



Melons

Strategic Agrichemical Review Process
(SARP)

April 2019

Hort Innovation
Project - MT18007

Hort Innovation Project Number:

MT18007 – Melon & Pineapple Industry SARP Report Updates.

SARP Service Provider:

Jeevan Khurana

Purpose of the report:

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

Date of report:

15 April 2019

Disclaimer:

Horticulture Innovation Australia Limited (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 Melons SARP. 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 Melon SARP or from reliance on information contained in the material or that Hort Innovation provides to you by any other means.

Legal Notice:

Copyright © Horticulture Innovation Australia Limited 2019

Copyright subsists in the Melons SARP. Horticulture Innovation Australia Limited (Hort Innovation) owns the copyright, other than as permitted under the Copyright ACT 1968 (Cth). The Melons SARP (in part or as a whole) cannot be reproduced, published, communicated or adapted without the prior written consent of Hort Innovation. Any request or enquiry to use the Melons SARP should be addressed to:

Communications Manager
Hort Innovation
Level 8, 1 Chifley Square
Sydney NSW 2000
Australia
Email: communications@horticulture.com.au
Phone: 02 8295 2300

**Hort
Innovation**
Strategic levy investment

**MELON
FUND**

This project has been funded by Hort Innovation using the melon 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	4
1.1 Diseases.....	5
1.2 Insects, mites and other invertebrates	5
1.3 Weeds.....	5
2. The Australian Melon Industry	6
3. Introduction	7
3.1 Background	7
3.2 Minor use permits and registration.....	8
3.3 Methods	8
3.4 Results and discussions	9
3.4.1 Detail.....	9
3.4.2 Appendices.....	9
4. Diseases, pests and weeds of melons	10
4.1 Diseases of melons	10
4.1.1 Disease priorities.....	10
4.1.2 Available and potential products for priority diseases.....	12
4.2 Insect, mite and other invertebrate pests of melons	24
4.2.1 Insect, mite and other invertebrate pest priorities.....	24
4.2.2 Available and potential products for priority insects, mites and other invertebrates	26
4.3 Weeds in melons	43
4.3.1 Weed priorities	43
4.3.2 Available and potential products for weed control	44
5. References	46
5.1 Information:	46
5.2 Abbreviations and Definitions:.....	46
5.3 Acknowledgements:.....	46
6. Appendices:	47
Appendix 1. Products available for disease control in melons.....	48
Appendix 2. Products available for control of insects, mites and other invertebrates in melons	52
Appendix 3. Products available for weed control in melons.....	57
Appendix 4. Current permits for use in melons	58
Appendix 5. Melons Maximum Residue Limits (MRLs)	60
Appendix 6: Melon regulatory risk assessment.....	65

1. Summary

The strategic levy investment project Melon & Pineapple Industry SARP Report Updates (MT18007) is part of the Hort Innovation Melon Fund. 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 melon industry with sound pesticide usage for the future that the industry can pursue for registration with the manufacturer, or minor-use permits with the Australian Pesticide and Veterinary Medicines Authority (APVMA).

1.1 Diseases

The high priority diseases are:

Common Name	Scientific Name
Gummy stem blight	<i>Didymella bryoniae</i>
Fusarium wilt	<i>Fusarium oxysporum</i>
Powdery mildew	<i>Golovinomyces cichoracearum & Podosphaera xanthiis</i>
Downy mildew	<i>Pseudoperonospora cubensis</i>

1.2 Insects, mites and other invertebrates

The high priority insect, mite and other invertebrate pests are:

Common Name	Scientific Name
Silverleaf Whitefly	<i>Bemisia tabaci</i>
Aphids (including Green peach aphid)	<i>Myzus persicae, Aphidae spp.</i>
Mites (two spotted and spider)	<i>Tetranychus urticae, Tetranychus spp.</i>
Native budworm, Cotton bollworm	<i>Helicoverpa spp.</i>
Cucumber moth	<i>Diaphania indica</i>
Root-knot nematodes	<i>Meloidogyne spp.</i>
Western flower thrips	<i>Frankliniella occidentalis</i>

1.3 Weeds

The high priority weeds are:

Common Name	Scientific Name
Nutgrass	<i>Cyperus rotundus</i>

Respondents were only asked to rate the importance of nutgrass to their business and the results were mixed. In addition, a variety of other weeds were nominated as being of high or moderate importance (see section 4.3.1). Weeds were considered priority gaps in the pest control strategy.

2. The Australian Melon Industry

The Australian Melon Industry is one of the larger Australian fruit industries, with a well-established production base across most states and territories that ensures a year round supply. Major production regions include Bowen, Bundaberg and Chinchilla in Queensland, which grows 34% of the crop, followed by New South Wales (Cowra and Riverina) growing 27%, the Northern Territory (Darwin and Katherine) growing 22%, Western Australia (South Perth, Carnarvon and Kununurra) growing 14%, with Victoria (2%) and South Australia (1%) producing smaller volumes. The southern production regions supply melons between January to July, while northern regions supply between July to December.

The Australian Melon Association estimates there are approximately 250 commercial melon growers, with a planted area of approximately 8,500 hectares.¹

In 2017/18 215,519 tonnes of melons were grown valued at \$124.2 million. Watermelons account for the largest share of production by volume (70%), followed by rockmelons (25%), honeydew (4%) and other melons (1%) such as the Piel de Sapo variety. The production of melons has grown consistently over the last 5 years, increasing by 12% (23,802 tonnes) to a peak of 231,146 tonnes in 2016/17, but decreasing by 7% (15,627 tonnes) year-on-year in 2017/18 from this peak.

Negligible quantities of fresh melons are imported into Australia, however in 2017/18 approximately 9% of the volume of production was exported; this amounted to 13,543 tonnes of muskmelons (*Cucumis melo*) and 6,728 tonnes of watermelons (*Citrullus lanatus*). Major export markets include Singapore, New Zealand and the UAE, and the volume of melon exports have more than doubled over the past 6 years, from 9,967 tonnes in 2012/13 to 20,271 in 2017/18.²

¹ <http://www.melonsaustralia.org.au/about>

² Hort Innovation (2019). Australian Horticulture Statistics Handbook 2017/18. [online] Available at: <https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/australian-horticulture-statistics-handbook/>

3. Introduction

3.1 Background

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

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

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

In combination with cultural practices, pesticides are important tools in melon 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 melon 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 melon 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 melon 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 melons but attempts to prioritise the major problems.

Exotic plant pests, not present in Australia, are not addressed in this document. A biosecurity plan has been developed for the Melon Industry in consultation with industry, government and scientists. The Biosecurity Plan for the Melon Industry outlines key threats to the industry, risk mitigation plans, identification and categorisation of exotic pests and contingency plans. High priority exotic pests have been assessed based on their potential to enter, establish, and spread in Australia (e.g. environmental factors, host range, vectors) and the cost to industry of control measures. For more information visit:

<http://www.planthealthaustralia.com.au/industries/melons/>

3.2 Minor use permits and registration

From a pesticide access perspective, the APVMA classifies melons (except watermelons) as a major crop. The crop fits within the APVMA Crop Group 011: Fruiting vegetables, Cucurbits. Therefore access to minor use permits can be relatively difficult. 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 melon industry is for manufacturers to register new pesticide uses in the crop.

3.3 Methods

The current update of the melon Strategic Agrichemical Review Process (SARP), which was last updated in 2014, was conducted by desktop audit and included an online industry survey. The process included gathering, collating and confirming information. The steps in the process were:

Process of Review	Activity / Date
Industry survey	Preparation and circulation of online industry survey to update priority pests and identify priority control gaps. Survey released: 25 January 2019 Survey extended: 28 February 2019 Survey closed: 11 March 2019
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
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 melon

Appendix 2. Products available for control of insects, mites and other invertebrates in melon

Appendix 3. Products available for weed control in melon

Appendix 4. Current permits for use in melon

Appendix 5. Melon Maximum Residue Limits (MRLs)

Appendix 6. Melon regulatory risk assessment

4. Diseases, pests and weeds of melons

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.

<https://www.croplife.org.au/resources/programs/resistance-management/>

In Chapter 4 information on regulatory risk derived from project MT17019 (Regulatory support and coordination) has been incorporated.

Some of the suggested options have no overseas MRLs (see Appendix 5). If treated fruit is to be exported nil residues at harvest would be needed for these options.

While care has been taken to ensure the accuracy of the information provided in this document the APVMA registered label and where relevant the APVMA approved permit must always be followed.

4.1 Diseases of melons

4.1.1 Disease priorities

Common name	Scientific name
High	
Gummy stem blight	<i>Didymella bryoniae</i>
Fusarium wilt	<i>Fusarium oxysporum</i>
Powdery mildew	<i>Golovinomyces cichoracearum</i> and <i>Podosphaera xanthiis</i>
Downy mildew	<i>Pseudoperonospora cubensis</i>
Moderate	
Anthrachnose disease	<i>Colletotrichum orbiculare</i>
Foliar disease caused by <i>Alternaria</i> spp.	<i>Alternaria</i> spp.
Cercospora leaf-spot	<i>Cercospora citrullina</i>

The most important disease issues based on the feedback received were Gummy stem blight and Fusarium wilt followed by powdery mildew.

Fusarium wilt was a priority issue of the original SARP. A now completed Hort Innovation project (2012-2015) VM12001 was undertaken that focussed on the characterisation and management of Fusarium wilt of watermelon. It found that *Fusarium oxysporum f. sp. niveum* (Fon) race 3, an aggressive and virulent race, was present in NT, Qld, WA, Vic and NSW. The project showed that using three Curcubita rootstocks grafted with the highly susceptible Royal Armada were 100% resistant. In addition, awareness raising, proposing of management options and extension strategies were undertaken.

Respondents were also concerned about viruses (high priority) including Cucumber Green Mottle Mosaic Virus (CGMMV), Melon Necrotic Spot Virus (MNSV), Papaya Ringspot Virus (PRSV) (watermelon strain) and Zucchini Yellow Mosaic Virus (ZYMV). Management of viruses include measures to avoid infection (hygiene, vector management, cultural practices) along with limiting impacts (resistant varieties, where available). Where appropriate, pesticide tools may contribute to vector management strategies (see section 4.2.2).

Bacterial fruit blotch (moderate priority) is caused by *Acidovorax avenae subsp. citrulli*, affects all types of melons and has caused serious losses throughout Queensland's melon growing regions. Management is non-chemical; using clean seeds and transplant material; eliminating alternative hosts; and through early detection and disposal of infected seedlings. For further information: <http://www.planthealthaustralia.com.au/industries/melons/>

Resistance management

Downy mildew and powdery mildew are both considered to have a high risk of resistance development. In Australia there are confirmed cases of Powdery Mildew resistance to Group 8 Bupirimate, Group 11 Strobilurins and Group 3 Triadimenol. Specific strategies are available for cucurbits for downy mildew and powdery mildew (shown below).

Downy mildew:

Strategy is for Group 4 (Phenylamide); Group 11 (Quinone outside Inhibitor); Group 28 + 43 (Carbamate plus Benzamide); Group 40 (Carboxylic acid amide); and Group 49 OSBP (Oxysterol binding protein inhibitor) fungicides.

<https://www.croplife.org.au/resources/programs/resistance-management/cucurbits-downy-mildew-5/>

Powdery mildew:

Strategy is for Group 3 (DMI, pyrimidine); Group 7 SDHI (Succinate dehydrogenase inhibitors); Group 8 (Hydroxy-(2-amino-) pyrimidine); Group 11 (Quinone outside Inhibitor) and other "systemic" fungicides; Group 13 aza-naphthalenes; Group U6 (Phenyl-acetamide); and Group U8 (Actin Inhibitor) fungicides.

<https://www.croplife.org.au/resources/programs/resistance-management/cucurbits-powdery-mildew-3/>

CropLife Australia recommends that in the absence of a specific resistance management strategy the use of fungicides from a specific mode of action be limited to a maximum of one-third of the total. The number of consecutive applications of the same group should also be limited by rotating/alternating between products from different activity groups. An exception is the use of Group M fungicides as they have a low risk of resistance development.

4.1.2 Available and potential products for priority diseases

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

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

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Gummy stem blight (<i>Didymella bryoniae</i>)							
Priority: High							
Gummy stem blight remains one of the highest priority diseases for the industry. The fungus is seed-borne and can survive in soil and plant material. The disease can cause economic loss in cucurbits, particularly in tropical areas. Cultural controls should be employed alongside fungicide treatments and include: <ul style="list-style-type: none"> Rotating cucurbits with other crops on a two-year basis Destroying organic debris at the end of a cucurbit crop by deep ploughing 							
Azoxystrobin (various)	11	Protective and curative	1	A	ALL	Registered in cucurbits for the control of powdery mildew, downy mildew, and gummy stem blight . [Resistance management - Max 1/3 of sprays or 4 sprays per crop; max 2 consecutive; Re-treatment interval 7-14 d]	-
Benalaxyl + Mancozeb (Galben)	4 + M3	Systemic, protective	7	A	Qld only	Registered in cucurbits for the control of downy mildew (all states), Anthracnose, gummy stem blight , Alternaria leaf spot, and Septoria spot of pumpkins (Qld only). [Sequence of 2 sprays with Re-treatment interval 7-10 d; max no of appl'ns not specified; subject to a resistance management strategy]	R2
Chlorothalonil (various)	M5	Protective	1	A	ALL	Registered in cucurbits for the control of downy mildew, gummy stem blight , anthracnose, Alternaria leaf blight, target leaf spot, and belly rot. [Re-treatment interval: 7-10 d; max no of appl'ns not specified]	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Copper oxychloride (various)	M1	Contact	1	A	NSW, ACT, WA, NT only	Registered in cucurbits for the control of angular leaf spot, bacterial leaf spot (all states), anthracnose, downy mildew and gummy stem blight (NSW, ACT, WA, NT only); registered in vegetables for control of rust and leaf spot diseases (QLD, NSW, VIC, TAS, SA, WA only). [Re-treatment interval: 7 d; max no of appl'ns not specified]	-
Dimethomorph (Eureka)	40	Systemic, contact	7	A	Qld and NT only	Registered in cucurbits for control of downy mildew (all states), Anthracnose, gummy stem blight , Alternaria leaf spot, and Septoria spot (pumpkin) (Qld and NT only). [To manage resistance a max of 4 appl'ns per crop; 2 consecutive and then rotate]	-
Mancozeb (various)	M3	Protective	7	A	ALL	Registered in melons for control of anthracnose, downy mildew, gummy stem blight , and Septoria spot. [Re-treatment interval: 7-10 d; max no of sprays not specified]	R2
Mancozeb + metalaxyl (Zeemil)	M3+4	Systemic, protective and curative	7	A	Qld only	Registered in cucurbits for control of downy mildew (all states), Anthracnose, gummy stem blight , and Alternaria leaf spot (Qld only). [max 4 appl'ns per season; Re-treatment interval 7-10 d]	R2
Metiram (Polyram)	M3	Non-systemic, protective	7	A	ALL	Registered in cucurbits for the control of downy mildew and gummy stem blight . [Re-treatment interval: 7 d; Max no of appl'ns not specified]	R2
Penthiopyrad (Fontelis)	7	Systemic	1	A	ALL	Registered in cucurbits (field and protected) for control of botrytis grey mould, powdery mildew, and gummy stem blight . [Max 3.5 L/ha per season; max 2 sequential appl'ns; specified rate is 1.75 L/ha]	-
Propineb (Antracol)	M3	Contact, protective	3	A	Qld, NSW, SA, WA only	Registered in cucurbits for the control of downy mildew (all states) / registered in watermelon and rockmelon for control of anthracnose and gummy stem blight (Qld, NSW, SA, WA only). [Re-treatment interval: 7-10 d; Max 4 appl'ns per crop]	R2
Propineb + oxadixyl (Rebound)	4 + M3	Systemic, contact	3	A	ALL	Registered in cucurbits for the control of downy mildew, gummy stem blight , and Anthracnose. [Apply a sequence of 2 sprays; Re-treatment interval 7-10 d; max no of sprays not specified]	R2
Fluopyram + Tebuconazole	7 + 3			P		This coformulation product, not currently registered in Australia, is registered overseas as Luna Experience. The US label is for use in the melon subgroup 9A (citron melon, muskmelon, watermelon) to control powdery mildew, alternaria leaf spot, gummy stem blight and anthracnose. Australian registrations in various crops are expected around 2020.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Fusarium (<i>Fusarium oxysporum</i>) Priority: High							
Fusarium remains one of the highest priority diseases for melon growers across Australia. There are currently no fungicides aside from fumigants registered for control of fusarium. Non-chemical considerations include clean transplants, farm biosecurity – preventing spread, resistant varieties (if available), grafting on resistant root stocks (expensive), cultural management practices (crop rotation), soil solarisation (expensive), foliar fertilisation and irrigation management. Varietal resistance is available in muskmelons to several races of the disease. Note Hort Innovation project VM12001 – discussed above that showed three different Curcubita rootstocks grafted with the highly susceptible Royal Armada watermelon variety were 100% resistant.							
Chloropicrin + 1,3-dichloropropene (Tri-Form)	-	Soil fumigant	NR	A	ALL (Restricted use TAS, VIC, SA)	Registered in various crops including vegetables for control of plant parasitic nematodes, symphyllans, wireworms, soil borne diseases (including <i>Fusarium</i> and <i>Verticillium</i> wilts, <i>Rhizoctonia</i> , <i>Pythium</i>) and suppression of weeds. Restricted chemical. [Users may require fumigator license]	-
Dazomet (Cerlong)	-	Soil fumigant	NR	A	ALL	Registered in broadacre seed beds for control of soil fungi (including <i>Fusarium</i> spp.), nematodes (cyst and non-cyst forming), soil insects and germinating seeds of weeds. [Users may require fumigator license]	-
Ethanedinitrile (EDN Fumigas)	-	Soil fumigant	NR	A	ALL	Registered in cucurbits for control of soil borne pathogens (including <i>Fusarium oxysporum</i>), nematodes (including <i>Meloidogyne</i> spp.) and weeds (including <i>Amaranthus retroflexus</i> , <i>Cyperus rotundus</i> and <i>Solanum nigrum</i>). [Use by licensed fumigators or approved persons only].	-
Metham sodium (Metham) and potassium formulated variant	-	Soil fumigant	NR	A	ALL	Registered for control of nematodes, germinating weed seeds (including fat hen), symphyllids (not TAS) and fungus diseases (including <i>Fusarium</i>) field application in beds or rows. Field application to total area NSW, QLD, SA, VIC, WA only. [Users may require fumigator license]	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Powdery mildew (<i>Golovinomyces cichoracearum</i> and <i>Podosphaera xanthiis</i> can be causal organisms on melons) Priority: High							
Powdery mildew is a high priority disease. Both protectant and curative fungicides contribute to disease control. Removal of diseased crop parts and debris reduces inoculum levels. Varietal resistance is available in muskmelons.							
Azoxystrobin (various)	11	Protective and curative	1	A	ALL	Registered in cucurbits for the control of powdery mildew , downy mildew, and gummy stem blight. [Resistance management - Max 1/3 of sprays or 4 sprays per crop; max 2 consecutive; Re-treatment interval 7-14 d]	-
Boscalid + Kresoxim-Methyl (Colliss)	7+11	Systemic, protective and curative	7	A	ALL	Registered in cucurbits for control of powdery mildew . [Apply 2 consecutive appl'ns with Re-treatment interval: 7-10 d; max 4 appl'ns per paddock per year; for resistance management max 2 appl'ns per crop]	-
Bupirimate (Nimrod)	8	Systemic, Protective, Curative	1	A	Qld, NT, NSW, ACT, WA only	Registered in melons (except watermelons) for control of powdery mildew . [Re-treatment interval: 7 d; rotate 3 different systemic fungicide groups per crop]	-
Bupirimate (Nimrod) PER14840	8	Systemic, Protective, Curative	1	A	ACT, NSW, Qld, SA, Tas, NT and WA only	PER14840 for use in cucurbits (including watermelon) for control of powdery mildew (<i>Sphaerotheca fuliginea</i>). [max 4 appl'ns per crop; Re-treatment interval: 7 d; follow resistance management strategy on label]	-
Copper octanoate (Tricop)	M1	Contact	1	A	ALL	Registered in cucurbits for control of powdery mildew and downy mildew. [Re-treatment interval: 7-10 d; max no of appl'ns not specified]	-
Cyflufenamid (various)	U6	Protective and curative	1	A	ALL	Registered in cucurbits for control of powdery mildew . [Re-treatment interval: 7-10 d; for resistance management do not apply consecutive sprays and no more than 2 appl'ns per crop]	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Hydrogen peroxide + peroxy acetic acid (Peratec)	M	Contact	1	A	ALL	Registered in cucurbits for control of powdery mildew (<i>Spaerotheca</i> spp.). [Re-treatment interval: 5-7 d; max 4 appl'ns per crop]	-
Metrafenone (Vivando)	U8	Protective and curative	7	A	ALL	Registered in cucurbits for control of powdery mildew [Apply 2 consecutive appl'ns with Re-treatment interval: 7-10 d; max 4 appl'ns per crop; no more than 1/3 of the spray program]	-
Penthiopyrad (Fontelis)	7	Systemic	1	A	ALL	Registered in cucurbits (field and protected) for control of botrytis grey mould, powdery mildew , and gummy stem blight. [Max 3.5 L/ha per season; max 2 sequential appl'ns; specified rate is 1.75 L/ha]	-
Proquinazid (Talendo)	13	Protective	1	A	ALL	Registered in cucurbits (field grown only) for control of powdery mildew . [Re-treatment interval: 10-14 d; max 2 consecutive appl'ns; max 3 appl'ns per crop per season; not more than 1/3 of the total powdery mildew spray program]	-
Pyriofenone (Kusabi)	U8	Systemic	NR	A	ALL	Registered in cucurbits for control of powdery mildew . [max 3 appl'ns per crop]	-
<i>Streptomyces lydicus</i> (Actinovate)	-	-	NR	A	ALL	Registered in cucurbits for suppression of powdery mildew ; and in vegetables as a seed treatment for suppression of specified fungal diseases including Fusarium. [max no of appl'ns not specified]	-
Sulphur (Solo)	M2	Contact	NR	A	VIC, TAS, SA, WA, NSW, QLD only	Registered in vegetables (excluding rockmelon) for control of powdery mildew , rust (<i>Uromyces</i> spp.), tomato russet mite, bean spider mite (VIC, TAS, SA, WA, NSW only), and two-spotted mite (VIC, TAS, SA, WA only); In QLD powdery mildew , rust (<i>Uromyces</i> spp.) and tomato russet mite. [Re-treatment interval: 14-21 d; max no of appl'ns not specified]	-
Tea tree oil (Timorex Gold)	-	Contact	NR	A	ALL	Registered in cucurbits including melons and watermelon for control of powdery mildew . [Re-treatment interval: 7-10 d; max no of appl'ns not specified]	-
Triadimefon (various)	3	Systemic, protective and curative	1	A	NSW, WA only	Registered in cucurbits for control of powdery mildew . [Re-treatment interval: 5-10 d; max no of appl'ns not specified]	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Triadimenol (various)	3	Systemic, protective and curative	1	A	ALL	Registered in cucurbits for control of powdery mildew . [max no of appl'ns not specified]	R3
Acibenzolar-s-methyl (Actigard Plant Activator)	-			P		Not registered in melons, there is an Australian registration for induction of systemic acquired resistance (SAR) to reduce symptoms of powdery mildew in tomatoes. Registered in the US on cucurbits including cantaloupe and watermelon for suppression of downy mildew and powdery mildew. Could be tank mixed with other fungicides where disease present. (Syngenta)	-
Fluopyram + Tebuconazole	7 + 3			P		This coformulation product, not currently registered in Australia, is registered overseas as Luna Experience. The US label is for use in the melon subgroup 9A (citron melon, muskmelon, watermelon) to control powdery mildew, alternaria leaf spot, gummy stem blight and anthracnose. Australian registrations in various crops are expected around 2020.	-
Florylpicoxamid (proposed name Adavelt)	TBC			P		Available information indicates that this new neopicolinamide fungicide is planned for launch in 2023. Uses may include cereals, vines, fruits, nuts and vegetables for control of pathogens including Septoria spp., Powdery Mildews, Botrytis spp, Anthracnose, Alternaria, Scab, Monilinia and others.	-
Downy mildew (<i>Pseudoperonospora cubensis</i>)							
Priority: High							
Downy mildew is a high/moderate priority for respondents in the current update. Management techniques may include cultural practices that increase airflow and minimise moisture in the plant canopy; moving the planting date.							
Azoxystrobin (various)	11	Protective and curative	1	A	ALL	Registered in cucurbits for the control of powdery mildew, downy mildew , and gummy stem blight. [Resistance management - Max 1/3 of sprays or 4 sprays per crop; max 2 consecutive; Re-treatment interval 7-14 d]	-
Benalaxyl + Mancozeb (Galben)	4 + M3	Systemic, protective	7	A	ALL	Registered in cucurbits for the control of downy mildew (all states), Anthracnose, gummy stem blight, Alternaria leaf spot, and Septoria spot of pumpkins (Qld only). [Sequence of 2 sprays with Re-treatment interval 7-10 d; max no of appl'ns not specified; subject to a resistance management strategy]	R2

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Chlorothalonil (various)	M5	Protective	1	A	ALL	Registered in cucurbits for the control of downy mildew , gummy stem blight, anthracnose, Alternaria leaf blight, target leaf spot, and belly rot. [Re-treatment interval: 7-10 d; max no of appl'ns not specified]	R3
Copper octanoate (Tricop)	M1	Contact	1	A	ALL	Registered in cucurbits for control of powdery mildew and downy mildew . [Re-treatment interval: 7-10 d; max no of appl'ns not specified]	-
Copper (various)	M1	Contact	1	A	ALL	Registered in cucurbits for control of angular leaf spot, bacterial leaf spot, and downy mildew . [Re-treatment interval: 7 d; max no of appl'ns not specified]	-
Dimethomorph (Eureka)	40	Systemic, contact	7	A	ALL	Registered in cucurbits for control of downy mildew (all states), Anthracnose, gummy stem blight, Alternaria leaf spot, and Septoria spot (pumpkin) (QLD and NT only). [To manage resistance a max of 4 appl'ns per crop; 2 consecutive and then rotate]	-
Mancozeb (various)	M3	Protective	7	A	ALL	Registered in melons for control of anthracnose, downy mildew , gummy stem blight, and Septoria spot. [Re-treatment interval: 7-10 d; max no of sprays not specified]	R2
Mancozeb + metalaxyl (Zeemil)	M3+4	Systemic, protective and curative	7	A	ALL	Registered in cucurbits for control of downy mildew (all states), Anthracnose, gummy stem blight, and Alternaria leaf spot (Qld only). [max 4 appl'ns per season; Re-treatment interval 7-10 d; resistance management strategy applies]	R2
Metiram (Polyram)	M3	Non-systemic, protective	7	A	ALL	Registered in cucurbits for the control of downy mildew and gummy stem blight. [Re-treatment interval: 7 d; Max no of appl'ns not specified]	R2
Oxathiapiprolin (Zorvec)	49	Systemic, protective	1	A	ALL	Registered in cucurbits including melons and rockmelons for control of downy mildew . [up to 2 consecutive appl'ns with Re-treatment interval: 7-10 d; max 3 appl'ns per crop as a precaution against resistance development]	-
Phosphorous acid (various)	33	Contact	NR	A	ALL	Registered in cucurbits for the control of downy mildew . [Re-treatment interval: 7 d; max no of appl'ns not specified]	-
Propamocarb hydrochloride + fluopicolide (Infinito)	28 + 43	Protective, translaminar, systemic	3	A	ALL	Registered in cucurbits (field and protected) for the control of downy mildew . [max 2 appl'ns per crop; Re-treatment interval: 7-10 d]	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Propineb (Antracol)	M3	Contact, protective	3	A	ALL	Registered in cucurbits for the control of downy mildew (all states) / registered in watermelon and rockmelon for control of anthracnose and gummy stem blight (Qld, NSW, SA, WA only). [Re-treatment interval: 7 d; Max 4 appl'ns per crop]	R2
Propineb + oxadixyl (Rebound)	4 + M3	Systemic, contact	3	A	ALL	Registered in cucurbits for the control of downy mildew , gummy stem blight, and Anthracnose. [Apply a sequence of 2 sprays; Re-treatment interval: 7-10 d; max no of sprays not specified] Re-treatment interval	R2
Zineb (Barmac Zineb)	M3	Protective	7	A	NSW, VIC, SA, WA, TAS, QLD only	Registered in cucurbits for the control of downy mildew and Anthracnose. [Re-treatment interval: 7 d; max no of appl'ns not specified]	R2
Ametoctradin + dimethomorph (Zampro)	45+40			P		Residue and efficacy trials currently underway as Hort Innovation project ST17000 for use of Zampro for control of downy mildew in cucurbits - a crop group label registration. (AgNova)	-
Amisulbrom + tribasic copper sulphate (Amicus Blue)	21 + M1			P		Currently registered in brassica and grapevines for control of downy mildew (Nufarm)	-
Cyazofamid (Ranman)	21			P		Not currently registered in cucurbits/melons. Registered in brassica and brassica leafy vegetable seedlings for control of downy mildew. Potential for a label extension to include melons.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Anthracnose disease (<i>Colletotrichum orbiculare</i>)							
Priority: Moderate							
Disease can be associated with seed and infected crop debris. Can be spread by rain/irrigation, workers and machinery. Lesions can affect leaf, stem and fruit. A preventative fungicide spray program, crop rotation, removal of crop debris, hygiene for workers and equipment. Tolerant varieties may be available.							
Benalaxyl + Mancozeb (Galben)	4 + M3	Systemic, protective	7	A	Qld only	Registered in cucurbits for the control of downy mildew (all states), Anthracnose , gummy stem blight, Alternaria leaf spot, and Septoria spot of pumpkins (Qld only). [Sequence of 2 sprays with Re-treatment interval 7-10 d; max no of appl'ns not specified; subject to a resistance management strategy]	R2
Chlorothalonil (various)	M5	Protective	1	A	ALL	Registered in cucurbits for the control of downy mildew, gummy stem blight, anthracnose , Alternaria leaf blight, target leaf spot, and belly rot. [Re-treatment interval: 7-10 d; max no of appl'ns not specified]	R3
Copper oxychloride (various)	M1	Contact	1	A	NSW, ACT, WA, NT only	Registered in cucurbits for the control of angular leaf spot, bacterial leaf spot (all states), anthracnose , downy mildew and gummy stem blight (NSW, ACT, WA, NT only); registered in vegetables for control of rust and leaf spot diseases (QLD, NSW, VIC, TAS, SA, WA only). [Re-treatment interval: 7 d; max no of appl'ns not specified]	-
Dimethomorph (Eureka)	40	Systemic, contact	7	A	QLD and NT only	Registered in cucurbits for control of downy mildew (all states), Anthracnose , gummy stem blight, Alternaria leaf spot, and Septoria spot (pumpkin) (QLD and NT only). [To manage resistance a max of 4 appl'ns per crop; 2 consecutive and then rotate]	-
Mancozeb (various)	M3	Protective	7	A	ALL	Registered in melons for control of anthracnose , downy mildew, gummy stem blight, and Septoria spot. [Re-treatment interval: 7-10 d; max no of sprays not specified]	R2
Mancozeb + metalaxyl (Zeemil)	M3+4	Systemic, protective and curative	7	A	Qld only	Registered in cucurbits for control of downy mildew (all states), Anthracnose , gummy stem blight, and Alternaria leaf spot (Qld only). [max 4 appl'ns per season; Re-treatment interval 7-10 d]	R2
Propineb (Antracol)	M3	Contact, protective	3	A	Qld, NSW, SA, WA only	Registered in cucurbits for the control of downy mildew (all states) / registered in watermelon and rockmelon for control of anthracnose and gummy stem blight (Qld, NSW, SA, WA only). [Re-treatment interval: 7-10 d; Max 4 appl'ns per crop]	R2
Propineb + oxadixyl (Rebound)	4 + M3	Systemic, contact	3	A	ALL	Registered in cucurbits for the control of downy mildew, gummy stem blight, and Anthracnose . [Apply a sequence of 2 sprays; Re-treatment interval 7-10 d; max no of sprays not specified]	R2

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Zineb (Barmac Zineb)	M3	Protective	7	A	NSW, VIC, SA, WA, TAS, QLD only	Registered in cucurbits for the control of downy mildew and Anthracnose . [Re-treatment interval: 7 d; max no of appl'ns not specified]	R2
Mefentrifluconazole (Belanty)	3			P		A potential product by BASF. Mefentrifluconazole is not yet approved for use in Australia or the USA, although applications are in progress. The active ingredient was recently approved in the EU.	-
Azoxystrobin (Amistar)	11			P-A		Potential for a label extension to include Anthracnose disease. Already registered in cucurbits for control of powdery mildew, downy mildew, and gummy stem blight	-
Fluopyram + Tebuconazole	7 + 3			P		This coformulation product, not currently registered in Australia, is registered overseas as Luna Experience. The US label is for use in the melon subgroup 9A (citron melon, muskmelon, watermelon) to control powdery mildew, alternaria leaf spot, gummy stem blight and anthracnose. Australian registrations in various crops are expected around 2020.	-
Florypicoxamid (proposed name Adavelt)	TBC			P		Available information indicates that this new neopicolinamide fungicide is planned for launch in 2023. Uses may include cereals, vines, fruits, nuts and vegetables for control of pathogens including Septoria spp., Powdery Mildews, Botrytis spp., Anthracnose, Alternaria, Scab, Monilinia and others.	-
Alternaria leaf spot (<i>Alternaria</i> spp.)							
Priority: Moderate							
Good hygiene is required as the fungus will over-winter on plant residue and can be spread on tools and water splashes. Seed may also be a source of new infection. Small spots develop on the upper surfaces of leaves. These can develop into larger lesions.							
Benalaxyl + Mancozeb (Galben)	4 + M3	Systemic, protective	7	A	Qld only	Registered in cucurbits for the control of downy mildew (all states), Anthracnose, gummy stem blight, Alternaria leaf spot , and Septoria spot of pumpkins (Qld only). [Sequence of 2 sprays with Re-treatment interval 7-10 d; max no of appl'ns not specified; subject to a resistance management strategy]	R2

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Chlorothalonil (various)	M5	Protective	1	A	ALL	Registered in cucurbits for the control of downy mildew, gummy stem blight, anthracnose, Alternaria leaf blight , target leaf spot, and belly rot. [Re-treatment interval: 7-10 d; max no of appl'ns not specified]	R3
Copper oxychloride (various)	M1	Contact	1	A	QLD, NSW, VIC, TAS, SA, WA only	Registered in cucurbits for the control of angular leaf spot, bacterial leaf spot (all states), anthracnose, downy mildew and gummy stem blight (NSW, ACT, WA, NT only); registered in vegetables for control of rust and leaf spot diseases (QLD, NSW, VIC, TAS, SA, WA only). [Re-treatment interval: 7-14 d; max no of appl'ns not specified]	-
Dimethomorph (Eureka)	40	Systemic, contact	7	A	QLD and NT only	Registered in cucurbits for control of downy mildew (all states), Anthracnose, gummy stem blight, Alternaria leaf spot , and Septoria spot (pumpkin) (QLD and NT only). [To manage resistance a max of 4 appl'ns per crop; 2 consecutive and then rotate]	-
Mancozeb + metalaxyl (Zeemil)	M3+4	Systemic, protective and curative	7	A	Qld only	Registered in cucurbits for control of downy mildew (all states), Anthracnose, gummy stem blight, and Alternaria leaf spot (Qld only) . [max 4 appl'ns per season; Re-treatment interval 7-10 d]	R2
Fluopyram + Tebuconazole	7 + 3			P		This coformulation product, not currently registered in Australia, is registered overseas as Luna Experience. The US label is for use in the melon subgroup 9A (citron melon, muskmelon, watermelon) to control powdery mildew, alternaria leaf spot, gummy stem blight and anthracnose. Australian registrations in various crops are expected around 2020.	-
Florypicoxamid (proposed name Adavelt)	TBC			P		Available information indicates that this new neopicolinamide fungicide is planned for launch in 2023. Uses may include cereals, vines, fruits, nuts and vegetables for control of pathogens including Septoria spp, Powdery Mildews, Botrytis spp, Anthracnose, Alternaria, Scab, Monilinia and others.	-
Mefentrifluconazole (Belanty)	3			P		A potential product by BASF. Mefentrifluconazole is not yet approved for use in Australia or the USA, although applications are in progress. The active ingredient was recently approved in the EU.	-
Iprodione (rovral)	2			P		Not registered for use in melons. Registered in Australia to combat specified <i>Alternaria</i> spp. on tomatoes, potatoes, mandarins, passionfruit.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Cercospora leaf-spot (<i>Cercospora citrullina</i>)							
Priority: Moderate							
The inoculum survives on crop debris and also on weeds. Distributed by wind, rain splash and irrigation water. Various cultural practices are important such as crop rotation, removing crop debris and avoiding spread (e.g. via overhead irrigation, equipment, etc).							
Chlorothalonil (various)	M5	Protective	1	A	ALL	Registered in cucurbits for the control of downy mildew, gummy stem blight, anthracnose, Alternaria leaf blight (<i>Alternaria cucumerina</i>), target leaf spot (<i>Cercospora citrullina</i>), and belly rot. [Re-treatment interval: 7-10 d; max no of appl'ns not specified]	R3
Copper oxychloride (various)	M1	Contact	1	A	QLD, NSW, VIC, TAS, SA, WA only	Registered in cucurbits for the control of angular leaf spot, bacterial leaf spot (all states), anthracnose, downy mildew and gummy stem blight (NSW, ACT, WA, NT only); registered in vegetables for control of rust and leaf spot diseases (QLD, NSW, VIC, TAS, SA, WA only). [Re-treatment interval: 7-14 d; max no of appl'ns not specified]	-

4.2 Insect, mite and other invertebrate pests of melons

4.2.1 Insect, mite and other invertebrate pest priorities

Common name	Scientific name
High	
Silverleaf whitefly	<i>Bemisia tabaci</i>
Green peach aphid	<i>Myzus persicae</i>
Aphids (other than green peach aphid)	<i>Aphidae spp.</i>
Two-spotted mites	<i>Tetranychus urticae</i>
Spider mites	<i>Tetranychus spp.</i>
Helicoverpa (Cotton bollworm Native budworm)	<i>Helicoverpa armigera</i> <i>Helicoverpa punctigera</i>
Cucumber moth	<i>Diaphania indica</i>
Root-knot nematodes	<i>Meloidogyne spp.</i>
Western flower thrips	<i>Frankliniella occidentalis</i>
Moderate	
Melon thrips	<i>Thrips palmi</i>
Onion thrips	<i>Thrips tabaci</i>
Broad mites	<i>Polyphagotarsonemus latus</i>
Queensland fruit fly	<i>Bactrocera tryoni</i>
Greenhouse whitefly	<i>Trialeurodes vaporariorum</i>
Cutworms	<i>Agrotis spp.</i>
Low	
Mediterranean fruit fly	<i>Ceratitis capitata</i>
Cucurbit stemborer	<i>Melittia cucurbitae</i>
Tomato russet mites	<i>Aculops lycopersici</i>
European red mite	<i>Panonychus ulmi</i>

As part of the current consultation sucking insects (silverleaf whitefly and aphids) along with mites were reported to be of the highest priority for action.

Resistance management

Specific resistance management strategies for melon pests exist for aphids and silver leaf whitefly.

Aphids: <https://www.croplife.org.au/resources/programs/resistance-management/various-cottonmelon-aphid-and-green-peach-aphid/>

Silver leaf whitefly: <https://www.croplife.org.au/resources/programs/resistance-management/various-silverleaf-whitefly/>

Further development and extension of IPM strategies and best management practices that can be implemented in the management of sucking insects and mites in melons may be warranted.

4.2.2 Available and potential products for priority insects, mites and other invertebrates

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

Availability		Regulatory risk (refer to Appendix 6)	
A	Available via either registration or permit approval	R1	Short-term: Critical concern over retaining access
P	Potential - a possible candidate to pursue for registration or permit	R2	Medium-term: Maintaining access of significant concern
P-A	Potential, already approved in the crop for another use	R3	Long-term: Potential issues associated with use - Monitoring required
Withholding Period (WHP) – Number of days from last treatment to harvest (H) or Grazing (G)			
Harvest	H	Not Required when used as directed	NR
Grazing	G	No Grazing Permitted	NG
IPM – indicative overall impact on beneficials (based on the Cotton Pest Management Guide 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
Silverleaf Whitefly <i>Bemisia tabaci</i> <i>Biotype B</i>								
Priority: High								
Silver leaf whitefly was a high priority for most respondents. Difficulties controlling the pest/resistance, aging chemistry available and the need for IPM strategies were mentioned. They can affect the crop directly by feeding and indirectly as a vector of viruses. A range of insecticides are currently available to growers with diversity in mode of action. However, resistance is an ongoing issue and virus transmission with whitefly infestations are a concern for industry.								
Afidopyropen (Versys)	9D	Disrupts feeding	1	A	ALL	Registered in cucurbits for the control of green peach aphid, cabbage aphid, currant lettuce aphid and cotton/melon aphid; suppression of silverleaf whitefly . Label states: low toxicity to insect predators and is suitable for use where IPM is practised. [Re-treatment interval: 14 d; max 2 consecutive; max 4 appln's total per crop]	L	-
Bifenthrin (various)	3A	Contact or ingestion	1	A	QLD, NSW, NT, WA only	Registered in cucurbits for control of native budworm, corn earworm, cucumber moth (all states), silverleaf whitefly biotype B (QLD, NSW, NT, WA only). [max 2 appl'ns per crop]	VH	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Chlorpyrifos (various)	1B	Systemic, contact	5	A	NSW, WA only	Registered in cucurbits for control of whiteflies (NSW, WA only); ants, mealybugs, field crickets, mole crickets (QLD only); Vegetables: Wingless grasshopper (NSW, VIC, TAS, WA only); cutworm (all states); field crickets, mole crickets (QLD, WA only); vegetable weevil (NSW, WA only). [max no. of appl'ns not specified]	H	R2
Cyantraniliprole (Benevia)	28	Foliar and systemic; stomach	1	A	ALL	Registered in cucurbits (including melons) for the control of melon aphid, silverleaf whitefly , cotton bollworm, cucumber moth, native budworm and suppression of western flower thrips. [Max 2 appl'ns per crop; Re-treatment interval: 7-10 d; sequential appl'ns rec.]	L-M	-
Fonicamid (Mainman)	9C	Systemic	1	A	ALL	Registered in cucurbits including rockmelons for control of green peach aphid, melon aphid, and silverleaf whitefly . [Max 2 appl'ns per crop; Re-treatment interval: min 2 weeks]	M	-
Imidacloprid (various)	4A	Systemic	NR	A	ALL	Registered in cucurbits for the control of silverleaf whitefly . [single soil application; do not apply group 4A as foliar spray (i.e. for other pests) after soil appl'n for SLWF]	M VH-bees	R2
Paraffinic oil (D-C-Maxx)	-	Contact	1	A	Qld only	Registered in cucurbits for control of Silverleaf whitefly . [max no. of applications not specified]	VL	-
Petroleum oil (various) PER12221 Version 3	-	Contact	1	A	ALL (Excl. Vic)	PER12221 for use in cucurbits (including melons) for control of greenhouse whitefly and Bemisia tabaci species (sweet potato whitefly, silverleaf whitefly biotype B , and whitefly biotype Q). [max no. of applications not specified]	VL	-
Potassium salts of fatty acids (Natrasoap)	-	Contact	Nil	A	ALL	Registered in vegetables for control of aphids, thrips, mealybug, two-spotted mites, spider mite, and white fly . [Re-treatment interval: 5-7 d; max no. of appl'ns not specified]	-	-
Pymetrozine (Chess)	9B	Systemic; ingestion	3	A	ALL	Registered in cucurbits (field and protected) for control of melon aphid, green peach aphid, potato aphid and cowpea aphid; and for suppression of silverleaf whitefly and greenhouse whitefly. [7 Re-treatment interval, max. 2 applications per crop]	L	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Pyriproxyfen (Admiral)	7C	Ingestion, residual, IGR	1	A	ALL	Registered in cucurbits (including melons and watermelons) for control of silverleaf whitefly and greenhouse whitefly. [Re-treatment interval: min 2 weeks; max 2 appl'ns per season]	VL	-
Spirotetramat (Movento)	23	Contact and systemic	1	A	ALL	Registered in cucurbits (field and protected) for control of cotton aphid, green peach aphid, and silverleaf whitefly biotype B . [Re-treatment interval: 7 d; max 3 appl'ns per crop]	M	-
Thiamethoxam + chlorantraniliprole (Durivo) PER87051	4A + 28	Systemic	H:35 NG	A	QLD only (within specified regions only)	PER87051 for use as a single post plant chemigation in various specified crops (including melons protected and field) / various specified pests (including Corn Earworm, Native budworm, Cabbage Aphid, Green Peach Aphid, Silverleaf Whitefly – all biotypes , Greenhouse Whitefly, Western Flower Thrips, Onion Thrips) [max 1 appl'n per crop]	M VH-bees	-
<p>Green peach aphid – <i>Myzus persicae</i> Aphids (other than green peach aphid) – <i>Aphidae</i> spp. Priority: High</p> <p>Aphids continue to be a priority issue for most growers. Direct damage, viral disease damage and resistance were mentioned. There is the additional risk of transmission of viral diseases (e.g. Zucchini yellow mosaic virus). Virus diseases were specifically raised by survey respondents. However using insecticides as a control measure to prevent the transmission of ZYMV by aphids is basically ineffective as the aphids can very quickly spread the disease before they are killed. An integrated approach is required. A range of practices are important including managing the sources of infection (host weeds, volunteer cucurbits, harvested crops), hygiene, planting new crops upwind, planting a non-host border crop for aphids to feed on and lose the virus before they enter the crop. This complexity needs to be considered when managing this pest as a viral vector. Resistance is also an issue.</p>								
Afidopyropen (Versys)	9D	Disrupts feeding	1	A	ALL	Registered in cucurbits for the control of green peach aphid , cabbage aphid, currant lettuce aphid and cotton/melon aphid ; suppression of silverleaf whitefly. Label states: low toxicity to insect predators and is suitable for use where IPM is practised. [14 d Re-treatment interval; max 2 consecutive; max 4 applications total per crop]	L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Cyantraniliprole (Benevia)	28	Foliar and systemic; stomach	1	A	ALL	Registered in cucurbits (including melons) for the control of melon aphid , silverleaf whitefly, cotton bollworm, cucumber moth, native budworm and suppression of western flower thrips. [Max 2 appl'ns per crop; Re-treatment interval 7-10 d; sequential appl'ns rec.]	L-M	-
Dimethoate (various)	1B	Broad spectrum contact and systemic	7	A	ALL	Registered in melons for control of aphids , jassids, mites, leaf hoppers, green vegetable bug, thrips, wingless grasshoppers (all states); and cucumber fly (NSW, QLD, WA, NT only). [max no. applications not specified]	H	R3
Fonicamid (Mainman)	9C	Systemic	1	A	ALL	Registered in cucurbits including rockmelons for control of green peach aphid, melon aphid , and silverleaf whitefly [Max 2 appl'ns per crop; Re-treatment interval: min 2 weeks]	M	-
Imidacloprid (Confidor)	4A	Contact and systemic	1	A	ALL	Registered in cucurbits for control of green peach aphid and melon aphid (Nuprid). [Do not apply consecutive sprays (group 4A) within or between seasons; protected/confined: max 1 appl'n (group 4A) per crop annuals, max 3 appl'ns (group 4A) in 12 months perennials; do not apply group 4A as foliar spray after an imidacloprid soil application]	M VH-bees	R2
Maldison (various)	1B	Contact and systemic	3	A	ALL	Registered in cucurbits for the control of aphids , green vegetable bug, jassids, leaf hopper, red legged earth mite (not Tas), Rutherglen bug, and twenty-eight spotted lady bird (not Tas). [max no. of applications not specified]	-[H]	-
Paraffinic oil (Trump) / Petroleum oil (BioCover)	-	Contact	1	A	ALL	Registered in cucurbits for control of aphids , mites, thrips and leafhopper. [max no. of applications not specified]	VL	-
Pirimicarb (Aphidex)	1A	Contact, systemic	2	A	ALL	Registered in cucurbits for control of aphids . [For GPA resistance man. – max 2 non- consecutive appl'ns per crop]	VL	R3
Potassium salts of fatty acids (Natrasoap)	-	Contact	Nil	A	ALL	Registered in vegetables for control of aphids , thrips, mealybug, two-spotted mites, spider mite, and white fly [Re-treatment interval: 5-7 d; max no. of appl'ns not specified]	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Pymetrozine (Chess)	9B	Systemic; ingestion	3	A	ALL	Registered in cucurbits (field and protected) for control of melon aphid, green peach aphid , potato aphid and cowpea aphid ; and for suppression of silverleaf whitefly and greenhouse whitefly. [7 Re-treatment interval, max. 2 applications per crop]	L	R3
Spirotetramat (Movento)	23	Contact and systemic	1	A	ALL	Registered in cucurbits (field and protected) for control of cotton aphid, green peach aphid , and silverleaf whitefly biotype B. [Re-treatment interval: 7 d; max 3 appl'ns per crop]	M	-
Sulfoxaflor (Transform)	4C	Systemic	1	A	ALL	Registered in cucurbits (field grown only) for control of green peach aphid, melon (cotton) aphid , and greenhouse whitefly. [Re-treatment interval: 7-10 d; max 4 non-consecutive appl'ns per season]	M VH-bees	-
Thiamethoxam + chlorantraniliprole (Durivo) PER87051	4A + 28	Systemic	H:35 NG	A	QLD only (within specified regions only)	PER87051 for use as a single post plant chemigation in various specified crops (including melons protected and field) / various specified pests (including Corn Earworm, Native budworm, Cabbage Aphid, Green Peach Aphid , Silverleaf Whitefly, Greenhouse Whitefly, Western Flower Thrips, Onion Thrips) [max 1 appl'n per crop]	M VH-bees	-
<p>Mites</p> <p>Two-spotted mites – <i>Tetranychus urticae</i> Spider mites – <i>Tetranychus spp.</i> Broad mites – <i>Polyphagotarsonemus latus</i> Tomato russet mites – <i>Aculops lycopersici</i> European red mite – <i>Panonychus ulmi</i></p> <p>Priority: High [two-spotted and spider mites]; Moderate [Broad mites]; Low [tomato russet mites and European red mite]</p> <p>There are a range of insecticides available, although some are not very effective. Two-spotted mites are the most important mite pest. Survey respondents mentioned a lack of efficacy/resistance and the limited options available. In the original SARP the need to develop IPM strategies with additional knowledge of relative effects on predatory insect's vs pest mites was noted. It was also noted that the pesticides available for mite control are quite expensive; and predatory mites are very expensive, slow to spread and can limit what chemistry can be applied to the crop to combat other issues.</p>								
Bifenazate (Acramite)	20D	Contact	H:3 NG	A	ALL	Registered in cucurbits for two-spotted mite , Bryobia mite [max 1 appl'n per season]	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Dimethoate (various)	1B	Broad spectrum contact and systemic	7	A	ALL	Registered in melons for control of aphids, jassids, mites , leaf hoppers, green vegetable bug, thrips, wingless grasshoppers (all states); and cucumber fly (NSW, QLD, WA, NT only) [max no. applications not specified]	H	R3
Etoxazole (Paramite) PER14650	10B	Contact and translaminar	7	A	ALL (Excl. Vic)	PER14650 for use in melons including cantaloupe, honeydew, and watermelons for control of two-spotted mites . [max 1 appl'n per season]	L	-
Hexythiazox (Calibre) PER14765	10A	Contact and stomach	3	A	ALL	PER14765 for use in cucurbits including melons for control of tomato russet mite, broad mite, and two-spotted mite [max 1 appl'n per crop]	-	-
Paraffinic oil (Trump)/ Petroleum oil (BioCover)	-	Contact	1	A	ALL	Registered in cucurbits for control of aphids, mites , thrips and leafhopper. [max no. of applications not specified]	VL	-
Potassium salts of fatty acids (Natrasoap)	-	Contact	Nil	A	ALL	Registered in vegetables for control of aphids, thrips, mealybug, two-spotted mites, spider mite , and white fly [Re-treatment interval: 5-7 d; max no. of appl'ns not specified]	-	-
Sulphur (Solo)	M2	Contact	NR	A	See comments	Registered in vegetables (excluding rockmelon) for control of powdery mildew, rust (<i>Uromyces</i> spp.), tomato russet mite , bean spider mite (VIC, TAS, SA, WA, NSW only), and two-spotted mite (VIC, TAS, SA, WA only); In QLD powdery mildew, rust (<i>Uromyces</i> spp.) and tomato russet mite . [Re-treatment interval: 14-21 d; max no. of appl'ns not specified]	-	-
Spiromesifen (Oberon 240 SC)	23			P		New foliar product by Bayer with potential application for control of two-spotted mite . Spiromesifen is not yet approved for use in Australia. It has been registered in the USA for some time for the control of various mites: e.g. Spider (including two-spotted spider mite) and tarsonemid (including broad mite); and also whiteflies (including greenhouse and silverleaf).		-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Diafenthiuron	12A			P		Not registered for use in melons. Currently registered in cotton for control of two spotted mite , cotton aphid and suppression of silverleaf whitefly.	L	-
Cyflumetofen (BAS9210I)	25			P		New foliar product by BASF coded BAS9210I with potential application for control of two-spotted mite . This active is currently not registered in Australia. It is registered in the EU and the USA. US labels include applications on citrus, grapes, pome fruits, strawberries, tomatoes and tree nuts for control of various mites: e.g. spider mites (including two-spotted) and European red mite.	-	-
SYNFOI21	TBC			P		New foliar product by Syngenta coded SYNFOI21 with potential application for control of two-spotted mites – <i>Tetranychus urticae</i> . A new mode of action – chemical class. The product is expected around 2022-23.		-
<p>Helicoverpa Species Cotton bollworm <i>H.armigera</i> Native Budworm <i>H.punctigera</i> Priority: High</p> <p>Newly emerged larvae are 1.5 mm long while mature larvae are about 40 mm. Chewing damage can occur on the foliage, flowers and fruit. When feeding they like to be protected. Responses were mixed on the importance of this pest - there was concern about the aging chemistry used and the need to try and protect existing options, such as group 28 chemistry.</p>								
<i>Bacillus thuringiensis subsp. kurstaki</i> (Dipel)	11A	Ingestion	NR	A	ALL	Registered in vegetables for the control of armyworm, cotton bollworm, native budworm , cabbage moth, cabbage white butterfly, green looper, lightbrown apple moth, pear looper, soybean looper, vine moth, and tobacco looper. [max no. of applications not specified]	VL	-
Bifenthrin (various)	3A	Contact or ingestion	1	A	ALL	Registered in cucurbits for control of native budworm , corn earworm, cucumber moth (all states), silverleaf whitefly biotype B (QLD, NSW, NT, WA only). [max 2 application per crop]	VH	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Carbaryl (various)	1A	Contact or ingestion	NR	A	ALL	Registered in cucurbits (prior to flowering only) for the control of Helicoverpa , pumpkin beetle, 28-spotted ladybird, cucurbit stem borer, wingless grasshopper, green vegetable bug, leaf eating ladybird, cutworms, European earwig, potato moth, Rutherglen bug, and army worms. [max no. of applications not specified]	H	-
Chlorantraniliprole (Coragen)	28	Systemic	1	A	ALL	Registered in melons for the control of cotton bollworm, native budworm and cucumber moth. [Re-treatment interval: 5 d; max 3 appl'ns per crop; max 2 consecutive appl'ns per crop]	L-M	-
Cyantraniliprole (Benevia)	28	Foliar and systemic; stomach	1	A	ALL	Registered in cucurbits (including melons) for the control of melon aphid, silverleaf whitefly, cotton bollworm , cucumber moth, native budworm and suppression of western flower thrips [Max 2 appl'ns per crop; Re-treatment interval 7-10 d; sequential appl'ns rec.]	L-M	-
Emamectin (proclaim)	6	Ingestion and contact	3	A	ALL	Registered in cucurbits including melons for the control of Helicoverpa spp. , Cluster caterpillar, Cucumber moth [Re-treatment interval:7 d; max 4 appl'ns per crop or year]	M	-
Flubendiamide (Belt)	28	Ingested	1	A	ALL	Registered in melons for the control of Cucumber moth and Helicoverpa spp. [Re-treatment interval: 7-14 d; max 3 appl'ns per crop]	L-M	-
Helicoverpa NPV (Helicovex)	-	Ingested	Nil	A	ALL	Registered in melons for the control of Cotton bollworm , corn earworm, tobacco budworm and native budworm [max no. of applications not specified]	VL	-
Methomyl (various) PER82428	1A	Contact	3	A	ALL	PER82428 for use in cucurbits including melons for control of Helicoverpa spp. , cucumber moth, cluster caterpillar, loopers, webworm, Rutherglen bug, thrips including Western flower thrips. [max 6 appl'ns per crop]	H	R2
Spinetoram (Success)	5	Contact and ingestion	3	A	ALL	Registered in cucurbits including melons for the control of Cucumber moth, Western flower thrips and Helicoverpa spp. [Re-treatment interval: 7-14 d; max no. of appl'ns not specified]	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Thiamethoxam + chlorantraniliprole (Durivo) PER87051	4A + 28	Systemic	H:35 NG	A	QLD only (within specified regions only)	PER87051 for use as a single post plant chemigation in various specified crops (including melons protected and field) / various specified pests (including Corn Earworm, Native budworm, Cabbage Aphid, Green Peach Aphid, Silverleaf Whitefly, Greenhouse Whitefly, Western Flower Thrips, Onion Thrips) [max 1 appl'n per crop]	M VH-bees	-
Indoxacarb (Avatar)	22A			P		Registered in leafy vegetables for control of <i>Helicoverpa</i> spp.	L	-
Broflanilide (TBC)	[30]			P		A new product by BASF and co-developed with Mitsui Chemicals Agro, Inc. (MCAG). Company information indicates that applications have been submitted in United States, Canada, Mexico, India and Australia. Initial Australian applications seem to be for domestic/commercial ant baits. Novel mode of action (IRAC Group 30) without known cross-resistance. Available information indicates efficacy in controlling problematic chewing insect pests, including Lepidoptera, beetles, and certain thrips in specialty and row crops.		-
Cucumber moth <i>Diaphania indica</i>								
Priority: High								
Moth larvae roll leaves with silken threads and eat the leaves between the veins. Adults grow to around 20 mm long green caterpillars with two white lines on their backs before pupating in folds of leaves. Caterpillars may also attack flowers reducing fruit set and damage fruits.								
Lacewing larvae and wasps predate moth larvae. A specific comment from a respondent indicated that the available options were not performing.								
Bifenthrin (various)	3A	Contact or ingestion	1	A	ALL	Registered in cucurbits for control of native budworm, corn earworm, cucumber moth (all states), silverleaf whitefly biotype B (QLD, NSW, NT, WA only). [max 2 appl'ns per crop]	VH	R3
Chlorantraniliprole (Coragen)	28	Systemic	1	A	ALL	Registered in melons for the control of cotton bollworm, native budworm and cucumber moth [Re-treatment interval: 5 d; max 3 appl'ns per crop; max 2 consecutive appl'ns per crop]	L-M	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Cyantraniliprole (Benevia)	28	Foliar and systemic; stomach	1	A	ALL	Registered in cucurbits (including melons) for the control of melon aphid, silverleaf whitefly, cotton bollworm, cucumber moth , native budworm and suppression of western flower thrips. [Max 2 appl'ns per crop; Re-treatment interval 7-10 d; sequential appl'ns rec.]	L-M	-
Emamectin (proclaim)	6	Ingestion and contact	3	A	ALL	Registered in cucurbits including melons for the control of <i>Helicoverpa</i> spp., Cluster caterpillar, Cucumber moth [Re-treatment interval:7 d; max 4 appl'ns per crop or year]	M	-
Flubendiamide (Belt)	28	Ingested	1	A	ALL	Registered in melons for the control of Cucumber moth and <i>Helicoverpa</i> spp. [Re-treatment interval: 7-14 d; max 3 appl'ns per crop]	L-M	-
Methomyl (various) PER82428	1A	Contact	3	A	ALL	PER82428 for use in cucurbits including melons for control of <i>Helicoverpa</i> spp., cucumber moth , cluster caterpillar, loopers, webworm, Rutherglen bug, thrips including Western flower thrips. [max 6 appl'ns per crop]	H	R2
Spinetoram (Success)	5	Contact and ingestion	3	A	ALL	Registered in cucurbits including melons for the control of Cucumber moth , Western flower thrips and <i>Helicoverpa</i> spp. [Re-treatment interval: 7-14 d; max no. of appl'ns not specified]	-	-
Root-knot nematodes (<i>Meloidogyne</i> spp.)								
Priority: High								
Nematodes, based on the original SARP data, are a high priority in SA, a moderate priority in Qld and a low priority in other states. While nematodes are a pest of high importance, as there are new control options either already available or in development these pests are a lower priority for new industry initiatives.								
Abamectin (Tervigo)	6	Contact	NR	A	ALL	Registered in rockmelon, melon, and watermelon for control of root-knot nematodes [max 5 appl'ns per crop]	M	-
Chloropicrin + 1,3-dichloropropene (Tri-Form)	-	Soil fumigant	NR	A	ALL (Restricted use TAS, VIC, SA)	Registered in vegetables for control of plant parasitic nematodes , symphylans, wireworms and soil borne diseases, Restricted chemical.	-	-
Dazomet (Cerlong)	-	Soil fumigant	NR	A	ALL	Registered in vegetables for control of soil fungi, nematodes , soil insects and weeds.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Ethanedinitrile (EDN Fumigas)	-	Soil fumigant	NR	A	ALL	Registered in cucurbits for control of soil borne pathogens (including <i>Fusarium oxysporum</i>), nematodes (including <i>Meloidogyne spp.</i>) and weeds (including <i>Amaranthus retroflexus</i> , <i>Cyperus rotundus</i> and <i>Solanum nigrum</i>). [Use by licensed fumigators or approved persons only].	-	-
Fluensulfone (Nimitz)	-	Contact	NR	A	ALL	Registered in cucurbits for control of root-knot nematodes . [max 1 appl'n per crop and 8L/ha per year]	-	-
Metham sodium (Metham) and potassium formulated variant	-	Soil fumigant	NR	A	ALL	Registered for control of nematodes , germinating weed seeds (including fat hen), symphylids (not TAS) and fungus diseases (including <i>Fusarium</i>) field application in beds or rows. Field application to total area NSW, QLD, SA, VIC, WA only.	-	-
Fluopyram (registered overseas as Velum)	7	Protective, systemic, curative fungicide and nematicide		P		Not currently registered for use in melons. Fluopyram is registered in Australia, formulated alone or in mixes with trifloxystrobin for use as a nematicide (turf) or fungicide in a range of crops. There is a fluopyram nematicide product by Bayer registered overseas as Velum that includes control of root-knot nematode (<i>Meloidogyne spp.</i>) in potato, tomato and tobacco (South African label – company website). The US label for Luna Privilege (fluopyram) - that may incorporate the velum products there - includes a claim for suppression of “nematodes” in cucurbits. A potential label extension for root knot nematodes in melons.		-
Fluazaindolizine				P		New nematicide by DuPont that is not registered in Australia, EU or USA. The potential use pattern is not yet known however it may have potential for future use in cucurbits/melons.		-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Western flower thrips <i>Frankiniella occidentalis</i> Priority: High								
Thrips are more problematic in tropical/subtropical regions than temperate ones. They can be found on all above ground plant parts. Damage appears as silvering and flecking on leaves. Predatory mites can control population numbers if present in sufficient numbers.								
Diazinon (various)	1B	Protectant	14	A	Qld, NSW, Vic, SA, WA only	Registered in cantaloupe and watermelons for control of caterpillars and cutworms. Registered in cucurbits for the control of thrips . [max no. applications not specified]	H	R3
Dimethoate (various)	1B	Broad spectrum contact and systemic	7	A	ALL	Registered in melons for control of aphids, jassids, mites, leaf hoppers, green vegetable bug, thrips , wingless grasshoppers (all states); and cucumber fly (NSW, QLD, WA, NT only) [max no. applications not specified]	H	R3
Cyantraniliprole (Benevia)	28	Foliar and systemic; stomach	1	A	ALL	Registered in cucurbits (including melons) for the control of melon aphid, silverleaf whitefly, cotton bollworm, cucumber moth, native budworm and suppression of western flower thrips [Max 2 appl'ns per crop; Re-treatment interval 7-10 d; sequential appl'ns rec.]	M	-
Methomyl (various) PER82428	1A	Contact	3	A	ALL	PER82428 for use in cucurbits including melons for control of <i>Helicoverpa</i> spp., cucumber moth, cluster caterpillar, loopers, webworm, Rutherglen bug, thrips including Western flower thrips . [max 6 appl'ns per crop]	H	R2
Paraffinic oil (Trump)/ Petroleum oil (BioCover)	-	Contact	1	A	ALL	Registered in cucurbits for control of aphids, mites, thrips and leafhopper. [max no. of applications not specified]	VL	-
Potassium salts of fatty acids (Natrasoap)	-	Contact	Nil	A	ALL	Registered in vegetables for control of aphids, thrips , mealybug, two-spotted mites, spider mite, and white fly [Re-treatment interval: 5-7 d; max no. of appl'ns not specified]	-	-
Spinetoram (Success)	5	Contact and ingestion	3	A	ALL	Registered in cucurbits including melons for the control of Cucumber moth, Western flower thrips and <i>Helicoverpa</i> spp. [Resistance man. strategy for WFT – max 3 consecutive appl'ns]	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Thiamethoxam + chlorantraniliprole (Durivo) PER87051	4A + 28	Systemic	H:35 NG	A	QLD only (within specified regions only)	PER87051 for use as a single post plant chemigation in various specified crops (including melons protected and field) / various specified pests (including Corn Earworm, Native budworm, Cabbage Aphid, Green Peach Aphid, Silverleaf Whitefly, Greenhouse Whitefly, Western Flower Thrips , Onion Thrips) [max 1 appl'n per crop]	M VH-bees	-
Pyriproxyfen	[9B]			P		Active not approved for use in Australia. Registered in the USA but not in the EU. The US label includes use on cucurbits – US crop group 9 – for control of aphids, leafhoppers and whiteflies. The label includes citrus thrips on citrus. It may be a possible option for control of WFT.		-
Fonicamid (Mainman)	9C	Systemic		P-A		Not registered for this pest on any crop. Registered in cucurbits including rockmelons for control of green peach aphid, melon aphid, and silverleaf whitefly. A potential option for a label extension to include control of Western Flower Thrips.	M	-
SYNFOI21	TBC			P		A new product from Syngenta coded SYNFOI21 may be a potential option for control of Western Flower Thrips. A new mode of action – chemical class. The product is expected around 2022-23.		-
<p>Melon Thrips <i>Thrips palmi</i> Onion thrips <i>Thrips tabaci</i> Priority: Moderate</p> <p>Thrips are more problematic in tropical/subtropical regions than temperate ones. They can be found on all above ground plant parts. Damage appears as silvery and flecking on leaves. Predatory mites can control population numbers if present in sufficient numbers.</p>								
Diazinon (various)	1B	Protectant	14	A	Qld, NSW, Vic, SA, WA only	Registered in cantaloupe and watermelons for control of caterpillars and cutworms. Registered in cucurbits for the control of thrips . [max no. applications not specified]	H	R3
Dimethoate (various)	1B	Broad spectrum contact and systemic	7	A	ALL	Registered in melons for control of aphids, jassids, mites, leaf hoppers, green vegetable bug, thrips , wingless grasshoppers (all states); and cucumber fly (NSW, QLD, WA, NT only) [max no. applications not specified]	H	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Methomyl (various) PER82428	1A	Contact	3	A	ALL	PER82428 for use in cucurbits including melons for control of <i>Helicoverpa</i> spp., cucumber moth, cluster caterpillar, loopers, webworm, Rutherglen bug, thrips including Western flower thrips. [max 6 appl'ns per crop]	H	R2
Potassium salts of fatty acids (Natrasoap)	-	Contact	Nil	A	ALL	Registered in vegetables for control of aphids, thrips , mealybug, two-spotted mites, spider mite, and white fly [Re-treatment interval: 5-7 d; max no. of appl'ns not specified]	-	-
Paraffinic oil (Trump)	-	Contact	1	A	ALL	Registered in cucurbits for control of aphids, mites, thrips and leafhopper. [max no. of applications not specified]	VL	-
Thiamethoxam + chlorantraniliprole (Durivo) PER87051	4A + 28	Systemic	H:35 NG	A	QLD only (within specified regions only)	PER87051 for use as a single post plant chemigation in various specified crops (including melons protected and field) / various specified pests (including Corn Earworm, Native budworm, Cabbage Aphid, Green Peach Aphid, Silverleaf Whitefly, Greenhouse Whitefly, Western Flower Thrips, Onion Thrips) [max 1 appl'n per crop]	M VH-bees	-
SYNFOI21	TBC			P		A new product from Syngenta coded SYNFOI21 may be a potential option for control of Thrips. A new mode of action – chemical class. The product is expected around 2022-23.		-
<p>Queensland fruit fly <i>Bactrocera tryoni</i> Mediterranean fruit fly <i>Ceratitis capitata</i> Priority: Moderate</p> <p>Fruit fly damage starts when the female fruit fly punctures the fruit with its long and sharp ovipositor. The fruit will start to decay with invading bacteria and the larvae feed on the decaying tissue. Mediterranean fruit fly occurs in parts of Western Australia with outbreaks and detections in South Australia in previous years. Queensland fruit fly has a large geographic spread through parts of NT, QLD, NSW and VIC. It has a broad host range of fruits and vegetables. Perimeter protein bait spraying and male annihilation technique have shown positive results but are not sufficient where populations are high [refer to Hort Innovation vegetable project VG13041].</p>								
Dimethoate (various) PER13859	1B	Broad spectrum contact and systemic	NR	A	ALL	PER13859 for orchard cleanup of fruit fly host crops following harvest. [max 2 appl'ns per host crop following harvest]	H	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Dimethoate (various) PER87065	1B	Broad spectrum contact and systemic	NR	A	ALL (Excl. Vic)	PER87065 for post-harvest treatment of melons including watermelons for the control of cucumber fly, lesser Queensland fruit fly, Queensland fruit fly , Mediterranean fly , banana fly and mango fly.	H	R3
Maldison (Fyfanon)	1B			P-A		Registered in cucumber as cover spray for control of fruit fly. Already registered in cucurbits generally for a range of different pests with a 3 day WHP. But it is also a broad spectrum organophosphate 1B.	H	-
Spinetoram (Success)	5	Contact and ingestion		P-A		No registration for this pest on the label in any crop. Registered in cucurbits including melons for various other pests - for the control of Cucumber moth, Western flower thrips and <i>Helicoverpa</i> spp.	-	-
Clothianidin (Samurai)	4A	systemic		P-A		Not registered for use in melons. PER80101 permits use against cucumber fruit fly (<i>Bactrocera cucumis</i>) in cucurbits.	M	R2
Green house whitefly <i>Trialeurodes vaporariorum</i>								
Priority: Moderate								
Favouring temperate climates it is a common pest in green houses and protected cropping. It is also a vector of certain viruses.								
Chlorpyrifos (various)	1B	Systemic, contact	5	A	NSW, WA only	Registered in cucurbits for control of whiteflies (NSW, WA only); ants, mealybugs, field crickets, mole crickets (QLD only); Vegetables: Wingless grasshopper (NSW, VIC, TAS, WA only); cutworm (all states); field crickets, mole crickets (QLD, WA only); vegetable weevil (NSW, WA only). [max no. of appl'ns not specified]	H	R2
Emulsifiable botanical oil (Eco-oil)	-	Contact	NR	A	ALL	Registered in vegetables for control of greenhouse whitefly [max 3 appl'ns in a 4-8 week period]	VL	-
Petroleum oil (various) PER12221 Version 3	-	Contact	1	A	ALL (Excl. Vic)	PER12221 for use in cucurbits (including melons) for control of greenhouse whitefly and Bemisia tabaci species (sweet potato whitefly, silverleaf whitefly biotype B, and whitefly biotype Q) [max no. of appl'ns not specified]	VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Potassium salts of fatty acids (Natrasoap)	-	Contact	Nil	A	ALL	Registered in vegetables for control of aphids, thrips, mealybug, two-spotted mites, spider mite, and white fly [Re-treatment interval: 5-7 d; max no. of appl'ns not specified]	-	-
Pymetrozine (Chess)	9B	Systemic; ingestion	3	A	ALL	Registered in cucurbits (field and protected) for control of melon aphid, green peach aphid, potato aphid and cowpea aphid; and for suppression of silverleaf whitefly and greenhouse whitefly . [7 Re-treatment interval, max. 2 appl'ns per crop]	L	R3
Pyriproxyfen (Admiral)	7C	Ingestion, residual, IGR	1	A	ALL	Registered in cucurbits (including melons and watermelons) for control of silverleaf whitefly and greenhouse whitefly . [Re-treatment interval: min 2 weeks; max 2 appl'ns per season]	VL	-
Sulfoxaflor (Transform)	4C	Systemic	1	A	ALL	Registered in cucurbits (field grown only) for control of green peach aphid, melon (cotton) aphid, and greenhouse whitefly . [Re-treatment interval: 7-10 d; max 4 non-consecutive appl'ns per season]	M	-
Thiamethoxam + chlorantraniliprole (Durivo) PER87051	4A + 28	Systemic	H:35 NG	A	QLD only (within specified regions only)	PER87051 for use as a single post plant chemigation in various specified crops (including melons protected and field) / various specified pests (including Corn Earworm, Native budworm, Cabbage Aphid, Green Peach Aphid, Silverleaf Whitefly, Greenhouse Whitefly , Western Flower Thrips, Onion Thrips) [max 1 appl'n per crop]	M VH-bees	-
Cutworms (<i>Agrotis spp.</i>)								
Priority: Moderate								
Cut worms, based on the original SARP data, are a high priority in SA and a low priority in other states. The bogong moth is the adult form of a cutworm. They range from 2.5-5cm long and can vary a great deal in colour. Growers expressed concern that only heavy chemistry is available for use. However cutworms may be incidentally managed while controlling other lepidopteran pests.								
Carbaryl (various)	1A	Systemic, contact	NR	A	ALL	Registered in cucurbits (prior to flowering only) for control of Helicoverpa, pumpkin beetle, 28-spotted ladybird, cucurbit stemborer, wingless grasshopper, green vegetable bug, leaf eating ladybird, cutworms , European earwig, potato moth, Rutherglen bug, and army worms. [max no. of appl'ns not specified]	H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Chlorpyrifos (various)	1B	Vegetables	5	A	ALL	Registered in cucurbits for control of whiteflies (NSW, WA only); ants, mealybugs, field crickets, mole crickets (QLD only); Vegetables: Wingless grasshopper (NSW, VIC, TAS, WA only); cutworm (all states); field crickets, mole crickets (QLD, WA only); vegetable weevil (NSW, WA only). [max no. of appl'ns not specified]	H	R2
Diazinon (various)	1B	Protectant	14	A	Qld, NSW, Vic, SA, WA only	Registered in cantaloupe and watermelons for control of caterpillars and cutworms . Registered in cucurbits for the control of thrips. [max no. appl'ns not specified]	H	R3
Trichlorfon (various)	1B	Contact	2	A	Qld, NT only	Registered in cucurbits for control of cutworm . [max no. of appl'ns not specified]	H	R1
Cucurbit stemborer <i>Melittia cucurbitae</i>								
Priority: Moderate								
Females lay eggs at the base of leaf stalks and the caterpillars develop and feed inside the stalk and migrate to the main stem. Their location inside the plant makes them difficult to kill.								
Carbaryl (various)	1A	Systemic, contact	NR	A	ALL	Registered in cucurbits (prior to flowering only) for control of Helicoverpa, pumpkin beetle, 28-spotted ladybird, cucurbit stemborer , wingless grasshopper, green vegetable bug, leaf eating ladybird, cutworms, European earwig, potato moth, Rutherglen bug, and army worms. [max no. of applications not specified]	H	-

4.3 Weeds in melons

4.3.1 Weed priorities

Common Name	Scientific Name
Nutgrass	<i>Cyperus rotundus</i>
Wireweed	<i>Polygonum aviculare</i>
Innocent weed	<i>Cenchrus echinatus</i>
Fat hen	<i>Chenopodium album</i>
Amaranth	<i>Amaranthus spp.</i>
Pigweed	<i>Portulaca oleracea</i>
Blackberry nightshade	<i>Solanum nigrum</i>
Feather top rhodes grass	<i>Chloris virgata</i>
Awnless Barnyard grass (glyphosate resistant)	<i>Echinochloa colona</i>
Paddy melon	<i>Cucumis myriocarpus</i>
Afghan melon/Wild melon	<i>Citrullus lanatus</i>

Weed control in many cases is aided through the use of plastic mulches/matting.

In the previous SARP it was reported that wireweed, innocent weed and fat hen were causing significant problems in SA.

The additional broadleaf weeds mentioned in the current SARP update include Amaranthus/Pigweeds, Blackberry nightshade (*Solanum nigrum*) and feral melons (as disease transmitters). It is assumed that feral melons refers to the Afghan and Prickly Paddy melons. Respondents nominated *Amaranthus spp.* in general.

The additional grass weeds included Feather top rhodes grass (*Chloris virgata*) and glyphosate resistant Barnyard grass (*Echinochloa colona*).

Given the small number of respondents it is difficult to assess how broadly these weed issues are impacting across the industry.

Resistance management

Of the weeds listed in the table above there are confirmed cases of resistance in Australia for Awnless Barnyard grass (Group M at more than 200 sites), Feather top Rhodes grass (Group M at 4 sites) and Blackberry nightshade (Group L at 2 sites).

Specific resistance management strategies for high resistance risk (A and B) and moderate resistance risk (C, D, F, G, I, J, K, L, M, N, Q and Z) herbicide modes of action are available on the CropLife Australia webpage.

<https://www.croplife.org.au/resources/programs/resistance-management/herbicide-resistance-management-strategies-2/>

4.3.2 Available and potential products for weed control

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

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

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Clomazone (various)	Q**	Rockmelon and watermelon / Post-plant pre-emergence broadleaf selective	Registered for use in rockmelons and watermelons for the control of various broadleaf weeds (including control of blackberry nightshade, fat hen, pig weed – <i>Portulaca oleracea</i> and suppression of Amaranth - <i>Amaranthus powellii</i>). [No more than 2L/ha in any 12 month period; Note: melon appl'n rates are 0.5-1 L/ha]	NR	A	ALL	-
Fluazifop-P as butyl (various)	A***	Cucurbits / Post emergent grass selective	Registered in cucurbits for the control of various grass weeds (including Barnyard grass). Only used in field grown crops. Used to spot spray grass weeds such as couch grass. [max no of appl'ns not specified]	21	A	ALL	-
Glyphosate (various)	M**	General seed bed preparation	Various weeds as specified, a pre-crop spray. Specified weeds include nutgrass, barnyard grass, amaranth, camel melon . Only used in field grown crops.	NR	A	ALL	-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Paraquat +/- diquat (various)	L**	General seed bed preparation / Post- emergence inter-row weed control	General weeds as a pre-crop spray. Only used in field grown crops. Post-emergence inter-row weed control (shielded spray – do not touch the crop). Add diquat where broadleaf weeds dominate. [Max no of appl'ns not specified]	NR	A	ALL	R2
Quizalofop-P-ethyl	A***	Honeydew melons / Post emergent grass selective	Various grass weeds (including barnyard grass). [Max no of appl'ns not specified]	63	A	ALL	R3
Sethoxydim	A***	Melons	Various grass weeds (including barnyard grass). [Max no of appl'ns not specified]	28	A	ALL	-

5. References

5.1 Information:

AgVet Collaborative Forum (Agrifutures Australia)	https://www.agrifutures.com.au/national-rural-issues/agvet-chemicals/
Australian Pesticide and Veterinary Medicines Authority	www.apvma.gov.au
APVMA Chemical review	https://apvma.gov.au/chemicals-and-products/chemical-review/listing
APVMA MRLs	www.comlaw.gov.au/Series/F2012L02501
APVMA Permit search	https://productsearch.apvma.gov.au/permits
APVMA Product search	https://productsearch.apvma.gov.au/products
Codex MRL database	http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/
Cotton Pest Management Guide 2018-19	https://www.cottoninfo.com.au/publications/cotton-pest-management-guide
CropLife Australia (resistance management)	https://www.croplife.org.au/resources/programs/resistance-management/
Growcom – Infopest Database	www.infopest.com.au
Hort Innovation	www.horticulture.com.au
Prevent Fruit Fly	http://preventfruitfly.com.au/fruit-fly-prevention-is-key-for-growers/

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, nematocides, 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 melon

Appendix 2. Products available for control of insects, mites and other invertebrates in melon

Appendix 3. Products available for weed control in melon

Appendix 4. Current permits for use in melon

Appendix 5. Melon Maximum Residue Limits (MRLs)

Appendix 6. Melon regulatory risk assessment

Appendix 1. Products available for disease control in melons

Active Ingredient (Trade Name)	Chem. group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Azoxystrobin (various)	11	Cucurbits	Powdery mildew, downy mildew, and gummy stem blight	ALL	1	-
Benalaxyl + Mancozeb (Galben)	4 + M3	Cucurbits	Downy mildew (all states), Anthracnose, gummy stem blight, Alternaria leaf spot, and Septoria spot of pumpkins (Qld only).	Variable	7	R2
Boscalid + Kresoxim-Methyl (Colliss)	7+11	Cucurbits	Powdery mildew	ALL	7	-
Bupirimate (Nimrod)	8	Melons (except watermelons)	Powdery mildew	Qld, NT, NSW, ACT, WA only	1	-
Bupirimate (Nimrod) PER14840	8	Cucurbits (including watermelon)	Powdery mildew (<i>Sphaerotheca fuliginea</i>)	ACT, NSW, Qld, SA, Tas, NT and WA only	1	-
Bromochloro-dimethylhydantoin (YM-Fab)	-	Fruits and vegetables	Control of <i>E. coli</i> , <i>Listeria</i> , <i>Staphylococcus</i> , <i>Salmonella</i> in wash water of fruit and vegetables in post-harvest wash systems. Surface sterilisation of fruits and vegetables in post-harvest wash systems.	ALL	NR	-
Chloropicrin + 1,3-dichloropropene (Tri-Form)	-	Field fumigation	Plant parasitic nematodes, symphylans, wireworms, soil borne diseases (including <i>Fusarium</i> and <i>Verticillium</i> wilts, <i>Rhizoctonia</i> , <i>Pythium</i>) and suppression of weeds	ALL (Restricted use some states)	NR	-
Chlorothalonil (various)	M5	Cucurbits	Downy mildew, gummy stem blight, anthracnose, Alternaria leaf blight, target leaf spot, and belly rot	ALL	1	R3
Copper (various)	M1	Cucurbits	Angular leaf spot, bacterial leaf spot, and downy mildew	ALL	1	-
Copper octanoate (Tricop)	M1	Cucurbits	Powdery mildew and downy mildew.	ALL	1	-

Active Ingredient (Trade Name)	Chem. group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Copper oxychloride (various)	M1	Cucurbits	Angular leaf spot, bacterial leaf spot (all states), anthracnose, downy mildew and gummy stem blight (NSW, ACT, WA, NT only); registered in vegetables for control of rust and leaf spot diseases (QLD, NSW, VIC, TAS, SA, WA only).	Variable	1	-
Cyflufenamid (various)	U6	Cucurbits	Powdery mildew	ALL	1	-
Dazomet (Cerlong)	-	Vegetables	Soil fungi, nematodes, soil insects and weeds	ALL	NR	-
Dimethomorph (Eureka)	40	Cucurbits	Downy mildew (all states), Anthracnose, gummy stem blight, Alternaria leaf spot (Qld and NT only)	Variable	7	-
Ethanedinitrile (EDN Fumigas)	-	Cucurbits	Soil borne pathogens (including <i>Fusarium oxysporum</i>), nematodes (including) and weeds. Use by licensed fumigators or approved persons only.	ALL	NR	-
Hydrogen peroxide + peroxy acetic acid (Peratec)	M	Cucurbits	Powdery mildew (<i>Sphaerotheca</i> spp.)	ALL	1	-
Imazalil (Fungaflor)	3	Rockmelons	Post-harvest decays: <i>penicillium</i> spp., <i>Alternaria</i> spp., <i>Fusarium</i> spp. (Do not use on rockmelons intended for export)	ALL	NR	-
Mancozeb (various)	M3	Cucurbits, melons, cantaloupe	Anthracnose, downy mildew, gummy stem blight, and Septoria spot	ALL	7	R2
Mancozeb + metalaxyl (Zeemil)	M3+4	Cucurbits	Downy mildew (all states), Anthracnose, gummy stem blight, and Alternaria leaf spot (Qld only)	Variable	7	R2
Metalaxyl (various)	4	Cucurbits	Damping off (<i>Pythium</i> and <i>Phytophthora</i> spp.)	NSW, Qld, WA only	7	-
Metham sodium (Metham)	-	Field fumigation	Nematodes, germinating weed seeds (including fat hen), symphylids (not TAS) and fungus diseases (including <i>Fusarium</i>) field application in beds or rows. Field application to total area NSW, QLD, SA, VIC, WA only.	ALL	NR	-
Metiram	M3	Cucurbits	Powdery mildew and gummy stem blight	ALL	7	R2
Metrafenone (Vivando)	U8	Cucurbits	Powdery mildew	ALL	7	-
Oxathiapiprolin (Zorvec)	49	Cucurbits including melons and rockmelon	Downy mildew	ALL	1	-

Active Ingredient (Trade Name)	Chem. group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Penthiopyrad (Fontelis)	7	Cucurbits (field and protected)	Botrytis grey mould, powdery mildew, and gummy stem blight	ALL	1	-
Per(oxy)acetic acid + hydrogen peroxide (Perasan / Pinnacle)	-	Fruit and vegetables	Controls bacterial growth in the process water for post-harvest processing of fruit and vegetables.	ALL	NR	-
Phosphorous acid (various)	33	Cucurbits	Downy mildew	ALL	NR	-
Potassium-monomethyl dithiocarbamate	-	General pre-plant soil fumigation	Metham potassium formulated variant. Nematodes, germinating weed seeds (including fat hen), symphylids (not TAS) and fungus diseases (including <i>Fusarium</i>) field application in beds or rows. Field application to total area NSW, QLD, SA, VIC, WA only.	ALL	NR	-
Propamocarb hydrochloride + fluopicolide (Infinito)	28 + 43	Cucurbits (field and protected)	Downy mildew	ALL	3	-
Propineb (Antracol)	M3	Cucurbits / Watermelon and rockmelon	Downy mildew (all states) / Anthracnose and gummy stem blight (Qld, NSW, SA, WA only)	Variable	3	R2
Propineb + oxadixyl (Rebound)	4 + M3	Cucurbits	Downy mildew, gummy stem blight, and Anthracnose	ALL	3	R2
Proquinazid (Talendo)	13	Cucurbits (field grown only)	Powdery mildew	ALL	1	-
Pyriofenone (Kusabi)	U8	Cucurbits	Powdery mildew	ALL	NR	-
<i>Streptomyces lydicus</i> (Actinovate)	-	Cucurbits	In cucurbits for suppression of powdery mildew; and in vegetables as a seed treatment for suppression of specified fungal diseases including <i>Fusarium</i>	ALL	NR	-
Sulphur (Solo)	M2	Vegetables (excluding rockmelon)	Powdery mildew, rust (<i>Uromyces</i> spp.), tomato russet mite, bean spider mite (VIC, TAS, SA, WA, NSW only), and two-spotted mite (VIC, TAS, SA, WA only). In QLD powdery mildew, rust (<i>Uromyces</i> spp.), tomato russet mite.	Variable	NR	-
Tea tree oil (Timorex Gold)	-	Cucurbits including melons and watermelon	Powdery mildew	ALL	NR	-
Triadimefon (various)	3	Cucurbits	Powdery mildew	NSW, WA only	1	R3

Active Ingredient (Trade Name)	Chem. group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Triadimenol (various)	3	Cucurbits	Powdery mildew	ALL	1	R3
Zineb (Barmac Zineb)	M3	Cucurbits	Downy mildew and Anthracnose	NSW, VIC, SA, WA, TAS, QLD only	7	R2

Appendix 2. Products available for control of insects, mites and other invertebrates in melons

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP	Regulatory risk
1,3-dichloropropene (Tri-Form)	-	Field crops	Plant parasitic nematodes. Restricted chemical.	ALL (Restricted use TAS, VIC, SA)	NR	-
1,3-dichloropropene + Chloropicrin (Tri-Form)	-	Field crops	Plant parasitic nematodes, symphylans, wireworms, soil borne diseases (including <i>Fusarium</i> and <i>Verticillium</i> wilts, <i>Rhizoctonia</i> , <i>Pythium</i>) and suppression of weeds	ALL (Restricted use TAS, VIC, SA)	NR	-
Abamectin (Tervigo)	6	Cucurbits including rockmelon, melon and watermelon	Root-knot nematodes	ALL	NR	-
Afidopyropen (Versys)	9D	Cucurbits	Green peach aphid, cabbage aphid, currant lettuce aphid and cotton/melon aphid; suppression of silverleaf whitefly	ALL	1	-
<i>Bacillus thuringiensis subsp. kurstaki</i> (Dipel)	11A	Vegetables	Armyworm, cotton bollworm, native budworm, cabbage moth, cabbage white butterfly, green looper, lightbrown apple moth, pear looper, soybean looper, vine moth, and tobacco looper.	ALL	NR	-
Bifenthrin (various)	3A	Cucurbits	Native budworm, corn earworm, cucumber moth (all states), silverleaf whitefly biotype B (QLD, NSW, NT, WA only).	Variable	1	R3
Bifenazate (Acramite)	20D	Cucurbits	Two-spotted mite, Bryobia mite	ALL	H:3 NG	-
Carbaryl (various)	1A	Cucurbits (prior to flowering only)	<i>Helicoverpa</i> , pumpkin beetle, 28-spotted ladybird, cucurbit stemborer, wingless grasshopper, green vegetable bug, leaf eating ladybird, cutworms, European earwig, potato moth, Rutherglen bug, and army worms.	ALL	NR	-
Chlorantraniliprole (Coragen)	28	Melons	Cotton bollworm, native budworm, and cucumber moth	ALL	1	-

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP	Regulatory risk
Chlorpyrifos (various)	1B	Cucurbits; vegetables	Cucurbits: Whiteflies (NSW, WA only); ants, mealybugs, field crickets, mole crickets (QLD only); Vegetables: Wingless grasshopper (NSW, VIC, TAS, WA only); cutworm (all states); field crickets, mole crickets (QLD, WA only); vegetable weevil (NSW, WA only)	Variable	5	R2
Clothianidin (Samurai) PER80101	4A	Cucurbits (field and protected)	Cucumber fruit fly	ALL	H:7 NG	R2
Cyantraniliprole (Benevia)	28	Cucurbits (including melons)	Melon aphid, Silverleaf whitefly, Cotton bollworm, Cucumber moth, Native budworm and suppression of Western flower thrips	ALL	1	-
Dazomet (Cerlong)	-	Seed beds, broadacre	Soil fungi, nematodes, soil insects and weeds	ALL	NR	-
Diazinon (various)	1B	Cantaloupe and watermelons; cucurbits	Caterpillars and cutworms; thrips	Qld, NSW, Vic, SA, WA only	14	R3
Dimethoate (various)	1B	Melons	Aphids, jassids, mites, leaf hoppers, green vegetable bug, thrips, wingless grasshoppers (all states); and cucumber fly (NSW, QLD, WA, NT only)	Variable	7	R3
Dimethoate (various) PER87065	1B	Post-harvest - melons including watermelons	Cucumber fly, lesser Queensland fruit fly, Queensland fruit fly, Mediterranean fly, banana fly, and mango fly	ALL (Excl. Vic)	NR	R3
Emamectin (Proclaim)	6	Cucurbits (including melons)	<i>Helicoverpa</i> spp., Cluster caterpillar, Cucumber moth	ALL	H:3 NG	-
Emulsifiable botanical oil (Eco-oil)	-	Vegetables	Greenhouse whitefly	ALL	NR	-
Etoxazole (Paramite) PER14650	10B	Melons including cantaloupe, honeydew and watermelons	Two-spotted mites	ALL (Excl. Vic)	7	-
Fonicamid (Mainman)	9C	Cucurbits including rockmelon	Green peach aphid, melon aphid, and silverleaf whitefly	ALL	1	-

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP	Regulatory risk
Flubendiamide (Belt)	28	Melons	Cucumber moth and <i>Helicoverpa</i> spp.	ALL	1	-
Fluensulfone (Nimitz)	-	Cucurbits	Root-knot nematodes	ALL	NR	-
<i>Helicoverpa</i> NPV (Helicovex)	-	Melons	Cotton bollworm, corn earworm, tobacco budworm and native budworm	ALL	Nil	-
Hexythiazox (Calibre) PER14765	10A	Cucurbits including melons	Tomato russet mite, broad mite, and two-spotted mite	ALL	3	-
Imidacloprid (Confidor)	4A	Cucurbits	Green peach aphid	ALL	1	R2
Imidacloprid (various)	4A	Cucurbits	Silverleaf whitefly, including type B	ALL	NR	R2
Maldison (Hy-Mal)	1B	Cucurbits	Pumpkin beetle	SA, NSW, Vic, WA & NT only	3	-
Maldison (Fyfanon)	1B	Cucurbits	Rutherglen bug (Do not apply to melons and cucumbers when wet)	Vic, Qld, SA, WA, Tas only	3	-
Maldison (various)	1B	Cucurbits	Aphids, green vegetable bug, jassids, leaf hopper, red legged earth mite (not Tas), Rutherglen bug, and twenty-eight spotted lady bird (not Tas).	ALL	3	-
Metham sodium (Metham)	-	General pre-plant soil fumigation	Nematodes, germinating weed seeds (including fat hen), symphylids (not TAS) and fungus diseases (including <i>Fusarium</i>) field application in beds or rows. Field application to total area NSW, QLD, SA, VIC, WA only.	ALL	NR	-
Methomyl (various) PER82428	1A	Cucurbits including melons	<i>Helicoverpa</i> spp., cucumber moth, cluster caterpillar, loopers, webworm, Rutherglen bug, thrips including Western flower thrips	ALL	3	R2

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP	Regulatory risk
Methyl bromide (various) PER80718	8A	Fruit and vegetables	Disinfestation treatment of commodities to meet interstate and intrastate quarantine requirements	ALL	3	*
Paraffinic oil (D-C-Maxx)	-	Cucurbits	Silverleaf whitefly	Qld only	1	-
Paraffinic oil (Trump)	-	Cucurbits	Aphids, mites, thrips and leafhopper	ALL	1	-
Petroleum oil (various) PER12221	-	Cucurbits (including melons)	Greenhouse whitefly and <i>Bemisia tabaci</i> species (sweet potato whitefly, silverleaf whitefly biotype B, and whitefly biotype Q)	ALL (Excl. Vic)	1	-
Pirimicarb (Aphidex)	1A	Cucurbits	Aphids	ALL	2	R3
Potassium-monomethyl dithiocarbamate	-	General pre-plant soil fumigation	Metham potassium formulated variant. Nematodes, germinating weed seeds (including fat hen), symphylids (not TAS) and fungus diseases (including <i>Fusarium</i>) field application in beds or rows. Field application to total area NSW, QLD, SA, VIC, WA only.	ALL	NR	-
Potassium salts of fatty acids (Natrasoap)	-	Vegetables	Aphids, thrips, mealybug, two-spotted mites, spider mite, and white fly	ALL	NR	-
Pymetrozine (Chess)	9B	Cucurbits (field and protected)	melon aphid, green peach aphid, potato aphid and cowpea aphid; and for suppression of silverleaf whitefly and greenhouse whitefly.	ALL	3	R3
Pyriproxyfen (various)	7C	Cucurbits (including melons and watermelon)	Silverleaf whitefly (<i>Bemisia tabaci</i> Biotype B)	ALL	1	-
Spinetoram (Success)	5	Cucurbits (including melons)	Cucumber moth, Western flower thrips, and Helicoverpa spp.	ALL	3	-
Spirotetramat (Movento)	23	Cucurbits (field and protected)	Cotton aphid, green peach aphid, and silverleaf whitefly biotype B	ALL	1	-
Sulfoxaflor (Transform)	4C	Cucurbits (field grown only)	Green peach aphid, melon (cotton) aphid, and greenhouse whitefly	ALL	1	-

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP	Regulatory risk
Sulphur (Solo)	M2	Vegetables (excluding rockmelon)	Powdery mildew, rust (<i>Uromyces</i> spp.), tomato russet mite, bean spider mite (VIC, TAS, SA, WA, NSW only), and two-spotted mite (VIC, TAS, SA, WA only). In QLD powdery mildew, rust (<i>Uromyces</i> spp.), tomato russet mite.	Variable	NR	-
Thiamethoxam +chlorantraniliprole (Durivo) PER87051	4A + 28	Various specified crops (including melons protected and field)	Various specified pests (including Corn Earworm, Native budworm, Cabbage Aphid, Green Peach Aphid, Silverleaf Whitefly, Greenhouse Whitefly, Western Flower Thrips, Onion Thrips)	QLD only (within specified regions only)	H:35 NG	-
Trichlorfon (various)	1B	Cucurbits	Cutworm	Qld, NT only	2	R1
Trichlorfon (Tyranex)	1B	Vegetables	Cabbage white butterfly, cabbage moth, green vegetable bug, and Rutherglen bug	ALL	2	R1

Appendix 3. Products available for weed control in melons

Active ingredient (Trade Name)	Chem. Group	Situation	Comment / Use / Weed	WHP (days)	States	Regulatory risk
Clomazone (various)	Q	Rockmelon and watermelon / Post-plant pre-emergence broadleaf selective	Various broadleaf weeds	NR	ALL	-
Fluazifop-P as butyl (various)	A	Cucurbits / Post emergent grass selective	Various grass weeds. Only used in field grown crops. Used to spot spray grass weeds such as couch grass.	21	ALL	-
Glyphosate (various)	M	General seed bed preparation	General weeds as a pre-crop spray. Only used in field grown crops.	NR	ALL	-
Paraquat + diquat (various)	L	General seed bed preparation	General weeds as a pre-crop spray. Only used in field grown crops.	NR	ALL	R2
Quizalofop-P-ethyl	A	Honeydew melons / Post emergent grass selective	Various grass weeds.	63	ALL	R3
Sethoxydim	A	Melons	Various grass weeds.	28	Variable refer to label	-

Appendix 4. Current permits for use in melons

Permit No.	Description	Issued Date	Expiry Date	States	Permit Holder
PER14840 Version 2	Bupirimate / Cucurbits (including watermelon) / Powdery mildew	01-Oct-14	30-Sep-19	ACT, NSW, Qld, SA, Tas, NT and WA only	Hort Innovation
PER80101 Version 3	Clothianidin (Samurai) / Cucurbits (field and protected) / Cucumber fruit fly (<i>Bactrocera cucumis</i>)	10-Nov-15	30-Sep-23	ALL	Hort Innovation
PER13859 Version 2	Dimethoate (various) / Orchard cleanup - fruit fly host crops following harvest / Fruit fly	09-Feb-15	31-Jul-24	ALL	Hort Innovation
PER87065	Dimethoate / Post-harvest melons including watermelons / Cucumber fly, lesser Queensland fruit fly, Queensland fruit fly, Mediterranean fly, banana fly, and mango fly	18-Feb-19	28-Feb-24	ALL (Excl. Vic)	Hort Innovation
PER14650 Version 2	Etoxazole (Paramite) / Melons including cantaloupe, honeydew and watermelons / Two-spotted mites	07-Nov-14	28-Feb-23	ALL (Excl. Vic)	AMA
PER14765 Version 4	Hexythiazox (Calibre) / Cucurbits including melons / Tomato russet mite, broad mite, and two-spotted mite	21-Feb-15	30-Sep-23	ALL (Excl. Vic)	Hort Innovation
PER82428 Version 4	Methomyl / Cucurbits including melons / <i>Helicoverpa</i> spp., cucumber moth, cluster caterpillar, loopers, webworm, Rutherglen bug, thrips including Western flower thrips	22-Apr-16	31-Mar-24	ALL	Hort Innovation
PER80718 Version 3	Methyl bromide (various) / Fruit and vegetables / Disinfestation treatment of commodities to meet interstate and intrastate quarantine requirements / Fruit fly, Silver leaf whitefly, Thrips	12-Apr-15	31-Mar-25	ALL	Biosecurity SA
PER12221 Version 4	Petroleum oil / Cucurbits (including melons) / Greenhouse whitefly and <i>Bemisia tabaci</i> species (sweet potato whitefly, silverleaf whitefly biotype B, and whitefly biotype Q)	29-Jun-12	30-Nov-22	ALL (Excl. Vic)	Hort Innovation

PER87051	Thiamethoxam + chlorantraniliprole (Durivo) / various specified crops (including melons protected and field) / various specified pests (including Corn Earworm, Native budworm, Cabbage Aphid, Green Peach Aphid, Silverleaf Whitefly, Greenhouse Whitefly, Western Flower Thrips, Onion Thrips	25-Feb-19	28-Feb-24	QLD only (within specified regions only)	Bundaberg Fruit and Vegetable Growers Cooperative
----------	---	-----------	-----------	--	---

Appendix 5. Melons Maximum Residue Limits (MRLs)

CODEX commodity groupings of fruiting vegetables and subgroups:

-	Vegetables (APVMA only)
VC0045	Fruiting vegetables, cucurbits
VC0046	Melons, except watermelon
VC0432	Watermelon

Note: Major export markets for melons include Singapore, New Zealand and the United Arab Emirates. Available information indicates that Singapore defers to Codex where a national MRL is not set. Food exported to New Zealand from Australia may be legally sold if it complies with Australian requirements. Available information indicates that in the absence specific limits in legislation the United Arab Emirates defers to Codex, followed by EU MRL standards or applies a 0.01ppm default value. 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	Singapore MRL mg/kg
Abamectin	VC0045	Fruiting vegetables, cucurbits	0.02	-	
	VC0046	Melons, except watermelon	-	0.01	
Acetamiprid	VC0045	Fruiting vegetables, cucurbits	-	0.2	
Acibenzolar-S-methyl	VC0045	Fruiting vegetables, cucurbits	-	0.8	
Afidopyropen	VC0045	Fruiting vegetables, cucurbits	0.7	-	
Aldrin and Dieldrin	VC0045	Fruiting vegetables, cucurbits	E0.1	E0.1	
Ametoctradin	VC0045	Fruiting vegetables, cucurbits	-	3	
Azinphos-methyl	VC0046	Melons, except watermelon	-	0.2	
	VC0432	Watermelon	-	0.2	
Azoxystrobin	VC0045	Fruiting vegetables, cucurbits	2	1	
Benalaxyl	VC0045	Fruiting vegetables, cucurbits	0.2	-	
	VC0046	Melons, except watermelon	-	0.3	
	VC0432	Watermelon	-	0.1	
Benomyl		Rockmelons			2
Bensulide	VC0045	Fruiting vegetables, cucurbits	*0.1	-	
Benzovindiflupyr	VC0045	Fruiting vegetables, cucurbits	-	0.2	
Bifenazate	VC0045	Fruiting vegetables, cucurbits	1	0.5	
Bifenthrin	VC0045	Fruiting vegetables, cucurbits	0.1	-	
Boscalid	VC0045	Fruiting vegetables, cucurbits	0.5	3	
Bromopropylate	VC0046	Melons, except watermelon	-	0.5	
Bupirimate	VC0045	Fruiting vegetables, cucurbits	1	-	
Buprofezin	VC0045	Fruiting vegetables, cucurbits	T2	0.7	
Captan	VC0046	Melons, except watermelon	-	10	
Carbaryl	VC0045	Fruiting vegetables, cucurbits	*0.01	-	
		Melons			3
Carbendazim		Cucurbits			0.5
		Melon			2
Chlorantraniliprole	VC0045	Fruiting vegetables, cucurbits	0.2	0.3	
Chlordane	VC0045	Fruiting vegetables, cucurbits	E0.05	-	
Chlorothalonil	VC0045	Fruiting vegetables, cucurbits	5	-	
	VC0046	Melons, except watermelon	-	2	
		Melons			7
Chlorpyrifos		Vegetables	T*0.01	-	
Chlorthal-dimethyl		Vegetables	5	-	
Clofentezine	VC0046	Melons, except watermelon	-	0.1	
Clomazone	VC0045	Fruiting vegetables, cucurbits	*0.05	-	

Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg	Singapore MRL mg/kg
Clothianidin	VC0045	Fruiting vegetables, cucurbits	T0.5	*0.02	
Cyantranilprole	VC0045	Fruiting vegetables, cucurbits	0.5	0.3	
Cyazofamid	VC0045	Fruiting vegetables, cucurbits	-	0.09	
Cyflufenamid	VC0045	Fruiting vegetables, cucurbits	0.1	-	
Cyhalothrin (includes lambda-cyhalothrin)	VC0045	Fruiting vegetables, cucurbits	-	0.05	
Cyhexatin		Melons			0.5
Cypermethrin	VC0045	Fruiting vegetables, cucurbits	T0.3	0.07	
Cyprodinil	VC0045	Fruiting vegetables, cucurbits	-	0.5	
	VC0046	Melons, except watermelon	T0.2	-	
Cyromazine	VC0045	Fruiting vegetables, cucurbits	T0.7	-	
	VC0046	Melons, except watermelon	-	0.5	
DDT		Vegetables	E1	-	
Deltamethrin	VC0045	Fruiting vegetables, cucurbits	-	0.2	
		Melons			0.01
Demeton		Melons			0.1
Diazinon		Vegetables	0.7	-	
Dichlobenil	VC0045	Fruiting vegetables, cucurbits	-	*0.01	
Dicofol		Vegetables	5	-	
Difenoconazole	VC0046	Melons, except watermelon	-	0.7	
	VC0432	Watermelon	-	0.02	
Dimethoate	VC0046	Melons, except watermelon	T5	-	
	VC0432	Watermelon	T5	-	
Dimethomorph	VC0045	Fruiting vegetables, cucurbits	0.5	0.5	
Dinocap	VC0045	Fruiting vegetables, cucurbits	-	*0.05	
	VC0046	Melons, except watermelon	-	0.5	
Dinotefuran	VC0045	Fruiting vegetables, cucurbits	-	0.5	
Diquat		Vegetables	*0.05	-	
Dithiocarbamates	VC0045	Fruiting vegetables, cucurbits	2	-	
	VC0046	Melons, except watermelon	-	0.5	
	VC0432	Watermelon	-	1	
2,2-DPA		Vegetables	*0.1	-	
Emamectin benzoate	VC0045	Fruiting vegetables, cucurbits	-	0.007	
Emamectin	VC0045	Fruiting vegetables, cucurbits	0.01	-	
Endrin	VC0045	Fruiting vegetables, cucurbits	-	E0.05	
Endosulfan	VC0046	Melons, except watermelon	-	2	
EPTC		Vegetables	*0.04	-	
Ethoprophos	VC0046	Melons, except watermelon	-	0.02	
Etoxazole	VC0045	Fruiting vegetables, cucurbits	T0.1	-	
Etridiazole		Vegetables	0.2	-	
Fenamidone	VC0045	Fruiting vegetables, cucurbits	-	0.2	
Fenamiphos	VC0046	Melons, except watermelon	-	0.05	
Fenarimol	VC0046	Melons, except watermelon	-	0.05	
Fenbuconazole	VC0046	Melons, except watermelon	-	0.2	
Fenbutatin-oxide		Melons			1
Fenpyroximate	VC0046	Melons, except watermelon	-	0.2	
Fenvalerate		Melons			0.2
		Watermelons			0.5
Flonicamid	VC0045	Fruiting vegetables, cucurbits	0.7	0.2	
Fluazifop-p-butyl	VC0045	Fruiting vegetables, cucurbits	0.1	-	
Flubendiamide	VC0045	Fruiting vegetables, cucurbits	0.2	0.2	

Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg	Singapore MRL mg/kg
Fludioxonil	VC0045	Fruiting vegetables, cucurbits	-	0.5	
	VC0046	Melons, except watermelon	T0.2	-	
Fluensulfone	VC0045	Fruiting vegetables, cucurbits	0.5	-	
	VC0046	Melons, except watermelon	-	0.3	
	VC0432	Watermelon	-	0.3	
Flumioxazin	VC0045	Fruiting vegetables, cucurbits	-	*0.02	
Fluopicolide	VC0045	Fruiting vegetables, cucurbits	0.5	0.5	
Flupyradifurone	VC0046	Melons, except watermelon	-	0.4	
Flutriafol	VC0045	Fruiting vegetables, cucurbits	-	0.3	
Fluxapyroxad	VC0045	Fruiting vegetables, cucurbits	-	0.2	
Folpet	VC0046	Melons, except watermelon	-	3	
		Watermelons			2
Fosetyl-Al	VC0046	Melons, except watermelon	-	60	
Glyphosate	VC0045	Fruiting vegetables, cucurbits	*0.1	-	
Guazatine	VC0046	Melons, except watermelon	10	-	
Heptachlor		Vegetables	E0.05	-	
Hexythiazox		Fruiting vegetables, cucurbits:			
	VC0045	(except watermelon)	-	0.05	
	VC0045	Fruiting vegetables, cucurbits	T0.05	-	
Imazalil	VC0046	Melons, except watermelon	10	Po2	
Imidacloprid	VC0045	Fruiting vegetables, cucurbits	0.2	-	
	VC0046	Melons, except watermelon	-	0.2	
	VC0432	Watermelon	-	0.2	
Indoxacarb	VC0045	Fruiting vegetables, cucurbits	-	0.5	
Inorganic bromide		Vegetables	20	-	
Isopyrazam	VC0046	Melons, except watermelon	-	0.15	
Kresoxim-methyl	VC0045	Fruiting vegetables, cucurbits	0.05	-	
Lindane		Vegetables	E2	-	
Linuron		Vegetables	*0.05	-	
Lufenuron	VC0046	Melons, except watermelon	-	0.4	
Maldison	VC0045	Fruiting vegetables, cucurbits	2	-	
Mandipropamid	VC0046	Melons, except watermelon	-	0.5	
Meptyldinocap	VC0046	Melons, except watermelon	-	0.5	
Metalaxyl	VC0045	Fruiting vegetables, cucurbits	0.2	-	
	VC0046	Melons, except watermelon	-	0.2	
	VC0432	Watermelon	-	0.2	
		Melons			0.2
		Watermelons			0.2
Metaldehyde		Vegetables	1	-	
Methiocarb	VC0046	Melons, except watermelon	-	0.2	
		Vegetables	0.1	-	
Methomyl	VC0045	Fruiting vegetables, cucurbits	0.1	0.1	
Methoxyfenozide		Fruiting vegetables, cucurbits:			
	VC0045	(except watermelon)	-	0.3	
Methyl bromide		Vegetables	T*0.05	-	
Metolachlor	VC0045	Fruiting vegetables, cucurbits	*0.05	-	
Metrafenone	VC0045	Fruiting vegetables, cucurbits	0.2	0.5	
Myclobutanil	VC0045	Fruiting vegetables, cucurbits	-	0.2	
Novaluron	VC0045	Fruiting vegetables, cucurbits	-	0.2	
Omethoate		Vegetables	2	-	
Oxadixyl	VC0045	Fruiting vegetables, cucurbits	0.5	-	

Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg	Singapore MRL mg/kg
Oxamyl	VC0046	Melons, except watermelon	-	0.01	
	VC0432	Watermelon	-	0.01	
		Melons			2
Oxathiapiprolin	VC0045	Fruiting vegetables, cucurbits	0.2	0.2	
Paclobutrazol	VC0045	Fruiting vegetables, cucurbits	T*0.01	-	
Paraquat	VC0045	Fruiting vegetables, cucurbits	-	0.02	
		Vegetables	*0.05	-	
Penconazole	VC0046	Melons, except watermelon	-	0.15	
Penthiopyrad	VC0045	Fruiting vegetables, cucurbits	1	0.5	
Permethrin	VC0046	Melons, except watermelon	-	0.1	
		Melons			0.1
Phosphomidon		Watermelons			0.1
Phosphorous acid	VC0045	Fruiting vegetables, cucurbits	T100	-	
Piperonyl Butoxide	VC0045	Fruiting vegetables, cucurbits	-	1	
		Vegetables	8	-	
Pirimicarb	VC0046	Melons, except watermelon	-	0.2	
		Vegetables	1	-	
Prometryn		Vegetables	*0.1	-	
Propamocarb	VC0045	Fruiting vegetables, cucurbits	5	5	
Propargite		Vegetables	3	-	
Propazine		Vegetables	*0.1	-	
Propineb	VC0045	Fruiting vegetables, cucurbits	2	-	
Proquinazid	VC0045	Fruiting vegetables, cucurbits	0.2	-	
Prothioconazole		Fruiting vegetables, cucurbits:			
	VC0045	(except watermelon)	-	0.2	
Pydiflumetofen	VC0045	Fruiting vegetables, cucurbits	T0.5	-	
Pymetrozine	VC0045	Fruiting vegetables, cucurbits	1	-	
Pyraclostrobin	VC0045	Fruiting vegetables, cucurbits	-	0.5	
Pyrethrins	VC0045	Fruiting vegetables, cucurbits	-	*0.05	
		Vegetables	1	-	
Pyriofenone	VC0045	Fruiting vegetables, cucurbits	0.7	-	
Pyriproxyfen	VC0045	Fruiting vegetables, cucurbits	0.2	-	
Quizalofop-ethyl	VC0046	Melons, except watermelon	*0.02	-	
Quizalofop-P-tefuryl	VC0046	Melons, except watermelon	*0.02	-	
Quinoxifen	VC0046	Melons, except watermelon	-	0.1	
Sethoxydim	VC0045	Fruiting vegetables, cucurbits	*0.1	-	
Spinetoram	VC0045	Fruiting vegetables, cucurbits	0.05	-	
	VC0046	Melons, except watermelon	-	*0.01	
Spinosad	VC0045	Fruiting vegetables, cucurbits	0.2	0.2	
Spiromesifen	VC0046	Melons, except watermelon	-	0.3	
Spirotetramat	VC0045	Fruiting vegetables, cucurbits	-	0.2	
	VC0046	Melons, except watermelon	0.5	-	
	VC0432	Watermelon	0.5	-	
Sulfoxaflor	VC0045	Fruiting vegetables, cucurbits	0.5	0.5	
Tebuconazole	VC0046	Melons, except watermelon	-	0.15	
Teflubenzuron	VC0046	Melons, except watermelon	-	0.3	
Thiacloprid	VC0046	Melons, except watermelon	-	0.2	
	VC0432	Watermelon	-	0.2	
Thiamethoxam	VC0045	Fruiting vegetables, cucurbits	T1	0.5	
Triadimefon		Fruiting vegetables, cucurbits:			
	VC0045	(based on triadimenol use only)	-	0.2	
	VC0045	Fruiting vegetables, cucurbits	0.2	-	

Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg	Singapore MRL mg/kg
Triadimefora [sic]		Melons			0.5
Triadimenol	VC0045	Fruiting vegetables, cucurbits	0.5	0.2	
Trichlorfon		Vegetables	0.1	-	
Trifloxystrobin	VC0045	Fruiting vegetables, cucurbits	-	0.3	
Trifluralin		Vegetables	0.05	-	
Zoxamide	VC0045	Fruiting vegetables, cucurbits	-	2	

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

NOTE: In the groups "fruiting vegetables, cucurbits" and "vegetables" listed above, only the melon exclusions (if any) from these groups are specified.

* Indicates that an MRL is at or about the Limit of Quantitation (LOQ)

T = Temporary MRL

E = The MRL is based on extraneous residues

Po = The MRL accommodates post-harvest treatment of the commodity

Sources: APVMA MRLs: Agricultural and Veterinary Chemicals Code Instrument No. 4 (MRL Standard) 2012. Compilation 72. Prepared 31 January 2019. CODEX MRLs: In addition to the online CODEX database, meeting reports were used to update recent changes (to February 2019). Singapore MRLs: Sale of Food Act (Chapter 283, Section 56(1)) – Food Regulations. Informal consolidation – version in force from 1/2/2019.

Appendix 6: Melon regulatory risk assessment

(This document was prepared as part of the Hort Innovation funded project MT17019 – Regulatory Support & Co-ordination.)

Melon Agrichemical regulatory risk assessment

February 2019

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 require the generation of new data. A consequence of which can be that many of these chemicals 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 farm chemicals 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 prohibiting the use in the exporting country to ensure compliance, as breaches of MRLs would adversely affect market access.

The effects of the above are greater pressure placed on the availability and use of individual chemicals 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 melons as well as current initiatives aimed at addressing identified pest management deficiencies.

Melon 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

Problem	Active Constituents	Chemical Group	Comment	Activities
Insect and mite pests				
Ants	canola oil +pyrethrins	3A		
	chlorpyrifos	1B	Currently under review by the APVMA & outcome uncertain. Ongoing issues internationally	
Aphids				
Aphids	canola oil +pyrethrins	3A		Syngenta have applied for registration of Minecto Forte (Diafenthiuron + cyantraniliprole)
	dimethoate	1B	To be reviewed by JMPR/Codex 2019/20. Europe – Proposing to drop all MRLs to <0.01 mg/kg.	
	maldison	1B		
	petroleum oil	UN		
	pirimicarb	1A	JMPR Periodic re-evaluation 2020	
Cabbage aphid	afidopyropen	9D		
Cotton aphid	afidopyropen	9D		
	cyantraniliprole	28		
	flonicamid	29		
	pymetrozine	9B	EU- Failed re-evaluation. Being phased out Codex – No registrant support	
	spirotetramat	23		
	sulfoxaflor	4C		
Cowpea aphid	pymetrozine	9B	EU- Failed re-evaluation. Being phased out Codex – No registrant support	
Currant lettuce aphid	afidopyropen	9D		

Problem	Active Constituents	Chemical Group	Comment	Activities
Green peach aphid	afidopyropen	9D		
	Flonicamid	29		
	imidacloprid	4A	Canada – Proposed phase-out EU – Removal of all field uses	
	pymetrozine	9B	EU- Failed re-evaluation. Being phased out Codex – No registrant support	
	spirotetramat	23		
	sulfoxaflor	4C		
Potato aphid	pymetrozine	9B	EU- Failed re-evaluation. Being phased out Codex – No registrant support	
Beetles				
Leaf eating ladybirds	carbaryl	1A	Canada – Re-evaluation recently completed; continued use considered acceptable Europe – deregistered	
Pumpkin beetle	carbaryl	1A	Canada – Review recently completed; continued use considered acceptable Europe – deregistered	
	maldison	1B		
	carbaryl	1A	Canada – Re-evaluation recently completed; continued use considered acceptable Europe – deregistered	
	maldison	1B		
28-spotted potato ladybird	carbaryl	1A	Canada – Re-evaluation recently completed; continued use considered acceptable Europe – deregistered	
	maldison	1B		
Lepidoptera				
Armyworms	carbaryl	1A	Canada – Re-evaluation recently completed; continued use considered acceptable Europe – deregistered	

Problem	Active Constituents	Chemical Group	Comment	Activities
Budworms (Heliothis)	beta-cyfluthrin	3A		
	carbaryl	1A	Canada – Re-evaluation recently completed; continued use considered acceptable Europe – deregistered	
	emamectin as benzoate	6		
	flubendiamide	28		
	methomyl	1A	APVMA – nominated for review Canada – Re-evaluation completed (2018). Majority of uses removed	
	spinetoram	5		
Cabbage white butterfly	canola oil +pyrethrins	3A		
Caterpillars	bifenthrin	3A		
	canola oil +pyrethrins	3A		
	diazinon	1B	JMPR Periodic re-evaluation 2020	
	spinetoram	5		
Cluster caterpillar	emamectin as benzoate	6		
	flubendiamide	28		
	methomyl	1A	APVMA – nominated for review Canada – Re-evaluation completed (2018). Majority of uses removed	
Corn earworm	bifenthrin	3A		
	Helicoverpa NPV (armigera)	UN		
	Helicoverpa NPV (zea)	UN		
Cotton bollworm	chlorantraniliprole	28		
	cyantraniliprole	28		

Problem	Active Constituents	Chemical Group	Comment	Activities
Cucumber moth	beta-cyfluthrin	3A		
	bifenthrin	3A		
	chlorantraniliprole	28		
	cyantraniliprole	28		
	emamectin as benzoate	6		
	methomyl	1A	APVMA – nominated for review Canada – Re-evaluation completed (2018). Majority of uses removed	
	spinetoram	5		
Cucurbit stem borer	carbaryl	1A	Canada – Re-evaluation recently completed; continued use considered acceptable Europe – deregistered	
Cutworms	carbaryl	1A	Canada – Re-evaluation recently completed; continued use considered acceptable Europe – deregistered	
	diazinon	1B	JMPR Periodic re-evaluation 2020	
	trichlorfon	1B	APVMA – nominated for review Codex – No MRLs Europe – deregistered US – No MRLs	
Diamondback (Cabbage) moth	canola oil +pyrethrins	3A		
Loopers	methomyl	1A	APVMA – nominated for review Canada – Re-evaluation completed (2018). Majority of uses removed	
Moths	bifenthrin	3A		
Native budworm	bifenthrin	3A		
	chlorantraniliprole	28		
	cyantraniliprole	28		
	emamectin as benzoate	6		
	Helicoverpa NPV	UN		
	petroleum oil +sugar/s	UN		

Problem	Active Constituents	Chemical Group	Comment	Activities
Potato moth (Leafminer)	carbaryl	1A	Canada – Re-evaluation recently completed; continued use considered acceptable Europe – deregistered	
Tomato grub	emamectin as benzoate	6		
Webworms	methomyl	1A	APVMA – nominated for review Canada – Re-evaluation completed (2018). Majority of uses removed	
Fruit fly				
Banana fruit fly	dimethoate	1B	To be reviewed by JMPR/Codex 2019/20. Europe – Proposing to drop all MRLs to <0.01 mg/kg.	
Cucumber fly	alpha-cypermethrin	3A		
	Clothianidin (PER80101)	4A	Canada – Proposing to cancel all outdoor uses. EU – Removal of all field uses	
	dimethoate	1B	To be reviewed by JMPR/Codex 2019/20. Europe – Proposing to drop all MRLs to <0.01 mg/kg.	
Flies	canola oil +pyrethrins	3A		
Lesser Queensland fruit fly	dimethoate	1B	To be reviewed by JMPR/Codex 2019/20. Europe – Proposing to drop all MRLs to <0.01 mg/kg.	
Mango fly	dimethoate	1B	To be reviewed by JMPR/Codex 2019/20. Europe – Proposing to drop all MRLs to <0.01 mg/kg.	
Mediterranean fruit fly	dimethoate	1B	To be reviewed by JMPR/Codex 2019/20. Europe – Proposing to drop all MRLs to <0.01 mg/kg.	
Queensland fruit fly	dimethoate	1B	To be reviewed by JMPR/Codex 2019/20. Europe – Proposing to drop all MRLs to <0.01 mg/kg.	
Grasshoppers/Locusts				
Australian plague locust	chlorpyrifos	1B	Currently under review by the APVMA & outcome uncertain. Ongoing issues internationally	
	maldison	1B		
Field crickets	chlorpyrifos	1B	Currently under review by the APVMA & outcome uncertain. Ongoing issues internationally	
Migratory locust	chlorpyrifos	1B	Currently under review by the APVMA & outcome uncertain. Ongoing issues internationally	
	maldison	1B		

Problem	Active Constituents	Chemical Group	Comment	Activities
Mole crickets	chlorpyrifos	1B	Currently under review by the APVMA & outcome uncertain. Ongoing issues internationally	
Spur-throated locust	chlorpyrifos	1B	Currently under review by the APVMA & outcome uncertain. Ongoing issues internationally	
	maldison	1B		
Wingless grasshopper	carbaryl	1A	Canada – Re-evaluation recently completed, continued use considered acceptable Europe – deregistered	
	dimethoate	1B	To be reviewed by JMPR/Codex 2019/20. Europe – Proposing to drop all MRLs to <0.01 mg/kg.	
Jassids/Plant bugs				
Brown marmorated stink bug	bifenthrin	3A		
Green vegetable bug	carbaryl	1A	Canada – Re-evaluation recently completed, continued use considered acceptable Europe – deregistered	
	dimethoate	1B	To be reviewed by JMPR/Codex 2019/20. Europe – Proposing to drop all MRLs to <0.01 mg/kg.	
	maldison	1B		
Jassids	dimethoate	1B	To be reviewed by JMPR/Codex 2019/20. Europe – Proposing to drop all MRLs to <0.01 mg/kg.	
	maldison	1B		
Leafhoppers	canola oil +pyrethrins	3A		
	dimethoate	1B	To be reviewed by JMPR/Codex 2019/20. Europe – Proposing to drop all MRLs to <0.01 mg/kg.	
	maldison	1B		
	petroleum oil	UN		
Rutherglen bug	carbaryl	1A	Canada – Re-evaluation recently completed, continued use considered acceptable Europe – deregistered	
	maldison	1B		
	methomyl	1A	APVMA – nominated for review Canada – Re-evaluation completed (2018). Majority of uses removed	

Problem	Active Constituents	Chemical Group	Comment	Activities
Yellow spotted stink bug	bifenthrin	3A		
Mealybug/Scale				
Mealybugs	canola oil +pyrethrins	3A		
	chlorpyrifos	1B	Currently under review by the APVMA & outcome uncertain. Ongoing issues internationally	
Scale insects	canola oil +pyrethrins	3A		
Mites				
Broad mite	hexythiazox	10A		
Bryobia mite	bifenazate	20		
Mites	bifenthrin	3A		
	dimethoate	1B	To be reviewed by JMPR/Codex 2019/20. Europe – Proposing to drop all MRLs to <0.01 mg/kg.	
	petroleum oil	UN		
Redlegged earth mite	maldison	1B		
Tomato russet mite	hexythiazox	10A	No Codex MRLs	
Two-spotted (Red spider) mite	bifenazate	20		Syngenta have applied for registration of Minecto Forte (Diafenthiuron + cyantraniliprole)
	canola oil +pyrethrins	3A		
	Etoxazole (PER14650)	10B		
	hexythiazox	10A	No Codex MRLs	
Nematodes				
Root-knot nematodes	abamectin	6		
	fluensulfone			

Problem	Active Constituents	Chemical Group	Comment	Activities
Thrips				
Thrips	canola oil +pyrethrins	3A		
	diazinon	1B	JMPR Periodic re-evaluation 2020	
	dimethoate	1B	To be reviewed by JMPR/Codex 2019/20. Europe – Proposing to drop all MRLs to <0.01 mg/kg.	
	methomyl	1A	APVMA – nominated for review Canada – Re-evaluation completed (2018). Majority of uses removed	
	petroleum oil	UN		
Western flower thrips	cyantraniliprole	28		
	methomyl	1A	APVMA – nominated for review Canada – Re-evaluation completed (2018). Majority of uses removed	
Western flower thrips	spinetoram	5		
White fly				
Cotton (Sweet Potato) whitefly	buprofezin	16		
Greenhouse whitefly	buprofezin	16		
	petroleum oil	UN		
	pymetrozine	9B	EU- Failed re-evaluation. Being phased out Codex – No registrant support	
	pyriproxyfen	7C	EU – Authorisation renewal process underway	
	sulfoxaflor	4C		
Silverleaf (Poinsettia) whitefly	afidopyropen	9D		
	bifenthrin	3A		
	flonicamid	29		
	imidacloprid	4A	Canada – Proposed phase-out EU – Removal of all field uses	
	pyriproxyfen	7C	EU – Authorisation renewal process underway	
	spirotetramat	23		

Problem	Active Constituents	Chemical Group	Comment	Activities
Silverleaf whiteflies	buprofezin	16		
	cyantranilprole	28		
	imidacloprid	4A	Canada – Proposed phase-out EU – Removal of all field uses	
	petroleum oil	UN		
	pymetrozine	9B	EU- Failed re-evaluation. Being phased out Codex – No registrant support	
Whiteflies	bifenthrin	3A		
	chlorpyrifos	1B	Currently under review by the APVMA & outcome uncertain. Ongoing issues internationally	
Whitefly	canola oil +pyrethrins	3A		
Other				
European earwig	carbaryl	1A	Canada – Review recently completed, continued use considered acceptable Europe – deregistered	
Pear and cherry slug	imidacloprid	4A	Canada – Proposed phase-out EU – Removal of all field uses	
Vegetable leafminer	abamectin	6		
DISEASES				
Alternaria fruit rot	guazatine acetate	M7	Codex – No MRLs Europe - Deregistered	
	imazalil	3	European review – data gaps identified. Withdrawal of EU MRL likely	

Problem	Active Constituents	Chemical Group	Comment	Activities
Alternaria leaf blight	benalaxyl	4		
	chlorothalonil	M5	APVMA - Nominated for review Canada – Review recently completed, continued use considered acceptable Europe - Deregistration proposed.	
	dimethomorph	40		
	mancozeb	M3	APVMA - Nominated for review Canada – Proposed cancelling of all uses Codex - To be reviewed 2020/21	
	metalaxyl	4		
	metalaxyl-M	4		
Angular leaf spot	Copper	M1		
Anthracnose	benalaxyl	4		
	chlorothalonil	M5	APVMA - Nominated for review Canada – Review recently completed, continued use considered acceptable Europe - Deregistration proposed.	
	Copper	M1		
	dimethomorph	40		
	mancozeb	M3	APVMA - Nominated for review Canada – Proposed cancelling of all uses Codex - To be reviewed 2020/21	
	metalaxyl	4		
	metalaxyl-M	4		
	oxadixyl	4		
	propineb	M3	APVMA - Nominated for review Codex - To be reviewed 2020/21 Europe - Deregistered	
	sulfur	M2		
	zineb	M3	APVMA - Nominated for review Canada – Proposed cancelling of foliar uses Codex - To be reviewed 2020/21 Europe - Deregistered	

Problem	Active Constituents	Chemical Group	Comment	Activities
Bacterial spot	Copper	M1		
Bactericide	iodine	M		
Damping off	metalaxyl	4		
	metalaxyl-M	4		

Problem	Active Constituents	Chemical Group	Comment	Activities
Downy mildew	azoxystrobin	11	Canada – Re-evaluation process underway. Outcome due November 2019	Data generation project initiated to support registration of ametoctradin + dimethomorph
	benalaxyl	4		
	chlorothalonil	M5	APVMA - Nominated for review Canada – Review recently completed, continued use considered acceptable Europe - Deregistration proposed.	
	Copper	M1		
	dimethomorph	40		
	fluopicolide	43		
	mancozeb	M3	APVMA - Nominated for review Canada – Proposed cancelling of all uses Codex - To be reviewed 2020/21	
	metalaxyl	4		
	metalaxyl-M	4		
	metiram	M3	APVMA - Nominated for review Canada – Proposed cancelling of foliar uses Codex - To be reviewed 2020/21	
	oxadixyl	4		
	oxathiapiprolin	49		
	phosphorous acid	33		
	propamocarb HCl	28		
	propineb	M3	APVMA - Nominated for review Codex - To be reviewed 2020/21 Europe - Deregistered	
sulfur	M2			
zineb	M3	APVMA - Nominated for review Canada – Proposed cancelling of foliar uses Codex - To be reviewed 2020/21 Europe - Deregistered		

Problem	Active Constituents	Chemical Group	Comment	Activities
Fungal diseases - Rhizoctonia	cyanogen (ethanedinitrile)	-		
Fungi	iodine	M		
Fungal diseases - Fusarium	cyanogen (ethanedinitrile)	-		
Fusarium fruit rot	guazatine acetate	M7	Codex – No MRLs Europe - Deregistered	
	imazalil	3		
Fusarium wilt	cyanogen (ethanedinitrile)	-		
Geotrichum fruit rot (Sour rot)	guazatine acetate	M7		
	imazalil as sulfate	3		
Grey mould	penthiopyrad	7		
Gummy stem blight	azoxystrobin	11	Canada – Re-evaluation process underway. Outcome due November 2019	
	benalaxyl	4		
	chlorothalonil	M5	APVMA - Nominated for review Canada – Review recently completed, continued use considered acceptable Europe - Deregistration proposed.	
	Copper	M1		
	dimethomorph	40		
	mancozeb	M3	APVMA - Nominated for review Canada – Proposed cancelling of all uses Codex - To be reviewed 2020/21	
	metalaxyl	4		
	metalaxyl-M	4		
	metiram	M3	APVMA - Nominated for review Canada – Proposed cancelling of foliar uses Codex - To be reviewed 2020/21	
	oxadixyl	4		
	penthiopyrad	7		
	propineb	M3	APVMA - Nominated for review Codex - To be reviewed 2020/21 Europe - Deregistered	
	sulfur	M2		

Problem	Active Constituents	Chemical Group	Comment	Activities
Late (Irish) blight	Copper	M1		
Leaf diseases/spots	Copper	M1		
Phytophthora soil fungus (Dieback)	metalaxyl	4		
Phytophthora trunk/collar rot	cyanogen (ethanedinitrile)	-		
Pink mould rot	guazatine acetate	M7		
	imazalil as sulfate	3		
Powdery mildew	azoxystrobin	11	Canada – Re-evaluation process underway. Outcome due November 2019	
	boscalid	7		
	Bupirimate (PER14840)	8		
	chlorothalonil	M5	APVMA - Nominated for review Canada – Review recently completed, continued use considered acceptable Europe - Deregistration proposed.	
	Copper	M1		
	cyflufenamid	U6		
	hydrogen peroxide +peroxyacetic acid	M		
	kresoxim-methyl	7	Canada – Re-evaluation process underway. Outcome due April 2019 Codex – JMPR re-evaluation completed	
	mancozeb	M3	APVMA - Nominated for review Canada – Proposed cancelling of all uses Codex - To be reviewed 2020/21	
	metrafenone	U8		
	penthiopyrad	7		
	proquinazid	13		
	pyriofenone	U8		
	Streptomyces lydicus	-		
	triadimefon	3	APVMA - Nominated for review Europe - Deregistered	
triadimenol	3	APVMA - Nominated for review		
Pythium diseases - soil borne	cyanogen (ethanedinitrile)	-		

Problem	Active Constituents	Chemical Group	Comment	Activities
Rhizoctonia ground rot	chlorothalonil	M5	APVMA - Nominated for review Canada – Review recently completed, continued use considered acceptable Europe - Deregistration proposed.	
Rhizoctonia rot	cyanogen (ethanedinitrile)	-		
Rhizopus rot	guazatine acetate	M7		
Root and collar rot	cyanogen (ethanedinitrile)	-		
Rust	Copper	M1		
	sulfur	M2		
Sclerotium crown rot	cyanogen (ethanedinitrile)	-		
Septoria leaf spot	Copper	M1		
	dimethomorph	40		
	mancozeb	M3	APVMA - Nominated for review Canada – Proposed cancelling of all uses Codex - To be reviewed 2020/21	
	sulfur	M2		
Spot blotch	cyanogen (ethanedinitrile)	-		
Target leafspot	chlorothalonil	M5	APVMA - Nominated for review Canada – Review recently completed, continued use considered acceptable Europe - Deregistration proposed.	
Target spot (Early blight)	Copper	M1		
	sulfur	M2		
WEEDS				
Broadleaf weeds and grasses	clomazone	Q		
	fluzifop-P	A		
	quizalofop-P	A	Canada – Under re-evaluation - proposed completion June 2019. EU – Candidate for substitution	
	sethoxydim	A		