflor (Transform) Corteva PER86598	4C	Contact & Ingestion	1	P-A	ALL (excl. VIC)	Pending Label Registration (submitted Jul-21) with Corteva for the tropical inedible peel crop group. (Hort Innovation project ST16006). Permitted in custard apple for control of Citrus Mealybug, Fruit-Spotting Bug and Banana-Spotting Bug. US registration for control of Leafhoppers in berries, root and tuber vegetables, pome fruit and small fruit vine climbing (except fuzzy kiwifruit).	M Bee:H	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion		P		Pending Label Registration with Bayer (submitted Dec-21) for the tropical inedible peel crop group for control of Fruit spotting bugs (Hort Innovation project ST19020). Registered for control of various sucking pests in macadamias, avocados, mangoes, papaya, cucurbits, eggplant, peppers, tomatoes, green beans, potatoes and sweet potatoes. US registration for control of **Leafhoppers** in alfalfa, brassica leafy vegetables, cucurbits, fruiting vegetables, leafy vegetables, legume vegetables, peanut, pome fruit, root vegetables, small fruit vine climbing (except fuzzy kiwifruit), taro leaves, tuberous and corm vegetables and turnip greens.	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registration of isocycloseram submitted to the APVMA May-2020, for use in citrus and vegetables for control of various insect and mite pests, in conjunction with the approval of the active constituent isocycloseram. Hort Innovation project ST20006 will be undertaking efficacy trials for various pests including, Leafroller Moth /Lepidoptera pests.	-	-
Tetraniliprole (Vayego) Bayer	28	Ingestion		P		Registered for control of Weevils in macadamia, pome fruit and stone fruit. Hort Innovation project ST17000 is generating data to support registration for control of Yellow Peach Moth, Leafroller Moths, Flower Eating Caterpillar, Looper, Fruit Piercing Moth and Elephant Weevil in tropical & sub-tropical fruit (inedible peel).	M Bee:VH	-
Green Vegetable Bug (*Nezara viridula*) **Priority: Low**								
Rated as a low priority in QLD and NSW.								
Beta-Cyfluthrin (Bulldock) PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in custard apple (field grown) for control of Fruit-Spotting Bug (*Amblypelta nitida*), Banana-Spotting Bug (*Amblypelta lutescens*), Elephant or Rhino Beetle (*Xylotrupes gideon*), Red-Shouldered Leaf Beetle (*Monolepta australis*), Swarming Leaf Beetle (*Rhyparida* spp.), Longicorn Trunk Borer (*Acalolepta vastator*), Macadamia Nut Borer (*Cryptophlebia ombrodelta*), Mango Tip Borer (*Penicillaria jocosatrix*), Flatid Planthopper (Flatidae), **Green Vegetable Bug** (*Nezara viridula*), **Lychee Stink Bug** (*Tessaratoma papillosa*) and Yellow Peach Moth (*Conogethes punctiferalis*). Do not use at flowering. Do not use more than 4 applications per year with a minimum of 21 days between consecutive sprays.	VH Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Trichlorfon PER14743	1B	Contact	7	A	ALL (excl. VIC)	Permitted in custard apple for control of Flatid Planthopper, Flower-Eating Caterpillar, Loopers, Yellow Peach Moth (*Conogethes punctiferalis*) and suppression of Fruit-Spotting Bug (*Amblypelta nitida*), Banana-Spotting Bug (*Amblypelta lutescens*), **Green Vegetable Bug** (*Nezara viridula*) and **Lychee Stink Bug** (*Lyramorpha rosea*). Do not use more than 6 applications per crop with a minimum re-treatment interval of 7-10 days between consecutive applications.	H Bee:H	R2
Acetamiprid + Pyriproxyfen (Trivor) Adama PER89943	4A+7C	Contact & Ingestion	28 NG	P-A	ALL (excl. VIC)	Pending Label Registration with ADAMA for the tropical inedible peel crop group. (Hort Innovation project ST16006). Permitted in custard apples for control of Fruit Spotting Bugs, Mealybugs, Scale Insects and Light Brown Apple Moth and suppression of Queensland Fruit Fly and Mediterranean Fruit Fly.	M Bee:M	R2
Sulfoxaflor (Transform) Corteva PER86598	4C	Contact & Ingestion	1	P-A	ALL (excl. VIC)	Permitted in custard apple for control of Citrus Mealybug, Fruit-Spotting Bug and Banana-Spotting Bug. Pending Label Registration (submitted Jul-21) with Corteva for the tropical inedible peel crop group. (Hort Innovation project ST16006)	M Bee:H	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion		P		Registered for control of various sucking pests in macadamias, avocados, mangoes, papaya, cucurbits, eggplant, peppers, tomatoes, green beans, potatoes and sweet potatoes. Pending Label Registration with Bayer (submitted Dec-21) for the tropical inedible peel crop group for control of Fruit spotting bugs (Hort Innovation project ST19020)	L Bee:L	-
Red Banded Thrips (*Selenothrips rubrocinctus*) **Priority: Low**								
Rated as a low priority in QLD and NSW.								
Potassium Salts of Fatty Acid (Natrasoap)	-	Contact	NR	A	ALL	Registered in fruit trees for control of Aphids, **Thrips**, Mealybug, Two Spotted Mites, Spider Mite, and Whitefly. Do not use during the hot part of the day. Use a retreatment interval of 5-7 days. Maximum number of applications not specified.	L Bee:L	-

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 NG	A	ALL	Registered in tropical & sub-tropical fruit (inedible peel) for control of Flower-Eating Caterpillars, Leafrollers, Loopers, Yellow Peach Moth, **Red-Banded Thrips** and Sorghum Head Caterpillar. Do not use more than 4 applications per season. Use a re-treatment interval of 7-14 days.	M Bee:H	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	NR G:14	A	ALL	Registered in tropical & sub-tropical fruit (inedible peel) for control of Flower-Eating Caterpillars, Leafrollers, Loopers, Yellow Peach Moth, **Red-Banded Thrips** and Sorghum Head Caterpillar. Do not use more than 4 applications per season. Use a re-treatment interval of 7-14 days.	L Bee:L	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion		P		Registered for control of various sucking pests in macadamias, avocados, mangoes, papaya, cucurbits, eggplant, peppers, tomatoes, green beans, potatoes and sweet potatoes, including suppression of **Thrips** in macadamia. US registration for suppression of **Thrips** in berries, citrus, fruiting vegetables, tropical and subtropical fruit, and control of Leafhoppers, Aphids, Squash Bug and Whitefly in cucurbits. Pending Label Registration with Bayer (submitted Dec-21) for the tropical inedible peel crop group for control of Fruit spotting bugs (Hort Innovation project ST19020)	L Bee:VL	-
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registration of isocycloseram submitted to the APVMA May-2020, for use in citrus and vegetables for control of various insect and mite pests, in conjunction with the approval of the active constituent isocycloseram. Hort Innovation project ST20006 will be undertaking efficacy trials for various pests including, Leafroller Moth /Lepidoptera pests.	-	-
Acetamiprid + Pyriproxyfen (Trivor) Adama PER89943	4A+7C	Contact & Ingestion	28 NG	P-A	ALL (excl. VIC)	Pending Label Registration with ADAMA for the tropical inedible peel crop group. (Hort Innovation project ST16006). Permitted in custard apples for control of Fruit Spotting Bugs, Mealybugs, Scale Insects and Light Brown Apple Moth and suppression of Queensland Fruit Fly and Mediterranean Fruit Fly. Registered for control of Kellys Citrus Thrips in citrus.	M Bee:M	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Beauveria bassiana (Velifer) BASF	UN	Biological	NR	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	-
Dimpropyridaz (Axalion) BASF	7			P		BASF has applied for registration to control Whitefly, Aphid and **Thrips** in leafy vegetables, brassica vegetables, fruiting vegetables and cucurbits. Registration is expected in 2023.	-	-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered for control of Western Flower Thrips and Tomato Thrips in green beans, control of Western Flower Thrips, Tomato Thrips and Plague Thrips in celery and rhubarb, herbs, bulb vegetables, and control of Western Flower Thrips in lettuce.	M Bee:VL	-
Fall Armyworm (*Spodoptera frugiperda*) **Priority: Low**								
Rated as a low priority in QLD and NSW. Fall Armyworm is an exotic pest that can reproduce prolifically, especially in warm weather. It is important to monitor crops for any incursions.								
Spinetoram (Success Neo) Corteva PER89241	5	Ingestion	NR NG	A	ALL	Permitted in tropical & sub-tropical fruit (inedible peel) for control of **Fall Armyworm**. Do not use more than 4 applications per season. Use a re-treatment interval of 7-14 days.	M Bee:H	-
Spinosad (Entrust Organic) Corteva PER89870	5	Ingestion	NR G:14	A	ALL	Permitted in tropical & sub-tropical fruit (inedible peel) for control of **Fall Armyworm**. Do not use more than 4 applications per season. Use a re-treatment interval of 7-14 days.	L Bee:L	-
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registration of isocycloseram submitted to the APVMA May-2020, for use in citrus and vegetables for control of various insect and mite pests, in conjunction with the approval of the active constituent isocycloseram. Hort Innovation project ST20006 will be undertaking efficacy trials for various pests including, Leafroller Moth /Lepidoptera pests.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory Risk
Tetraniliprole (Vayego) Bayer	28	Ingestion		P		ST17000 is generating data to support registration for control of Yellow Peach Moth, Leafroller Moths, Flower Eating Caterpillar, Looper, Fruit Piercing Moth and Elephant Weevil in tropical & sub-tropical fruit (inedible peel). Registered for control of Carob Moth in almonds, Codling Moth and Light Brown Apple Moth in pome fruit, and control of Oriental fruit Moth in stone fruit.	M Bee:VH	-

4.3 Weeds in custard apples

4.3.1 Weed priorities

Common Name	Scientific Name
Moderate	
Flaxleaf Fleabane	*Conyza bonariensis*
Couch Grass	*Cynodon dactylon*
Low	
Feather Top Rhodes Grass	*Chloris virgata*
Ryegrass	*Lolium* spp.
Flannel Weed	*Sida cordifolia*
Dock	*Rumex* spp.
Blackberry Nightshade	*Solanum nigrum*
Fat Hen	*Chenopodium album*
Marshmallow	*Malva parviflora*
Willow Weed	*Persicaria maculosa*

There were no high priority weeds identified but Flaxleaf Fleabane and Couch Grass were identified as a moderate priority based on the feedback received.

Resistance management
There are confirmed cases of resistance in Australia for Awnless Barnyard Grass (Group 9 at more than 200 sites), Feather Top Rhodes Grass (Group 9 at 4 sites) and Blackberry Nightshade (Group 22 at 2 sites).

Specific resistance management strategies for high resistance risk (1 and 2) and moderate resistance risk (0, 3, 4, 5, 9, 10, 12, 14, 15, 22, 27 and 34) herbicide modes of action are available on the CropLife Australia webpage[6].

This report uses the new numerical herbicide mode of action classifications. Refer to the CropLife website[7] to compare these to the previous alphabetical classifications.

[6] https://www.croplife.org.au/resources/programs/resistance-management/herbicide-resistance-management-strategies-2/
[7] https://www.croplife.org.au/wp-content/uploads/2021/07/A2-poster_03_FINAL.pdf

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 7)	
		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: Moderate**							
Rated as a moderate priority in QLD and NSW. Flaxleaf Fleabane seeds prolifically and can germinate year-round. It is difficult to control with herbicides and a continuous program is required to manage it in the orchard.							
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds.	NR	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, including **Flaxleaf Fleabane**. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Custard Apples / Directed or Shielded Spray	Registered in custard apples 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	A	ALL	R3

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, including **Flaxleaf Fleabane**. Do not allow spray to contact any part of the tree, including the trunk.	H:1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerrilla)	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual weeds, including **Flaxleaf Fleabane**. Avoid contact with crop foliage.	H: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, including **Flaxleaf Fleabane**. Do not allow spray to contact any part of the tree, including the trunk.	G:1	A	ALL	R3
Flumioxazin (Chateau)	14**		Registered for control of **Flaxleaf Fleabane** in grapevines, pome fruit, stone fruit, citrus, tree nuts, olives, avocados, blueberries and on irrigation channel banks and drainage ditches.		P		-
Propachlor (Ramrod)	15**		Registered for control of **Flaxleaf Fleabane** in maize, sorghum, sweet corn, brassica vegetables and onions.		P		-
Couch Grass (*Cynodon dactylon*) **Priority: Moderate**							
Rated as a moderate priority in QLD and a low priority in NSW. Couch Grass is an aggressive and highly competitive perennial grass that grows year-round in most areas. Herbicide control is effectively provided it is targeted to young, actively growing weeds. Multiple applications are usually required.							
Amitrole	34**	Orchards / Directed Spray	Registered in orchards as a directed spray for the control of grass and broadleaf weeds, including **Couch Grass**.	56	A	ALL	-
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds.	NR	A	ALL	-
Fluazifop-P (Fusilade)	1***	Custard Apples / Directed Spray	Registered in custard apples as a directed spray for the control of grass weeds, including **Couch Grass**.	14	A	QLD, NSW, WA & NT	-

Active Ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory Risk
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, including **Couch Grass**. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Custard Apples / Directed or Shielded Spray	Registered in custard apples for control of various grass and broadleaf weeds, including **Couch Grass**. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Haloxyfop (Verdict)	1***	Custard Apples / Directed Spray	Registered in custard apples for control of grass weeds, including **Couch Grass**. Spray should be directed to the base of the tree, avoiding contact with fruit and foliage.	NR	A	ALL	-
2,2-DPA	0**		Registered for control of annual and perennial grasses, including **Couch Grass**, in citrus, vines, stone fruit, apples and pears.		P		-
Norflurazon (Zoliar) Agnova Technologies	12**		Registered for control of grass and broadleaf weeds, including **Couch Grass** in citrus, grapes, nuts, stone and pome fruits.		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		-
S-Metolachlor + Prosulfocarb (Boxer Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds including Blackberry Nightshade in cereal crops, pulse crops and potatoes. Hort Innovation is pursuing trials on onions and carrots.		P		-
Terbacil	5**		Registered for control of **Couch Grass** in apples and peaches.		P		R3

Active Ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory Risk
Feather Top Rhodes Grass (*Chloris virgata*) **Priority: Low**							
Rated as a low priority in QLD and NSW. 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 annual and perennial grass weeds, including **Feather Top Rhodes Grass**. Apply after trees have recovered from transplant shock and are showing signs of active growth. Do not apply to bearing trees.	NR	A	ALL	R3
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds.	NR	A	ALL	-
Fluazifop-P (Fusilade)	1***	Custard Apples / Directed Spray	Registered in custard apples as a directed spray for the control of grass weeds, including **Feather Top Rhodes Grass**.	14	A	QLD, NSW, WA & NT	-
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, including **Feather Top Rhodes Grass**. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Custard Apples / Directed or Shielded Spray	Registered in custard apples for control of various grass and broadleaf weeds, including **Feather Top Rhodes Grass**. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Haloxyfop (Verdict)	1***	Custard Apples / Directed Spray	Registered in custard apples for control of grass weeds, including **Feather Top Rhodes Grass**. Spray should be directed to the base of the tree, avoiding contact with fruit and foliage.	NR	A	ALL	-
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds, including **Feather Top Rhodes Grass**. Do not allow spray to contact any part of the tree, including the trunk.	H: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 (Guerrilla)	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual weeds, including **Feather Top Rhodes Grass**. Avoid contact with crop foliage.	H: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, including **Feather Top Rhodes Grass**. Do not allow spray to contact any part of the tree, including the trunk.	G:1	A	ALL	R3
2,2-DPA	0**		Registered for control of annual and perennial grasses, including **Feather Top Rhodes Grass**, in citrus, vines, stone fruit, apples and pears.		P		-
Flumioxazin (Chateau)	14**		Registered for control of **Feather Top Rhodes Grass** in grapevines, pome fruit, stone fruit, citrus, tree nuts, olives, avocados, blueberries and on irrigation channel banks and drainage ditches.		P		-
Ryegrass (*Lolium* spp.) **Priority: Low**							
Rated as a low priority in QLD and NSW. The most serious grass weed of southern Australia with distribution that is gradually extending north. Populations are prone to herbicide resistance so integrated weed management and rotation of herbicide modes of action are important aspects of a long-term control strategy.							
Amitrole	34**	Orchards / Directed Spray	Registered in orchards as a directed spray for the control of grass and broadleaf weeds, including **Ryegrass**.	56	A	ALL	-
Clethodim (Select)	1***	Non-Bearing Fruit Trees	Registered in non-bearing fruit trees for control of annual and perennial grass weeds, including **Ryegrass**. Apply after trees have recovered from transplant shock and are showing signs of active growth. Do not apply to bearing trees.	NR	A	ALL	R3
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds.	NR	A	ALL	-
Fluazifop-P (Fusilade)	1***	Custard Apples / Directed Spray	Registered in custard apples as a directed spray for the control of grass weeds, including **Ryegrass**.	14	A	QLD, NSW, WA & NT	-

Active Ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory Risk
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, including **Ryegrass**. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Custard Apples / Directed or Shielded Spray	Registered in custard apples for control of various grass and broadleaf weeds, including **Ryegrass**. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Haloxyfop (Verdict)	1***	Custard Apples / Directed Spray	Registered in custard apples for control of grass weeds, including **Ryegrass**. Spray should be directed to the base of the tree, avoiding contact with fruit and foliage.	NR	A	ALL	-
Oxyfluorfen (Goal)	14**	Custard Apple / Directed Spray / Tank Mix with Glyphosate, Paraquat or Paraquat/Diquat	Registered in custard apple for control of various grass and broadleaf weeds, including **Ryegrass**. 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, including **Ryegrass**. Do not allow spray to contact any part of the tree, including the trunk.	H:1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerrilla)	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual weeds, including **Ryegrass**. Avoid contact with crop foliage.	H: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, including **Ryegrass**. Do not allow spray to contact any part of the tree, including the trunk.	G:1	A	ALL	R3
Trifluralin	3**	Orchards / Pre-Plant Residual	Registered in orchards as a pre-plant residual for control of grass and broadleaf weeds, including **Ryegrass**.	NR	A	QLD, SA, WA, VIC & TAS	-
2,2-DPA	0**		Registered for control of annual and perennial grasses, including **Ryegrass**, in citrus, vines, stone fruit, apples and pears.		P		-

Active Ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory Risk
Flumioxazin (Chateau)	14**		Registered for control of **Ryegrass** in grapevines, pome fruit, stone fruit, citrus, tree nuts, olives, avocados, blueberries and on irrigation channel banks and drainage ditches.		P		-
Norflurazon (Zoliar) Agnova Technologies	12**		Registered for control of grass and broadleaf weeds, including **Annual Ryegrass** in asparagus, citrus, grapes, nuts, stone and pome fruits.		P		-
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds, including **Annual Ryegrass** in Brassica vegetables, Brassica leafy vegetables, sweet potatoes, spring onions, shallots, spinach, silverbeet, rhubarb, culinary herbs and beans.		P		-
S-Metolachlor+ Prosulfocarb (Boxer Gold) Syngenta	15**		Registered for control of **Ryegrass** in potatoes.		P		-
Flannel Weed (*Sida cordifolia*) **Priority: Low**							
Rated as a low priority in QLD and NSW. Perennial broadleaf weed that is difficult to control when plants become established.							
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds.	NR	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, including **Flannel Weed**. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Custard Apples / Directed or Shielded Spray	Registered in custard apples for control of various grass and broadleaf weeds, including **Flannel Weed**. 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
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds, including **Flannel Weed**. Do not allow spray to contact any part of the tree, including the trunk.	H:1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerrilla)	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual weeds, including **Flannel Weed**. Avoid contact with crop foliage.	H: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, including **Flannel Weed**. Do not allow spray to contact any part of the tree, including the trunk.	G:1	A	ALL	R3
Norflurazon (Zoliar) Agnova Technologies	12**		Registered for control of grass and broadleaf weeds in citrus, grapes, nuts, stone and pome fruits.		P		-
Dock (*Rumex* spp.) **Priority: Low**							
Rated as a low priority in QLD and NSW. Widespread species that is prolific and difficult to control when established.							
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds.	NR	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, including **Dock**. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Custard Apples / Directed or Shielded Spray	Registered in custard apples for control of various grass and broadleaf weeds, including **Dock**. 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
Oxyfluorfen (Goal)	14**	Custard Apple / Directed Spray / Tank Mix with Glyphosate, Paraquat or Paraquat/Diquat	Registered in custard apple for control of various grass and broadleaf weeds, including **Dock**. 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, including **Dock**. Do not allow spray to contact any part of the tree, including the trunk.	H:1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerrilla)	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual weeds, including **Dock**. Avoid contact with crop foliage.	H: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, including **Dock**. Do not allow spray to contact any part of the tree, including the trunk.	G:1	A	ALL	R3
Blackberry Nightshade (*Solanum nigrum*) **Priority: Low**							
Rated as a low priority in QLD and NSW. Prolific weed that is widely adapted and difficult to eradicate, mainly due to its long-term seed viability.							
Amitrole	34**	Orchards / Directed Spray	Registered in orchards as a directed spray for the control of grass and broadleaf weeds, including **Blackberry Nightshade**.	56	A	ALL	-
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds.	NR	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, including **Blackberry Nightshade**. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Custard Apples / Directed or Shielded Spray	Registered in custard apples for control of various grass and broadleaf weeds, including **Blackberry Nightshade**. 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
Isoxaben (Gallery) Corteva	29**	Bearing & Non-Bearing Fruit Trees / Residual Weed Control	Registered in non-bearing fruit trees for control of broadleaf weeds, including **Blackberry Nightshade**. Apply as a directed spray to weed-free, well prepared soil. Must be activated by at least 12.5mm of rainfall or sprinkler irrigation within 21 days of application.	NR	A	ALL	-
Oxyfluorfen (Goal)	14**	Custard Apple / Directed Spray / Tank Mix with Glyphosate, Paraquat or Paraquat/Diquat	Registered in custard apple 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	-
Oryzalin	3**	Custard Apple / Non-Bearing / Directed Spray	Registered in non-bearing custard apple for control of various grass and broadleaf weeds, including **Blackberry Nightshade**. 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, including **Blackberry Nightshade**. Do not allow spray to contact any part of the tree, including the trunk.	H:1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerrilla)	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual weeds, including **Blackberry Nightshade**. Avoid contact with crop foliage.	H: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, including **Blackberry Nightshade**. Do not allow spray to contact any part of the tree, including the trunk.	G:1	A	ALL	R3
Flumioxazin (Chateau)	14**		Registered for control of **Blackberry Nightshade** in grapevines, pome fruit, stone fruit, citrus, tree nuts, olives, avocados, blueberries and on irrigation channel banks and drainage ditches.		P		-
Norflurazon (Zoliar) Agnova Technologies	12**		Registered for control of grass and broadleaf weeds in citrus, grapes, nuts, stone and pome fruits.		P		-

Active Ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory Risk
Fat Hen (*Chenopodium album*) **Priority: Low**							
Rated as a low priority in QLD and NSW. Fat Hen is a fast-growing woody annual weed, which can germinate throughout most of the year. Timely herbicide control id critical for managing this weed.							
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds.	NR	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, including **Fat Hen**. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Custard Apples / Directed or Shielded Spray	Registered in custard apples for control of various grass and broadleaf weeds, including **Fat Hen**. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Isoxaben (Gallery) Corteva	29**	Bearing & Non-Bearing Fruit Trees / Residual Weed Control	Registered in non-bearing fruit trees for control of broadleaf weeds, including **Fat Hen**. Apply as a directed spray to weed-free, well prepared soil. Must be activated by at least 12.5mm of rainfall or sprinkler irrigation within 21 days of application.	NR	A	ALL	-
Oxyfluorfen (Goal)	14**	Custard Apple / Directed Spray / Tank Mix with Glyphosate, Paraquat or Paraquat/Diquat	Registered in custard apple for 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	-
Oryzalin	3**	Custard Apple / Non-Bearing / Directed Spray	Registered in non-bearing custard apple for control of various grass and broadleaf weeds, including **Fat Hen**. 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, including **Fat Hen**. Do not allow spray to contact any part of the tree, including the trunk.	H: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 (Guerrilla)	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual weeds, including **Fat Hen**. Avoid contact with crop foliage.	H: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, including **Fat Hen**. Do not allow spray to contact any part of the tree, including the trunk.	G:1	A	ALL	R3
Flumioxazin (Chateau)	14**		Registered for control of **Fat Hen** in grapevines, pome fruit, stone fruit, citrus, tree nuts, olives, avocados, blueberries and on irrigation channel banks and drainage ditches.		P		-
Norflurazon (Zoliar) Agnova Technologies	12**		Registered for control of grass and broadleaf weeds in citrus, grapes, nuts, stone and pome fruits.		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		-
Marshmallow (*Malva parviflora*) **Priority: Low**							
Rated as a low priority in QLD and NSW. Adapted to a wide variety of environments and highly competitive weed. Control with knockdown herbicides can be unreliable.							
Carfentrazone (Hammer)	14**	Tropical & Sub-Tropical Fruits / Directed Spray or Spot Spray	Registered in tropical and sub-tropical fruits for control of various broadleaf weeds, including **Marshmallow**. If weeds are already present, use as a spike in a mixture with glyphosate or paraquat.	NR	A	ALL	-
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Registered in orchards for residual weed control of annual grass and broadleaf weeds.	NR	A	ALL	-

Active Ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory Risk
Glyphosate (Roundup)	9**	Custard Apples / Directed or Shielded Spray	Registered in custard apples for control of various grass and broadleaf weeds, including **Marshmallow**. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Isoxaben (Gallery) Corteva	29**	Bearing & Non-Bearing Fruit Trees / Residual Weed Control	Registered in non-bearing fruit trees for control of broadleaf weeds, including **Marshmallow**. Apply as a directed spray to weed-free, well prepared soil. Must be activated by at least 12.5mm of rainfall or sprinkler irrigation within 21 days of application.	NR	A	ALL	-
Oxyfluorfen (Goal)	14**	Custard Apple / Directed Spray / Tank Mix with Glyphosate, Paraquat or Paraquat/Diquat	Registered in custard apple 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, including **Marshmallow**. Do not allow spray to contact any part of the tree, including the trunk.	H:1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerrilla)	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual weeds, including **Marshmallow**. Avoid contact with crop foliage.	H: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, including **Marshmallow**. Do not allow spray to contact any part of the tree, including the trunk.	G:1	A	ALL	R3
Flumioxazin (Chateau)	14**		Registered for control of **Marshmallow** in grapevines, pome fruit, stone fruit, citrus, tree nuts, olives, avocados, blueberries and on irrigation channel banks and drainage ditches.		P		-
Willow Weed (*Persicaria maculosa*) **Priority: Low**							
Rated as a low priority in QLD and NSW.							

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.	NR	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, including **Willow Weed**. Apply treatment along the sides of crops and between rows of crops.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Custard Apples / Directed or Shielded Spray	Registered in custard apples for control of various grass and broadleaf weeds, including **Willow Weed**. 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, including **Willow Weed**. Do not allow spray to contact any part of the tree, including the trunk.	H:1 G:7	A	ALL	R3
Paraquat + Amitrole (Guerrilla)	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual weeds, including **Willow Weed**. Avoid contact with crop foliage.	H: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, including **Willow Weed**. Do not allow spray to contact any part of the tree, including the trunk.	G:1	A	ALL	R3

4.4 Plant Growth Regulators in custard apples

4.4.1 Plant Growth Regulator priorities

Plant Growth Regulator priorities were not determined.

PGR Issue
Unknown
Control of Vegetative Growth

4.3.2 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	WHP (days)	Availability	States	Regulatory Risk
Control of Vegetative Growth **Priority: Unknown**							
Rated as a high priority in NSW and VIC, a moderate priority in QLD and SA, and as a low priority in WA.							
Uniconazole-P (Sunny Plant Growth Regulator) PER13951	-	Custard Apples	Permitted in custard apple for the **control of vegetative growth**. Do not apply after the commencement of main flowering. Do not apply more than 1 application per crop.	NR	A	ALL (excl. VIC)	-

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	https://www.legislation.gov.au/Details/F2022L00545
APVMA Permit search	https://productsearch.apvma.gov.au/permits
APVMA Product search	https://productsearch.apvma.gov.au/products
AUSVEG	https://ausveg.com.au
Codex MRL database	http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/
Cotton Pest Management Guide 2021-22	https://www.cottoninfo.com.au/publications/cotton-pest-management-guide
CropLife Australia (Resistance Management)	https://www.croplife.org.au/resources/programs/resistance-management/
Infopest Database	www.infopest.com.au
Hort Innovation	www.horticulture.com.au
IPDM Manual for Custard Apple	https://www.horticulture.com.au/globalassets/hort-innovation/resource-assets/cu13001-custard-apple-ipdm-manual.pdf

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 custard apple
Appendix 2. Products available for control of insects and mites in custard apple
Appendix 3. Products available for weed control in custard apple
Appendix 4. Plant growth regulators available in custard apple
Appendix 5. Current permits for use in custard apple
Appendix 6. Custard Apple Maximum Residue Limits (MRLs)
Appendix 7. Custard Apple Agrichemical Regulatory Risk Assessment

Appendix 1. Products available for disease control in custard apples

Active Ingredient (Trade Name)	Chem. group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Bromo Chloro Dimethyl Hydantoin (BCDMH)	-	Sanitiser / Post-Harvest Treatment	External Rot Causing Organisms	ALL	NR	-
Chlorine		Sanitiser / Post-Harvest Treatment	Bacteria and Fungi	ALL	NR	-
Copper Oxychloride	M1	Custard Apples	Massasso Spot Purple Blotch	QLD & WA	1	-
Copper	M1	Tropical Fruit	Phytophthora Stem Canker	QLD & NSW	1	-
Copper PER11943	M1	Custard Apple	Anthracnose (*Colletotrichum gloeosporioides*)	ALL (excl. VIC)	1	-
Didecyl Dimethyl Ammonium Chloride (Sporekill)	-	Tropical & Sub-Tropical Fruit (Inedible Peel) / Post-Harvest Disinfectant	Bacteria & Fungi	ALL	NR	-
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Tropical & Sub-Tropical Fruit (Inedible Peel)	Anthracnose (*Colletotrichum* spp.) Stem End Rot	ALL	3 NG	-
Iodine	M	Tropical and Sub-Tropical Fruit / Post Harvest Dip	Bacteria & Fungi	ALL	NR	-
Mancozeb	M3	Custard Apple	Pseudocercospora Fruit Spot	ALL	1	R2
Mancozeb PER11943	M3	Custard Apple	Anthracnose (*Colletotrichum gloeosporioides*)	ALL (excl. VIC)	14	R2
Peroxyacetic Acid	M	Sanitiser / Post-Harvest Treatment	Bacteria	ALL	NR	-
Phosphorous Acid PER13807	33	Custard Apple	Phytophthora	ALL (excl. VIC)	NR	-

Active Ingredient (Trade Name)	Chem. group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Prochloraz (Octave) PER83212	3	Custard Apple	Anthracnose (*Colletotrichum gloeosporioides*)	ALL (excl. VIC)	NR NG	R3
Pyraclostrobin (Cabrio) PER13952	11	Custard Apple	Pseudocercospora Fruit Spot (*Pseudocercospora anonicola*)	NSW & QLD	3	-

Appendix 2. Products available for control of insects and mites in custard apples

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
4-(P-Acetoxyphenyl)-2-Butanone + Malathion	1B	Fruit Fly Trap	Queensland Fruit Fly	ALL	NR	R3
Abamectin	6	Custard Apple	Two Spotted Mite (*Tetranychus urticae*) Banana Spotted Mite (*Tetranychus lambi*)	ALL	14 NG	-
Acetamiprid + Pyriproxyfen (Trivor) Adama PER89943	4A+7C	Custard Apples	Fruit Spotting Bugs (*Amblypelta nitida*, *A.lutescens*) Mealybugs (Pseudococcidae) Scale Insects (Coccoidea) Light Brown Apple Moth (*Epiphyas postvittana*) Suppression of: Queensland Fruit Fly (*Bactrocera tryoni*) Mediterranean Fruit Fly (*Ceratitis capitata*)	ALL (excl. VIC)	28 NG	R2
Bacillus thuringiensis subsp Kurstaki Strain HD-1	11	Fruit	Armyworm (*Spodoptera* spp.) Cotton Bollworm (*Helicoverpa armigera*) Native Budworm (*Helicoverpa punctigera*) Cabbage Moth (*Plutella xylostella*) Cabbage White Butterfly (*Pieris rapae*) Loopers Light Brown Apple Moth (*Epiphyas postvittana*) Vine Moth (*Agarista agricola*)	ALL	NR	-

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Beta-Cyfluthrin (Bulldock) PER80374	3A	Custard Apple / Field Grown	Fruit-Spotting Bug (*Amblypelta nitida*) Banana-Spotting Bug (*Amblypelta lutescens*) Elephant or Rhino Beetle (*Xylotrupes gideon*) Red-Shouldered Leaf Beetle (*Monolepta australis*) Swarming Leaf Beetle (*Rhyparida* spp.) Longicorn Trunk Borer (*Acalolepta vastator*) Macadamia Nut Borer (*Cryptophlebia ombrodelta*) Mango Tip Borer (*Penicillaria jocosatrix*) Flatid Planthopper (Flatidae) Green Vegetable Bug (*Nezara viridula*) Lychee Stink Bug (*Tessaratoma papillosa*) Yellow Peach Moth (*Conogethes punctiferalis*)	NSW, NT, QLD, SA & WA	7	-
Buprofezin (Applaud) Corteva	16	Custard Apples	Mealybugs Scale Insects	ALL	14	-
Clothianidin (Samurai) PER84992	4A	Custard Apple	Citrus Mealybug (*Planococcus citri*)	ALL (excl. VIC)	NR NG	R2
Dimethoate	1B	Custard Apples / Post-Harvest Dip	Queensland Fruit Fly	NSW, WA & NT	NR	R1
Dimethoate PER13859	1B	Fruit Fly Host Crops / Following Completion of Harvest only	Fruit Fly	ALL	NR	R1
Dimethoate PER87164	1B	Custard Apple / Post-Harvest Treatment	Queensland Fruit Fly (*Bactrocera tryoni*) Lesser Qld Fruit Fly (*Bactrocera neohumeralis*) Northern Territory Fruit Fly (*Bactrocera aquilonis*) Mediterranean Fruit Fly (*Ceratitis capitata*)	ALL	NR	R1
Etoxazole (Paramite) PER14227	10B	Custard Apple	Two Spotted Mite (*Tetranychus urticae*) Banana Spotted Mite (*Tetranychus lambi*)	NSW, NT, QLD & WA	7 NG	-

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Fipronil PER87605	2B	Custard Apple	Ants (Formicidae)	ALL (excl. VIC)	NR NG	R3
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Fruit Tree	Suitable for organic growers. Broad spectrum activity including ants, aphids, caterpillars, earwigs, whitefly, thrips and leafhopper.	ALL	1	-
Malathion	1B	Fruit Tree / Fruit Fly Bait	Fruit Fly	ALL	3	R3
Methoxyfenozide (Prodigy) Corteva	18	Custard Apples	Yellow Peach Moth (*Conogethes punctiferalis*)	ALL	7 NG	-
Petroleum Oil	UNM	Custard Apples	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	Sub-Tropical Fruit (Inedible Peel)	Clean up spray just prior to harvest Fruit Fly Rutherglen Bug Spiders	ALL	1	-
Pyriproxifen (Distance Ant Bait)	7C	Tropical Fruit Plantations	Invasive and Nuisance Ants	ALL	NR	-
Spinetoram (Success Neo) Corteva	5	Tropical & Sub-Tropical Fruit (Inedible Peel)	Flower-Eating Caterpillars Leafrollers Loopers Yellow Peach Moth Red-Banded Thrips Sorghum Head Caterpillar	ALL	NR NG	-

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Spinetoram (Success Neo) Corteva PER89241	5	Tropical & Sub-Tropical Fruit (Inedible Peel)	Fall Armyworm	ALL (excl. VIC)	NR NG	-
Spinosad (Entrust Organic) Corteva	5	Tropical & Sub-Tropical Fruit (Inedible Peel)	Flower-Eating Caterpillars Leafrollers Loopers Yellow Peach Moth Red-Banded Thrips Sorghum Head Caterpillar	ALL	NR G:14	-
Spinosad (Entrust Organic) Corteva PER89870	5	Tropical & Sub-Tropical Fruit (Inedible Peel)	Fall Armyworm	ALL (excl. VIC)	NR G:14	-
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 PER86598	4C	Custard Apple	Citrus Mealybug (*Planococcus citri*) Fruit-Spotting Bug (*Amblypelta nitida*) Banana-Spotting Bug (*Amblypelta lutescens*)	ALL (excl. VIC)	1	-
Tebufenozide (Mimic)	18	Custard Apple	Yellow Peach Moth	ALL	14	-
Trichlorfon PER12450	1B	Custard Apple	Queensland Fruit Fly (*Bactrocera tryoni*) Mediterranean Fruit Fly (*Ceratitis capitata*)	ALL (excl. VIC)	7 G:7	R2

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Trichlorfon PER14743	1B	Custard Apple	Flatid Planthopper Flower-Eating Caterpillar Loopers Yellow Peach Moth (*Conogethes punctiferalis*) Suppression of: Fruit-Spotting Bug (*Amblypelta nitida*) Banana-Spotting Bug (*Amblypelta lutescens*) Green Vegetable Bug (*Nezara viridula*) Lychee Stink Bug (*Lyramorpha rosea*)	ALL (excl. VIC)	7	R2

Appendix 3. Products available for weed control in custard apples

Active ingredient (Trade Name)	Chem. Group	Situation	Comment / Use / Weed	WHP (days)	States	Regulatory risk
Amitrole	34**	Orchards / Directed Spray	Grass and Broadleaf Weeds	56	ALL	-
Carfentrazone (Hammer)	14**	Tropical & Sub-Tropical Fruits / Tank Mix with Glyphosate	Broadleaf Weeds	NR	ALL	-
Clethodim (Select)	1***	Non-Bearing Fruit Tree	Annual Ryegrass (*Lolium rigidum*), Annual Phalaris (*Phalaris minor*), Barley Grass (*Hordeum leporinum*), Barnyard Grass (*Echinochloa* spp.), Blown Grass (*Agrostis avenacea*), Brome Grass (*Bromus diandrus*), Crowsfoot Grass (*Eleusine indica*), Feathertop Rhodes Grass (*Chloris virgata*), Liverseed Grass (*Urochloa panicoides*), Paradoxa Grass (*Phalaris paradoxa*), Red Sprangletop Grass (*Leptochloa filiformis*), Seedling Johnson Grass (*Sorghum halepense*), Summer Grass (*Digitaria* spp.), Volunteer Sorghum (*Sorghum* spp.), Volunteer Wheat (*Triticum aestivum*), Volunteer Oats (*Avena sativa*), Volunteer Barley (*Hordeum vulgare*), Winter Grass (*Poa annua*), suppression of Silver Grass (*Vulpia bromoides*) (not QLD, WA)	NR	ALL	-
Dichlobenil (Casoran)	29**	Orchards / Residual Weed Control	Annual Grass and Broadleaf Weeds	NR	ALL	-
Diquat (Reglone)	22**	Orchards / Directed Spray	Capeweed (for addition to Paraquat when control of Capeweed is required)	NR	ALL	R3
Fluazifop-P (Fusilade)	1***	Custard Apples / Directed Spray	Grass Weeds	14	QLD, NSW, WA & NT	-
Glufosinate (Basta)	10**	Non-Bearing Fruit Tree	Grass and Broadleaf Weeds	NR G:56	ALL	R3

Active ingredient (Trade Name)	Chem. Group	Situation	Comment / Use / Weed	WHP (days)	States	Regulatory risk
Glyphosate (Roundup)	9**	Custard Apples / Directed or Shielded Spray	Grass and Broadleaf Weeds	NR	ALL	R3
Haloxyfop (Verdict)	1***	Custard Apples / Directed Spray	Grass Weeds	NR	ALL	-
Isoxaben (Gallery) Corteva	29**	Bearing and Non-Bearing Fruit Tree / Residual Weed Control	Broadleaf Weeds.	NR	ALL	-
Oryzalin	3**	Custard Apple / Non-Bearing	Grass and Broadleaf Weeds	NR	ALL	-
Oxyfluorfen (Goal)	14**	Custard Apple / Directed Spray / Tank Mix with Glyphosate, Paraquat or Paraquat/Diquat	Grass and Broadleaf Weeds	NR NG	ALL	-
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Annual Grass and broadleaf weeds	H:1 G:7	ALL	R3
Paraquat + Amitrole (Guerrilla)	22** + 34**	Orchards / Directed Spray	Annual Weeds Capeweed or *Erodium* spp.	H:NR G:1	QLD, VIC, SA, WA, TAS and NT	R3
			Annual Weeds Fat Hen Pigweed		NSW	
			Flaxleaf Fleabane		ALL	
Paraquat + Diquat (SpraySeed)	22**	Orchards / Directed Spray	Grass and Broadleaf Weeds	G:1	ALL	R3
Trifluralin	3**	Orchards / Pre-Plant Residual	Grass and Broadleaf Weeds	NR	QLD, SA, WA, VIC & TAS	-

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

Appendix 4. Plant growth regulators available in custard apples

Active ingredient (Trade Name)	Chem. Group	Situation	Comment / Use	WHP (days)	States	Regulatory risk
Uniconazole-P (Sunny Plant Growth Regulator) PER13951	-	Custard Apple	Control Vegetative Growth	NR	ALL (excl. VIC)	-

Appendix 5. Current permits for use in custard apples

Permit No.	Description	Issued Date	Expiry Date	Permit Holder
PER89943	Acetamiprid + Pyriproxyfen (Trivor) / Custard Apples / Fruit Spotting Bugs, Banana Spotting Bugs, Mealybug & Scale Insects, Suppression of Mediterranean Fruit Fly & Queensland Fruit Fly	29-Jan-21	31-Jan-24	Hort Innovation
PER80374 Version 2	Beta-Cyfluthrin / Custard Apple, Lychee, Mango, Persimmon / Fruit-Spotting Bug, Banana-Spotting Bug, Elephant Or Rhino Beetle, Red-Shouldered Leaf Beetle, Swarming Leaf Beetle, Longicorn Trunk Borer, Macadamia Nut Borer, Mango Tip Borer, Flatid Planthopper, Green Vegetable Bug, Lychee Stink Bug & Yellow Peach Moth	1-Oct-15	31-Aug-22	Australian Lychee Growers Association
PER84992	Clothianidin (Samurai) / Custard Apples / Citrus Mealy Bug	19-Feb-18	28-Feb-23	CAA c/o Hort Innovation
PER11943 Version 3	Copper & Mancozeb / Custard Apple / Anthracnose	28-May-12	30-Apr-27	Hort Innovation
PER13859 Version 2	Dimethoate/ Orchard clean-up - fruit fly host crops following harvest / Fruit Fly	09-Feb-15	31-Jul-24	Growcom
PER87164 Version 2	Dimethoate / Custard Apple / Queensland Fruit Fly	1-Mar-19	31-Mar-24	Hort Innovation
PER14227 Version 3	Etoxazole (Paramite) / Custard Apple / Two Spotted Mite, Banana Spider Mite	31-Oct-13	30-Jun-23	CAA
PER87605 Version 2	Fipronil / Custard Apple / Ants	12-Apr-19	30-Apr-25	Hort Innovation
PER13807 Version 2	Phosphorous Acid / Custard apple / Phytophthora	7-Nov-12	30-Sep-22	CAA c/o Hort Innovation
PER83212 Version 2	Prochloraz (Octave) / Custard Apple / Anthracnose	1-Sep-16	31-Mar-23	CAA c/o Hort Innovation
PER13952 Version 4	Pyraclostrobin (Cabrio) / Custard Apple / Pseudocercospora Leaf Spot	31-May-13	31-Aug-26	Hort Innovation
PER89241	Spinetoram (Delegate) / Tropical and Sub-Tropical Fruit (Inedible Peel) / Fall Armyworm	6-Mar-20	31-Mar-23	Hort Innovation
PER89870	Spinosad (Entrust Organic) / Tropical and Sub-Tropical Fruit (Inedible Peel) / Fall Armyworm	21-Jul-20	31-Jul-23	Hort Innovation

Permit No.	Description	Issued Date	Expiry Date	Permit Holder
PER86598	Sulfoxaflor (Transform) / Custard apple / Citrus Mealybug, Fruit Spotting Bug and Banana Spotting Bug	1-Nov-18	30-Nov-23	Hort Innovation
PER12450 Version 7	Trichlorfon / Custard Apple / Fruit Fly	6-Oct-11	30-Nov-25	Hort Innovation
PER14743 Version 3	Trichlorfon / Custard Apple, Lychee, Mango & Persimmon / Flatid Planthopper, Flower Eating Caterpillar, Looper & Yellow Peach Moth. Suppression Only: Fruit-Spotting Bug, Banana Spotting Bug, Green Vegetable Bug and Lychee Stink Bug	1-Jun-14	30-Jun-25	Hort Innovation
PER13951 Version 2	Uniconazole-P (Sunny Plant Growth Regulator) / Custard Apple / Plant Growth Regulation	28-Jun-13	30-Jun-23	CAA

Appendix 6. Custard Apple Maximum Residue Limits (MRLs)

CODEX commodity groupings of pome fruits and subgroups:

FI 0332 Custard Apple
FI 0030 Assorted Tropical and Sub-Tropical Fruits – Inedible Peel
FI 2023 Assorted Tropical and Sub-Tropical Fruits – Inedible, Rough or Hairy Peel - Large Fruit

Note: Australia's exports approximately 5% of production for custard apple, with most of this going to Hong Kong and Singapore. International trade volumes are negligible. Available information indicates that in the absence specific limits in legislation that most countries defer to Codex, followed by EU MRL standards or apply a 0.01 ppm 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	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Abamectin	FI 0332	Custard Apple	*0.01	-
Acetamiprid	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel	0.2	-
Aldrin and Dieldrin		Fruits	E0.05	-
Bromide Ion		Fruits {except Avocado; Citrus Fruits; Dried Fruits; Strawberry}	20	-
		Fruits	-	20
Buprofezin	FI 0332	Custard Apple	0.1	-
Carfentrazone-ethyl	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel	*0.05	-
Clothianidin	FI 0332	Custard Apple	T0.1	-
Cyfluthrin	FI 0332	Custard Apple	T0.1	-
DDT		Fruits	E1	-
Diazinon		Fruits {except Citrus Fruits; Grapes; Olives; Peach}	0.5	-
Dicofol		Fruits {except Strawberry}	5	-
Didecyldimethyl-ammonium chloride	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel	20	-
Dimethoate	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel {except Avocado; Mango; Pineapple}	5	-
Diphenylamine		Fruits {except Apple; Pear}	0.5	-
Diquat		Fruits	*0.05	-
Dithianon		Fruits {except Blueberries}	2	-
Dithiocarbamates	FI 0332	Custard Apple	5	-
Endosulfan	FI 0332	Custard Apple	-	0.5
Etoxazole	FI 0332	Custard Apple	T0.1	-
	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel	5	-
Fipronil	FI 0332	Custard Apple	T0.05	-
Fluazifop-p-butyl	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel {except Avocado; Banana)	0.05	-

Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Fluopyram	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel {except Banana; Pineapple}	2	-
Glufosinate	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel {except Banana; Kiwifruit}	-	0.1
	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel	0.2	-
Glyphosate	FI 0332	Custard Apple	*0.05	-
Haloxyfop	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel	*0.05	-
Inorganic Bromide		Fruits {except Avocado; Citrus Fruits; Dried Fruits; Strawberry}	20	-
		Fruits	-	20
Isoxaben	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel	*0.01	-
Lindane		Fruits {except Apple; Cherries; Cranberry; Grapes; Peach; Pineapple; Plums; Strawberry}	E0.5	-
Maldison		Fruits {except Berries and Other Small Fruits; Citrus Fruits; Dried Fruits; Stone Fruits}	2	-
Metaldehyde		Fruits	1	-
Methiocarb		Fruits {except Citrus Fruits; Grapes}	T0.1	-
Methoxyfenozide	FI 0332	Custard Apple	0.3	-
Methyl Bromide		Fruits {except Jackfruit; Litchi; Mango; Papaya [pawpaw]}	T*0.05	-
Omethoate	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel {except Avocado; Mango; Pineapple}	2	-
Oryzalin		Fruits	0.1	-
Oxyfluorfen	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel	*0.01	-
Paclobutrazol	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel {except Avocado; Mango}	*0.01	-
Paraquat		Fruits {except Olives}	*0.05	-
	FI 0030	Assorted tropical and sub-tropical fruits – inedible peel	-	*0.01
	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel	*0.05	-
Phosphine	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel	T*0.01	-
Phosphorous Acid	FI 0332	Custard Apple	500	-
Piperonyl Butoxide		Fruits	8	-
Pirimicarb		Fruits {except Blackberries}	0.5	-
Prochloraz	FI 0332	Custard Apple	T1	-
	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel	-	Po7
Pyraclostrobin	FI 0332	Custard Apple	T3	-
Pyrethrins		Fruits	1	-
	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel	0.3	-

Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Simazine		Fruits	*0.01	-
Spinetoram	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel	0.3	-
Spinosad	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel	0.3	-
Sulfoxaflor	FI 0332	Custard Apple	T0.5	-
Tebufenozide	FI 0332	Custard Apple	0.3	-
Trichlorfon	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel	T3	-
Trifloxystrobin	FI 0030	Assorted Tropical and Sub-Tropical Fruits – Inedible Peel {except Banana; Pineapple}	2	-
Trifluralin		Fruits	*0.05	-
Uniconazole-P	FI 0332	Custard Apple	T*0.01	-

NOTE: MRLs are constantly under review and subject to change. Check for current MRLs and do not rely on the values stated above.

* Indicates that an MRL is at the Limit of Quantitation (LOQ)
T =Temporary MRL
E = The MRL is based on extraneous residues

Sources: APVMA MRLs: Agricultural and Veterinary Chemicals Code (MRL Standard) Instrument 2019. Compilation 23. Prepared 4 February 2022. CODEX MRLs: CODEX Alimentarius International Food Standards database (February 2022), http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/

Appendix 7. Custard Apple Agrichemical Regulatory Risk Assessment

Custard Apple
Agrichemical Regulatory
Risk Assessment

March 2022

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 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 custard apples as well as current initiatives aimed at addressing identified pest management deficiencies.

Custard Apple 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	Comment
INSECT AND OTHER PESTS			
Abamectin	**6**	Two-spotted spider mite & Strawberry spider mite	EU: Restricted use to permanent greenhouses
Acetamiprid + pyriproxyfen	**4A+ 7C**	Banana-spotting bug (PER89943)	Acetamiprid APVMA: Under review
		Fruit Fly (PER89943)	
		Fruit-spotting bug (PER89943)	
		Mealybugs (PER89943)	
		Scale insects (PER89943)	
Beta-cyfluthrin	**3A**	Banana-spotting bug	EU: No authorisation in place
		Flatid planthoppers	
		Fruit-spotting bug	
		Green vegetable bug	
		Litchi stink bug	
		Mango shoot caterpillar	
		Elephant/Rhinoceros beetle (PER80374)	
		Fig longicorn/ trunk borer (PER80374)	
		Red shouldered leaf beetle (PER80374)	
		Swarming leaf beetles (PER80374	
		Yellow peach moth (PER80374)	

Active Constituents	Chemical Group	Problem	Comment
Buprofezin	**16**	Mealybugs Scale insects	EU: MRLs set to limit of quantification
Clothianidin	**4A**	Citrus mealybug (PER84992)	APVMA: Under review Canada: Field uses cancelled or amended EU: Not authorised USA: Re-registration with new risk mitigation measures
Dimethoate	**1B**	Fruit Fly (PER87164) (Post-harvest dip)	Codex: MRL deletion recommended. EU: Not authorised
Etoxazole	**10B**	Two-spotted spider mite & Strawberry spider mite (PER14227)	EU: Only uses on greenhouse ornamentals approved & Candidate for substitution
Fipronil	**2B**	Ants (PER87605)	APVMA: Under review Codex: Re-evaluation underway EU: No authorisation in place
Maldison (lures)	**1B**	Fruit Fly	APVMA: Under review Codex: Re-evaluation scheduled EU: Use restricted to permanent greenhouses
Methoxyfenozide	**18**	Yellow peach moth	EU: Proposed restricted authorisation & Candidate for substitution
Paraffinic oil/ petroleum oil	**UN**	Scale insects	
Pyrethrins	**3A**	Fruit Fly	
Pyriproxyfen	**7C**	Ants	

Active Constituents	Chemical Group	Problem	Comment
Spinetoram	**5**	Flower eating caterpillars	
		Leafroller caterpillars	
		Loopers	
		Sorghum head caterpillar	
		Yellow peach moth	
		Fall Armyworm (PER89241)	
Spinosad	**5**	Avocado leafroller	
		Flower eating caterpillars	
		Ivy leaf roller	
		Lightbrown apple moth	
		Loopers	
		Sorghum head caterpillar	
		Yellow peach moth	
		Fall armyworm (PER89870)	
Sulfoxaflor	**4C**	Banana-spotting bug (PER86598)	USA: Pollinator concerns EU: Restricted to permanent glasshouses only
		Citrus mealybug (PER86598)	
		Fruit-spotting bug (PER86598)	
Tebufenozide	**18**	Yellow peach moth	
Trichlorfon	**1B**	Fruit Fly (PER12450)	APVMA: nominated for review Codex: No MRLs EU: No authorisations USA: No MRLs
		Banana-spotting bug (PER14743)	
		Flatid planthoppers (PER14743)	
		Flower eating caterpillars (PER14743)	
		Fruit-spotting bug (PER14743)	
		Green vegetable bug (PER14743)	
		Litchi stink bug (PER14743)	
		Loopers (PER14743) (PER14743)	
		Yellow peach moth	

Active Constituents	Chemical Group	Problem	Comment
DISEASES			
Copper	**M1**	Anthracnose	EU: Candidates for substitution
		Purple blotch	
		Pseudocercospora	
DDAC		Sanitizer	EU: No authorisation in place
Mancozeb	**M3**	Anthracnose	APVMA: nominated for review Canada: Many uses cancelled Codex: To be reviewed 2023/24 EU: Authorisation not renewed
		Pseudocercospora	
Phosphorous acid	**33**	Phytophthora (PER13807)	
Prochloraz	**3**	Anthracnose (PER83212)	Codex: Periodic re-evaluation scheduled EU: No authorisation
Pyraclostrobin	**11**	Pseudocercospora leaf spot (PER13952)	

Active Constituents	Chemical Group	Comment
WEEDS		
Carfentrazone-ethyl	**14**	
Clethodim (non-bearing trees)	**1**	Codex: MRLs proposed for deletion
Diquat	**22**	APVMA: Currently under review EU: No authorisation in place
Fluazifop-P	**1**	
Glyphosate	**9**	Ongoing issues internationally
Haloxyfop-P	**1**	EU: No authorisation in place
Isoxaben	**29**	
Oryzalin	**3**	EU: No authorisation in place
Oxyfluorfen	**14**	EU: Candidate for substitution USA: Interim review decision Label amendments proposed
Paraquat	**22**	APVMA: Currently under review EU: Not authorised Rotterdam Convention - nominated
PLANT GROWTH REGULATOR		
Uniconazole-P (PER13951)		EU: No authorisation in place

Funding statement: This *multi-industry* project has been funded by Hort Innovation, using *industry research and development levies* and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.