



Pumpkin

Strategic Agrichemical Review Process
(SARP)

June 2021

Hort Innovation
Project - VG18004

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VG18004 – Vegetable Strategic Agrichemical Review Process (SARP) Report Updates

SARP Service Provider:

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Purpose of the report:

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

Date of report:

June 2021

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**Hort
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Strategic levy investment

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1. Summary

The strategic levy investment project Vegetable Industry SARP Report Updates (VG18004) is part of the Hort Innovation Vegetable 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 Pumpkin 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 disease is:

Common name	Scientific name
Powdery Mildew	<i>Podosphaera xanthii</i>

1.2 Insects and Mites

The high priority insects and mites are:

Common name	Scientific name
Green Peach Aphid	<i>Myzus persicae</i>
Cabbage Aphid	<i>Brevicoryne brassicae</i>
Currant Lettuce Aphid	<i>Nasonovia ribis-nigri</i>
Melon Aphid	<i>Aphis gossypii</i>
Silverleaf Whitefly	<i>Bemisia tabaci Biotype B</i>

1.3 Weeds

The high priority weeds are:

Common Name	Scientific Name
Nutgrass	<i>Cyperus rotundus</i>
Blackberry Nightshade	<i>Solanum nigrum</i>
Fat Hen	<i>Chenopodium album</i>

2. The Australian Pumpkin Industry

The Australian Pumpkin industry is a minor horticultural industry.

The majority of pumpkins are field grown in the warmer states. Major production areas include the Murrumbidgee region in New South Wales; Bundaberg and the Darling Downs region in Queensland; and the Northern region of Victoria.

Production¹ for the year ending in June 2020 was 116,071 tonnes with a value of \$107.0m. Ninety-four percent was sold to the fresh market, three percent was used for processing and three percent was exported.

Australia is a net exporter of pumpkins. For the year ending in June 2020, Australia exported 3,256 tonnes of fresh pumpkins, the majority of which was sent to Singapore (79%), Japan (8%), Malaysia (5%), Hong Kong (4%) and Brunei (1%).

Fresh Pumpkin Seasonality by State

State	19/20 t	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
New South Wales (28%)	32,737	High	High	High	High	Medium	Medium	Low	Low	Low	Low	Low	None
Victoria (4%)	4,109	High	High	High	High	Medium	Medium	Low	Low	Low	Low	Low	None
Queensland (47%)	55,494	High	High	High	High	Medium	Medium	Low	Low	Low	Low	Low	None
Western Australia (17%)	20,359	High	High	High	High	Medium	Medium	Low	Low	Low	Low	Low	None
South Australia (2%)	2,349	High	High	High	High	Medium	Medium	Low	Low	Low	Low	Low	None
Tasmania (<1%)	552	High	High	High	High	Medium	Medium	Low	Low	Low	Low	Low	None
Northern Territory (2%)	2,268	High	High	High	High	Medium	Medium	Low	Low	Low	Low	Low	None
Availability legend		High	High	High	High	Medium	Medium	Low	Low	Low	Low	Low	None

Due to Australia's varying weather conditions and the diversity in varieties of Pumpkins, the Australian industry is now able to supply domestic markets with fresh Pumpkins throughout the year.

Fresh Pumpkins Seasonality by Variety

Variety	19/20 t	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Jap/Kent	57,134	High	High	High	High	Medium	Medium	Low	Low	Low	Low	Low	None
Butternut	35,423	High	High	High	High	Medium	Medium	Low	Low	Low	Low	Low	None
Grey	19,426	High	High	High	High	Medium	Medium	Low	Low	Low	Low	Low	None
Processing	3,599	High	High	High	High	Medium	Medium	Low	Low	Low	Low	Low	None
Other	2,285	High	High	High	High	Medium	Medium	Low	Low	Low	Low	Low	None
Availability legend		High	High	High	High	Medium	Medium	Low	Low	Low	Low	Low	None

¹ Hort Innovation (2020). Australian Horticulture Statistics Handbook 2019/20. [online] Available at: <https://www.horticulture.com.au/globalassets/hort-innovation/resource-assets/ha18002-australian-horticulture-statistics-handbook-2019-20-vegetables.pdf>

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 Pumpkin 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 Pumpkin 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 Pumpkin 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 Pumpkin 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 Pumpkins 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 Vegetable Industry in consultation with industry, government and scientists. The Biosecurity Plan² for the Vegetable Industry which covers Pumpkin 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.

² <https://ausveg.com.au/app/uploads/2018/06/Industry-Biosecurity-Plan-for-the-Vegetable-Industry.pdf>

3.2 Minor use permits and registration

From a pesticide access perspective, the APVMA classifies Pumpkin as a major crop. The crop fits within the APVMA crop group 011: Fruiting vegetables, Cucurbits within the subgroup 011B: Melons, Pumpkins and Winter Squash.

Therefore, access to minor use permits can be difficult and permit requests need to be in accordance to the APVMA's minor use guidance³.

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

³ <https://apvma.gov.au/node/10931>

3.3 Methods

The current update of the Pumpkin Strategic Agrichemical Review Process (SARP), which was last updated in 2014, was conducted by desktop audit using industry information gathered during 2011-2014 under MT10029 – Managing pesticide access in horticulture and finalised under VG12081 - Review of vegetable SARP reports. The process included gathering, collating and confirming information:

Hort Innovation Project Reference	Process of Review - Activity
VG16060 - Vegetable Agrichemical Pest Management Needs and Priorities (AUSVEG) - Commenced: 2 May 2017	<p>Engagement and consultation with growers and other relevant stakeholders. Including; Online crop specific surveys, workshops and one on one consultation Nationally.</p> <p>Collation of information collected by commodity on applicable pests, diseases and weeds in order of priority.</p>
MT17019 – Regulatory Support & Co-ordination (AKC)	<p>Pumpkin Agrichemical Regulatory Risk Assessment Document</p> <p>To assist strategic planning, with respect to future pest management options, this document was developed as part of the Hort Innovation funded project MT17019 to highlight the regulatory threats to agrichemicals currently approved for the management of the pests and diseases in Pumpkin as well as current initiatives aimed at addressing identified pest management deficiencies.</p>
VG18004 – Vegetable Strategic Agrichemical Review Process (SARP) Report Updates	<p>SARP updated via a desktop audit:</p> <p>Review list of priorities ranked as high, moderate and low for each plant pest groups (disease, insects and weeds) – provided by VG16060</p> <p>Identify industries pest priority gaps in order of importance</p> <p>Update current pesticides available via label registrations or minor use permits</p> <p>Update available pesticide use patterns, IPM ranking/compatibility, mode of action and chemical group.</p> <p>Identify pesticides at risk (under review and/or limited uses) via MT17019 Regulatory Support & Co-ordination – AKC consulting.</p> <p>Identify any appropriate solutions through the outcomes of the AgChem Forum’s or similar market intelligence and their overall suitability (IPM compatibility, Chemical group to manage resistance, risk profile, existing domestic MRL’s or global MRL’s including any potential trade barriers, efficacy, OH&S, environmental safety and sustainability).</p> <p>Include known pesticide solutions that are currently under development with registrants for new uses in the nominated crops or in current Hort Innovation projects.</p> <p>Update MRL tables to include Australian MRL’s, Codex and any applicable export market MRL’s</p>

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 pumpkin
- Appendix 2. Products available for control of insects and mites in pumpkin
- Appendix 3. Products available for weed control in pumpkin
- Appendix 4. Current permits for use in pumpkin
- Appendix 5. Pumpkin Maximum Residue Limits (MRLs)
- Appendix 6. Pumpkin Agrichemical Regulatory Risk Assessment

4. Diseases, Pests and Weeds of Pumpkin

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 website⁴.

In chapter 4, information on regulatory risk derived from project MT17019 - Regulatory support and coordination (Appendix 6) 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 <https://www.croplife.org.au/resources/programs/resistance-management/>

4.1 Diseases of pumpkin

4.1.1 Disease priorities

Common name	Scientific name
High	
Powdery Mildew	<i>Podosphaera xanthii</i>
Moderate	
Viruses	Papaya Ringspot Virus Zucchini Yellow Mosaic Virus Watermelon Mosaic Virus
Bacterial Leaf Spot	<i>Xanthomonas campestris</i>
Downy Mildew	<i>Pseudoperonospora cubensis</i>
Gummy Stem Blight	<i>Didymella bryoniae</i>
Scab	<i>Cladosporium</i> spp.
Low	
Brown or Surface Etch	<i>Fusarium</i> spp.
Fusarium Foot Rot	<i>Fusarium solani</i>
Alternaria Leaf Blight	<i>Alternaria cucumerina</i>
Anthraco nose	<i>Colletotrichum orbiculare</i>
Grey Mould	<i>Botrytis cinerea</i>
Rhizoctonia Ground Rot	<i>Rhizoctonia solani</i>
Septoria Spot	<i>Septoria cucurbitacearum</i>
Target Leaf Spot	<i>Cercospora citrulline</i>

The most important disease issue based on the feedback received was Powdery Mildew. Available and potential products for this disease are in Section 4.1.2.

Some of the fungal and bacterial diseases that have received moderate to low priority have few options to suppress or control but should be supplemented by management practices that would increase airflow and minimise moisture in the plant canopy. Soil fumigation also helps in preventing some diseases.

Viruses are transmitted by several aphid species in a non-persistent manner. A key aspect of virus disease management is to accurately identify the virus causing the disease and then implement appropriate management strategies.

Management methods that promote clean seeds and transplant material, early detection and disposal of infected seedlings would keep most of these diseases in check whilst eliminating alternative hosts, crop rotation, cover crops, bio fumigation and farm hygiene are also important to prevent spread of these between sites. Taking precautions to prevent spread of disease from nursery to field would also help in this effort.

Resistance Management

Powdery Mildew and Downy 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.

There are several disease strategies that apply to cucurbits on the CropLife website⁵, including Powdery Mildew and Downy Mildew.

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

4.1.2 Available and potential products for priority diseases

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

Availability		Regulatory risk (refer to Appendix 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
Powdery Mildew (<i>Podosphaera xanthii</i>)							
Priority: High							
Powdery Mildew was ranked as a high priority in QLD & NSW and as a moderate priority in WA. Powdery Mildew causes a characteristic white, powdery growth on infected plants. Photosynthetic efficiency is reduced in affected leaves and fruit can be scarred and damaged, causing produce to be downgraded. Severe outbreaks can cause defoliation, exposing fruit to sunburn and predisposing them to secondary rots.							
Azoxystrobin (Amistar)	11	Protectant & curative	1	A	ALL	Registered in cucurbits for the control of Powdery Mildew , Downy Mildew and Gummy Stem Blight. Commence soon after transplanting and continue till fruit maturity. [Max. no. of applications not specified; 2 sequential applications; re-treatment interval: 7 - 14 d]	-
Azoxystrobin + Oxathiapiprolin (Orondis Flexi) Syngenta	11+49	Protective & curative	3 NG	A	ALL	Registered in cucurbits for the control of Downy Mildew and suppression of Powdery Mildew , Gummy Stem Blight and <i>Sclerotinia</i> spp. [Max. 2 applications per crop; re-treatment interval: 7 - 14 d]	-
Boscalid + Kresoxim-Methyl (Colliss) BASF	7+11	Protectant & curative	7	A	ALL	Registered in cucurbits for control of Powdery Mildew . [Max. 2 applications per crop; re-treatment interval: 7 - 10 d]	-
Bupirimate (Nimrod)	8	Protectant & curative	1	A	ALL	Registered in cucurbits including pumpkins, cucumber & zucchini for control of Powdery Mildew . [Max. 4 applications per crop; re-treatment interval: 7 d]	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Copper Octanoate	M1	Protectant	1	A	ALL	Registered in cucurbits for control of Powdery Mildew and Downy Mildew. [Max. no. of applications not specified; re-treatment interval: 7-10 d]	-
Cyflufenamid (Flute) AgNova	U6	Protectant & curative	1	A	ALL	Registered in cucurbits for control of Powdery Mildew . Begin application at first sign of disease. [Max. 2 applications per crop; re-treatment interval: 7 - 10 d]	-
Hydrogen Peroxide + Peroxyacetic Acid (Peratec Plus)	M	Protectant	1	A	ALL	Registered in cucurbits including pumpkin for control of Powdery Mildew (<i>Sphaerotheca</i> spp.). [Max. 4 applications per crop; re-treatment interval: 5-7 d]	-
Metrafenone (Vivando) BASF	U8	Protectant	7	A	ALL	Registered in cucurbits for control of Powdery Mildew . [Max. 4 applications per crop; 2 sequential applications; re-treatment interval: 7-10 d]	-
Penthiopyrad (Fontelis) Corteva	7	Protectant	1	A	ALL	Registered in cucurbits including pumpkin (field and protected) for control of Botrytis Grey Mould, Powdery Mildew , and Gummy Stem Blight. [Max. no. of applications not specified; 2 sequential applications; re-treatment interval: 7 – 14 d]	-
Proquinazid (Talendo) Corteva	13	Protectant	1	A	ALL	Registered in cucurbits (field grown only) for control of Powdery Mildew . [Max. 3 applications per crop; 2 sequential applications; re-treatment interval: 10-14 d]	-
Pyriofenone (Kusabi) AgNova	50	Protectant & Curative	NR	A	ALL	Registered in cucurbits (field) for control of Powdery Mildew . [Max. 3 applications per crop; re-treatment interval: 7-10 d].	-
<i>Streptomyces lydicus</i> (Actinovate)	BM 02	Biological	NR	A	ALL	Registered in cucurbits for suppression of Powdery Mildew . [Max no of applications and re-treatment intervals not specified]	-
Sulphur	M2	Protectant	NR	A	ALL	Registered in vegetables (field & protected) for control of Powdery Mildew and Rust. [Max no of applications not specified; re-treatment interval 14-21 d]	-
Tea Tree Oil (Timorex)	46	Protectant	NR	A	ALL	Registered in cucurbits for control of Powdery Mildew . [Max. no. of applications not specified; re-treatment interval: 7-10 d]	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Triadimefon	3	Protectant & curative	1	A	NSW & WA	Registered in cucurbits for control of Powdery Mildew . [Max. no. of applications not specified; re-treatment interval: 5-10 d]	R3
Triadimenol (Bayfidan)	3	Protectant & curative	1	A	ALL	Registered in cucurbits for control of Powdery Mildew . [Max. 4 applications per crop; re-treatment interval: 5-10 d]	R3
ADM1700F Adama	TBC			P		Fungicide in development from Adama with Powdery Mildew activity	-
<i>Bacillus amyloliquefaciens</i> (Serenade Opti) Bayer	BM 02	Biological	NR	P		Registered for suppression of Bacterial Spot in capsicum, chilli and tomato, Anthracnose and Stem End Rot in avocado and mango, and Botrytis in grapevines and strawberries. Permitted for control of Powdery Mildew in eggplant. US registration for control of Powdery Mildew in cucurbits, grapes, pome fruit, stone fruit and strawberries.	-
<i>Bacillus amyloliquefaciens strain MBI 600</i> (Serifel) BASF	BM 02	Biological	NR	P		Registered for control of Botrytis in grapevines and strawberries. Permitted for suppression of Powdery Mildew in nursery stock. US registration for control of Powdery Mildew in artichoke, berries, brassica leafy vegetables, bulb vegetables, cucurbits, fruiting vegetables, grapes, hops, leafy vegetables, legume vegetables, pome fruit, stone fruit, sugar beet and tobacco.	-
BLAD (ProBlad Plus)	BM 01	Biological	NR	P		Registered for control of Brown Rot and Blossom Blight in stone fruit. US registration for control of Powdery Mildew in cucurbits, fruiting vegetables, grapes, hops, pome fruit and strawberries.	-
Florylpicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New active in development from Corteva with activity on Septoria, Powdery Mildew , Botrytis, Anthracnose, Alternaria, Scab, Monilinia, Rust and <i>Mycosphaerella</i> spp. Scheduled for JMPR evaluation in 2023.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of Powdery Mildew in almond, Brassica leafy vegetables, cucurbits, grapes, hops, dry and succulent beans, stone fruit and sunflower.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative		P		Registered for control of Powdery Mildew in apples. US registration for control of Powdery Mildew in artichoke, almond, low growing berry except cranberry, Brassica vegetables, Brassica leafy vegetables, carrot cherry, dill seed, pome fruit, small vine climbing fruit except kiwi fruit, ginseng, herbs, hops, leafy greens, cucurbits, pecan, leafy petioles (including celery fennel (bulb) & rhubarb) fruiting vegetables & root vegetables except sugar beet.	-
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered for control of Alternaria Leaf Spot, Black Spot, Brown Rot Nut Scab, Shot Hole and Rust in almond, Brown Rot in cherries and Husk Spot in macadamia. US registration for control of Alternaria Leaf Blight, Powdery Mildew , Anthracnose, Cercospora Leaf Spot, Gummy Stem Blight, Microdochium Blight, Target Leaf Spot and suppression of Downy Mildew in cucurbits.	-
Isofetamid (Kenja) ISK / AgNova	7	Protective & Curative		P		Registered for control of Botrytis Grey Mould in berries. US registration for control of Grey Mould, Powdery Mildew and Anthracnose in low-growing berries.	-
NUL3195 Nufarm	TBC			P		Fungicide in development from Nufarm with activity on Powdery Mildew and <i>Botrytis</i> .	-
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Protectant & Curative		P		Registered for control of Botrytis in berries and grapes, and Botrytis and Sclerotinia in leafy vegetables and potato. US registration for control of Powdery Mildew in brassica vegetables cucurbits, fruiting vegetables, grapes, specific leaf petioles, leafy greens, root and tuber vegetables, mustard greens, potato, root vegetables. strawberry and tuberous and corm vegetables.	R3
Mosaic Viruses (Papaya Ringspot Virus, Zucchini Yellow Mosaic Virus, Watermelon Mosaic Virus)							
Priority: Moderate							
Mosaic viruses were ranked as a moderate priority in QLD, NSW & WA. Viruses are transmitted by several aphid species in a non-persistent manner.							

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Bacterial Leaf Spot (<i>Xanthomonas campestris</i>)							
Priority: Moderate							
Bacterial Leaf Spot was ranked as a moderate priority in QLD & NSW, and as a low priority in WA. The bacterium may be introduced in seed or in surviving undecomposed crop residue or other host plants. Bacteria spread in water splash during wet, windy weather or by overhead irrigation. It can also disperse on insects, or on people or equipment moving through the crop. Applications of copper may reduce disease spread.							
Copper Ammonium Acetate	M1	Protectant	1	A	ALL	Registered in cucurbits for the control of Angular Leaf Spot, Bacterial Leaf Spot and Downy Mildew. Apply at first signs of disease. [Max. no. of applications not specified; re-treatment interval: 7 - 10 d]	-
Copper Hydroxide	M1	Protectant	1	A	ALL	Registered in cucurbits for the control of Angular Leaf Spot and Bacterial Leaf Spot . Apply at first signs of disease. [Max. no. of applications not specified; re-treatment interval: 7 - 10 d]	-
Copper Oxychloride	M1	Protectant	1	A	ALL	Registered in cucurbits for control of Angular Leaf Spot, Bacterial Leaf Spot , Downy Mildew, Anthracnose and Gummy Stem Blight. [Max. no. of applications not specified; re-treatment interval: 7-10 d]	-
Copper as Tribasic Copper Sulfate	M1	Protectant	1	A	ALL	Registered in cucurbits for the control of Angular Leaf Spot and Bacterial Leaf Spot . Apply at first signs of disease. [Max. no. of applications not specified; re-treatment interval: 7 - 10 d]	-
Copper as Cuprous Oxide	M1	Protectant	1	A	ALL	Registered in cucurbits for the control of Angular Leaf Spot and Bacterial Leaf Spot . Apply at first signs of disease. [Max. no. of applications not specified; re-treatment interval: 7 - 10 d]	-
<i>Bacillus amyloliquefaciens</i> (Serenade Opti) Bayer	BM 02	Biological	NR	P		Registered for suppression of Bacterial Spot in capsicum, chilli and tomato, Anthracnose and Stem End Rot in avocado and mango, and Botrytis in grapevines and strawberries. US registration for control of Xanthomonas spp. in fruiting vegetables, root/tuber and corm vegetables and stone fruit.	-
<i>Bacillus amyloliquefaciens strain MBI 600</i> (Serifel) BASF	BM 02	Biological	NR	P		Registered for control of Botrytis in grapevines and strawberries. US registration for control of Xanthomonas spp. in citrus, fruiting vegetables, leafy vegetables, stone fruit, root and tuber vegetables and tree nuts, and control of Anthracnose, Alternaria Leaf Spot, Downy Mildew, Gummy Stem Blight and Powdery Mildew in cucurbits.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Acibenzolar-S-Methyl (Actigard Plant Activator) Syngenta	P01	Protectant		P		Registered in tomatoes for the suppression of Bacterial Speck, Bacterial Spot (<i>Xanthomonas spp.</i>), Bacterial Canker and Powdery Mildew. US registration for suppression of <i>Xanthomonas spp.</i> in Brassica leafy vegetables, cucurbits, low growing berry, bulb onion, pepper and tomato.	-
Downy Mildew (<i>Pseudoperonospora cubensis</i>)							
Priority: Moderate							
Downy Mildew was ranked as a moderate priority in QLD & NSW and as a low priority in WA. It is a common disease that is characterised by a white downy fungal growth that develops on the underside of the leaf and is favoured by warm, moist weather. Management options include general farm hygiene, crop rotation, planting space and the use of fungicide applications when conditions favour disease.							
Azoxystrobin (Amistar)	11	Protectant & curative	1	A	ALL	Registered in cucurbits for the control of Powdery Mildew, Downy Mildew and Gummy Stem Blight. Commence soon after transplanting and continue till fruit maturity. [Max. no. of applications not specified; 2 sequential applications; re-treatment interval: 7 - 14 d]	-
Azoxystrobin + Oxathiapiprolin (Orondis Flexi) Syngenta	11+49	Protective & curative	3 NG	A	ALL	Registered in cucurbits for the control of Downy Mildew and suppression of Powdery Mildew, Gummy Stem Blight and <i>Sclerotinia spp.</i> [Max. 2 applications per crop; re-treatment interval: 7 - 14 d]	-
Chlorothalonil (Bravo)	M5	Protectant	1	A	ALL	Registered in cucurbits including pumpkin for control of Downy Mildew , Gummy Stem Blight, Anthracnose, Alternaria Leaf Blight and Target Leaf Spot and suppression of Belly Rot. [Max. no. of applications not specified; re-treatment interval: 7 - 14 d]	R3
Copper Ammonium Acetate	M1	Protectant	1	A	ALL	Registered in cucurbits for the control of Angular Leaf Spot, Bacterial Leaf Spot and Downy Mildew . Apply at first signs of disease. [Max. no. of applications not specified; re-treatment interval: 7 - 10 d]	-
Copper Octanoate	M1	Protectant	1	A	ALL	Registered in cucurbits for control of Powdery Mildew and Downy Mildew . [Max. no. of applications not specified; re-treatment interval: 7-10 d]	-
Copper Oxychloride	M1	Protectant	1	A	ALL	Registered in cucurbits for control of Angular Leaf Spot, Bacterial Leaf Spot, Downy Mildew , Anthracnose and Gummy Stem Blight. [Max. no. of applications not specified; re-treatment interval: 7-10 d]	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Dimethomorph (Acrobat) BASF	40	Protectant	7	A	ALL	Registered in cucurbits for control of Downy Mildew , Anthracnose, Gummy Stem Blight, Alternaria Leaf Spot and Septoria Spot. [Max. 4 applications per crop; re-treatment interval: 7-10 d]	-
Dimethomorph + Mancozeb (Acrobat WDG) BASF	40+M3	Protectant	7	A	ALL	Registered in cucurbits for control of Downy Mildew . [Max. 4 applications per crop; re-treatment interval: 7-10 d]	R2
Mancozeb	M3	Protectant	7	A	ALL	Registered in cucurbits (field) for control of Anthracnose, Downy Mildew , Gummy Stem Blight, and Septoria Spot. [Max. no. of applications not specified; re-treatment interval: 7-10 d]	R2
Mancozeb + Metalaxyl-M (Ridomil Gold MZ) Syngenta	M3+4	Protectant & Curative	7	A	ALL	Registered in cucurbits (field) for control of Downy Mildew . [Max. 4 applications per crop; apply 2 consecutive applications at re-treatment interval of 7-10 d]	R2
Metiram (Polyram) BASF	M3	Protectant	7	A	ALL	Registered in cucurbits for the control of Downy Mildew and Gummy Stem Blight. [Max. no. of applications not specified; re-treatment interval: 7 d]	R2
Oxathiapiprolin (Zorvec Enicade) Corteva	49	Protectant	1	A	ALL	Registered in cucurbits for control of Downy Mildew . [Max. 3 applications per crop; 2 consecutive; re-treatment interval 7-10 d]	-
Phosphorous Acid	33	Protectant	NR	A	ALL	Registered in cucurbits for the control of Downy Mildew . [Max. no. of applications not specified; re-treatment interval 7 d]	-
Propamocarb Hydrochloride + Fluopicolide (Infito) Bayer	28+43	Protectant	1	A	ALL	Registered in cucurbits (field and protected) for the control of Downy Mildew . Use subject to CropLife Resistance management strategies. [max 2 applications per crop; re-treatment interval: 7-10 d]	-
Propineb (Antracol) Bayer	M3	Protectant	3	A	ALL	Registered in cucurbits for the control of Downy Mildew . [Max. 4 applications per crop; re-treatment interval: 7- d]	R2

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Propineb + Oxadixyl (Rebound) Kiwi Rural Trading	4+M3	Protectant	3	A	ALL	Registered in cucurbits for the control of Downy Mildew , Gummy Stem Blight, and Anthracnose. [Max. no. of applications not specified; 2 sequential applications; re-treatment interval: 7 – 10 d]	R2
Zineb	M3	Protectant	7	A	ALL	Registered in cucurbits for the control of Downy Mildew and Anthracnose. [Max. no. of applications not specified; re-treatment interval: 7 d]	R2
Hydrogen Peroxide + Peroxyacetic Acid (Peratec Plus)	M	Protectant	1	P-A	ALL	Registered in cucurbits for control of Powdery Mildew. Registered for control of Downy Mildew in brassica vegetables, bulb vegetables and grapes.	-
Acibenzolar-S-Methyl (Actigard Plant Activator) Syngenta	P01	Protectant		P		Registered in tomatoes for the suppression of Bacterial Speck, Bacterial Spot, Bacterial Canker and Powdery Mildew. US registration for control of Downy Mildew in Brassica leafy vegetables, cucurbits, leafy vegetables, spinach, and suppression of Downy Mildew in bulb onion.	-
Cyazofamid (Ranman) ISK	21	Protectant		P		Registered for control of Late Blight and White Blister in potatoes and broccoli. US registration for control of Downy Mildew in herbs, brassica leafy vegetables, cucurbits, grapes, hops, leafy greens, succulent-podded and succulent-shelled beans and bulb vegetables.	-
Dimethomorph + Amitoctradin (Zampro) AgNova	40+45	Protectant		P		Registered for control of Downy Mildew in grape vines. Hort Innovation project ST17000 is generating data to support a label registration for control of Downy Mildew in cucurbits.	-
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered for control of Alternaria Leaf Spot, Black Spot, Brown Rot Nut Scab, Shot Hole and Rust in almond, Brown Rot in cherries and Husk Spot in macadamia. US registration for control of Alternaria Leaf Blight, Powdery Mildew, Anthracnose, Cercospora Leaf Spot, Gummy Stem Blight, Microdochium Blight, Target Leaf Spot and suppression of Downy Mildew in cucurbits.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Mandipropamid (Revus) Syngenta	40	Protectant		P		Registered for control of Downy Mildew in grapes and brassica leafy crops. US registration for suppression of Downy Mildew in cucurbits and control of Downy Mildew in basil, edible podded bean, brassica vegetables, leafy vegetables, bulb vegetables, fruiting vegetables (except tomatoes), grapes and hops.	-
Gummy Stem Blight (<i>Didymella bryoniae</i>)							
Priority: Moderate							
Gummy Stem Blight was ranked as a moderate priority in QLD & NSW and as a low priority in WA. The fungus usually attacks stems causing a watery rot at ground level which may spread up the stem and into roots. Infection of the root and stem prevents the flow of water and nutrients, and plants wilt. Management options include use of clean seed and good on-farm hygiene.							
Azoxystrobin (Amistar)	11	Protectant & curative	1	A	ALL	Registered in cucurbits for the control of Powdery Mildew, Downy Mildew and Gummy Stem Blight . Commence soon after transplanting and continue till fruit maturity. [Max. no. of applications not specified; 2 sequential applications; re-treatment interval: 7 - 14 d]	-
Azoxystrobin + Oxathiapiprolin (Orondis Flexi) Syngenta	11+49	Protective & curative	3 NG	A	ALL	Registered in cucurbits for the control of Downy Mildew and suppression of Powdery Mildew, Gummy Stem Blight and <i>Sclerotinia</i> spp. [Max. 2 applications per crop; re-treatment interval: 7 - 14 d]	-
Chlorothalonil (Bravo)	M5	Protectant	1	A	ALL	Registered in cucurbits for control of Downy Mildew, Gummy Stem Blight , Anthracnose, Alternaria Leaf Blight and Target Leaf Spot and suppression of Belly Rot. [Max. no. of applications not specified; re-treatment interval: 7 - 14 d]	R3
Copper Oxychloride	M1	Protectant	1	A	ALL	Registered in cucurbits for control of Angular Leaf Spot, Bacterial Leaf Spot, Downy Mildew, Anthracnose and Gummy Stem Blight . [Max. no. of applications not specified; re-treatment interval: 7-10 d]	-
Dimethomorph (Acrobat) BASF	40	Protectant	7	A	ALL	Registered in cucurbits for control of Downy Mildew, Anthracnose, Gummy Stem Blight , Alternaria Leaf Spot and Septoria Spot. [Max. 4 applications per crop; re-treatment interval: 7-10 d]	-
Dimethomorph + Mancozeb (Acrobat WDG) BASF	40+M3	Protectant	7	A	QLD & NT	Registered in cucurbits for control of Downy Mildew, Anthracnose, Gummy Stem Blight , Alternaria Leaf Spot and Septoria Spot. [Max. 4 applications per crop; re-treatment interval: 7-10 d]	R2

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Mancozeb	M3	Protectant	7	A	ALL	Registered in cucurbits (field) for control of Anthracnose, Downy Mildew, Gummy Stem Blight , and Septoria Spot. [Max. no. of applications not specified; re-treatment interval: 7-10 d]	R2
Mancozeb + Metalaxyl-M (Ridomil Gold MZ) Syngenta	M3+4	Protectant & Curative	7	A	QLD	Registered in cucurbits (field) for control of Downy Mildew, Anthracnose, Gummy Stem Blight , Alternaria Leaf Spot and Septoria Leaf Spot. [Max. 4 applications per crop; apply 2 consecutive applications at re-treatment interval of 7-10 d]	R2
Metiram (Polyram) BASF	M3	Protectant	7	A	ALL	Registered in cucurbits for the control of Downy Mildew and Gummy Stem Blight . [Max. no. of applications not specified; re-treatment interval: 7 d]	R2
Penthiopyrad (Fontelis) Corteva	7	Protectant	1	A	ALL	Registered in cucurbits (field and protected) for control of Botrytis Grey Mould, Powdery Mildew, and Gummy Stem Blight . [Max. no. of applications not specified; 2 sequential applications; re-treatment interval: 7 – 14 d]	-
Propineb + Oxadixyl (Rebound) Kiwi Rural Trading	4+M3	Protectant	3	A	ALL	Registered in cucurbits for the control of Downy Mildew, Gummy Stem Blight , and Anthracnose. [Max. no. of applications not specified; 2 sequential applications; re-treatment interval: 7 – 10 d]	R2
<i>Bacillus amyloliquefaciens</i> strain MBI 600 (Serifel) BASF	BM 02	Biological	NR	P		Registered for control of Botrytis in grapevines and strawberries. US registration for control of Gummy Stem Blight in cucurbits.	-
Cyprodinil + Fludioxonil (Switch) Syngenta	9+12	Protective & Curative		P		Registered for control of Sclerotinia, Botrytis and other diseases in several vegetable crops including leafy vegetables, peas, beans, leafy vegetables & lettuce. US registration for control of Gummy Stem Blight in cucurbits.	R3
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of Gummy Stem Blight in cucurbits.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative		P		Registered for control of <i>Alternaria</i> , Black Spot and Powdery Mildew in apples, Black Spot in pears, Blossom Blight, Brown Rot, Hull Rot, Shot Hole and Rust in stone fruit, and various leaf diseases in tropical fruits. US registration for control of Gummy Stem Blight in cucurbits.	-
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered for control of Alternaria Leaf Spot, Black Spot, Brown Rot Nut Scab, Shot Hole and Rust in almond, Brown Rot in cherries and Husk Spot in macadamia. US registration for control of Alternaria Leaf Blight, Powdery Mildew, Anthracnose, Cercospora Leaf Spot, Gummy Stem Blight , Microdochium Blight, Target Leaf Spot and suppression of Downy Mildew in cucurbits.	-
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Protectant & Curative		P		Registered for control of Botrytis in berries and grapes, and Botrytis and Sclerotinia in leafy vegetables and potato. US registration for control of Gummy Stem Blight in cucurbits.	R3
Scab (<i>Cladosporium</i> spp.)							
Priority: Moderate							
Scab was ranked as a moderate priority in QLD & NSW and as a low priority in WA.							
Copper	M1	Protectant	1	P-A	ALL	Registered in cucurbits for control of Angular Leaf Spot, Bacterial Leaf Spot, Downy Mildew, Anthracnose and Gummy Stem Blight. Registered for control of Scab (<i>Cladosporium carpophilum</i>) in stone fruit.	-
Mancozeb	M3	Protectant	7	P-A	ALL	Registered in cucurbits (field) for control of Alternaria Spot, Anthracnose, Downy Mildew, Ring Spot, Gummy Stem Blight, and Septoria Spot. Registered for control of Scab (<i>Cladosporium carpophilum</i>) in stone fruit.	R2
Penthiopyrad (Fontelis) Corteva	7	Protectant	1	P-A	ALL	Registered in cucurbits (field and protected) for control of Botrytis Grey Mould, Powdery Mildew, and Gummy Stem Blight. Registered for control of Scab (<i>Cladosporium carpophilum</i>) in stone fruit.	-
Azoxystrobin (Amistar)	11	Protectant & curative	1	P-A	ALL	Registered in cucurbits for the control of Powdery Mildew, Downy Mildew and Gummy Stem Blight. Registered for control of Cladosporium in passionfruit and Rubus.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Florypicoxamid (Adavelt) Corteva	21	Protective & curative		P		New active in development from Corteva with activity on Septoria, Powdery Mildew, Botrytis, Anthracnose, Alternaria, Scab , Monilinia, Rust and <i>Mycosphaerella</i> spp. Scheduled for JMPR evaluation in 2023.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of Cladosporium spp. in almond, bulb vegetables, stone fruit and tree nuts, and control of Powdery Mildew, Alternaria Leaf Spot, Gummy Stem Blight, Belly Rot and Anthracnose in cucurbits.	R3
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered for control of Cladosporium spp. in almonds. US registration for control of Scab in stone fruit and tree nuts, and for control of Alternaria Leaf Blight, Powdery Mildew, Anthracnose, Cercospora Leaf Spot, Gummy Stem Blight, Microdochium Blight, Target Leaf Spot and suppression of Downy Mildew in cucurbits.	-
Brown or Surface Etch							
Priority: Low							
Brown Etch was ranked as a moderate priority in NSW and as a low priority in QLD & WA. Brown or Surface Etch is an issue only in butternut pumpkin varieties particularly during wet years. The causal organism has not been identified and current research indicates that control using fungicides is unlikely to be successful. Management options include reducing humidity in field by avoiding the use of overhead irrigation and good farm hygiene.							
Fusarium Foot Rot (<i>Fusarium solani</i>)							
Priority: Low							
Fusarium Foot Rot was ranked as a moderate priority in WA and as a low priority in QLD & NSW. It is a soil-borne disease that is widespread in most regions. The roots of the plant can become infected, but it is primarily limited to the crown and fruit. Cultural controls recommended including soil fumigation, crop rotation and the use of resistant varieties.							
1,3-dichloropropene + Chloropicrin (Telone C-35)	8B	Soil fumigant	NR	A	ALL (Restricted use TAS, VIC & SA)	Registered in various crops including vegetables for control of plant parasitic Nematodes, Symphylans, Wireworms, soil borne diseases (including Fusarium and <i>Verticillium</i> wilts, <i>Rhizoctonia</i> , <i>Pythium</i>) and suppression of weeds. Restricted chemical. [Users may require fumigator license]	-
Dazomet (Basamid)	8F	Soil fumigant	NR	A	ALL	Registered in broadacre seed beds for control of soil fungi (including <i>Pythium</i> , <i>Phytophthora</i> , Fusarium , and <i>Verticillium</i>), nematodes (cyst and non-cyst forming), soil insects and germinating seeds of weeds.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Metham Sodium	-	Fumigant	NR	A	ALL	Registered in food crops as a pre-plant fumigant for control of fungal diseases including <i>Rhizoctonia</i> , <i>Pythium</i> , <i>Fusarium</i> , <i>Phytophthora</i> , <i>Verticillium</i> , <i>Sclerotinia</i> and Club Root of crucifers. Applied as a soil injection, soil surface spray in front of a rotary tiller or through approved trickle irrigation systems.	-
<i>Streptomyces lydicus</i> (Actinovate)	BM 02	Biological	NR	A	ALL	Registered in cucurbits for suppression of Powdery Mildew and in vegetables for control of <i>Fusarium</i> , <i>Rhizoctonia</i> and <i>Pythium</i> as seed treatment in vegetables.	-
<i>Bacillus amyloliquefaciens</i> Strain QST 713 (Serenade Prime Soil Ameliorant and Biofungicide) Bayer	BM 02	Biological	NR	P-A	ALL	Registered in vegetables for application to soil to improve bioavailability of soil resources to horticultural crops.	-
Fludioxonil + Metalaxyl-M (Maxim XL) Syngenta	12+4	Protectant & Curative		P		Registered for control of Damping Off and Root Rot caused by <i>Pythium</i> and <i>Fusarium spp.</i> in industrial hemp, maize, sweet corn and sorghum.	R3
Fludioxonil + Sedaxane (Vibrance Premium Seed Treatment) Syngenta	12+7	Protectant & Curative		P		Registered for control of <i>Fusarium Dry Rot</i> in potatoes.	R3
NUL3163 Nufarm	TBC			P		New active in development from Nufarm with activity on <i>Fusarium</i>, <i>Pythium</i> & <i>Rhizoctonia</i> .	-
Thiram + Thiabendazole (P-Pickel T)	1+M3	Protectant		P		Registered for control of Black Spot (<i>Mycosphaerella pinodes</i>) & Seedling Root Rots (<i>Fusarium</i>, <i>Pythium</i> & <i>Macrofomina</i> spp.) in field & garden peas as a liquid seed dressing.	R2

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Alternaria Leaf Blight (<i>Alternaria cucumerina</i>)							
Priority: Low							
Alternaria Leaf Blight was ranked as a low priority in QLD, NSW & WA. <i>Alternaria</i> species produce various sorts of toxic metabolites during their active growth and causes severe diseases in many plants by limiting their productivity. Crop rotation, removal and burning of plant debris, if infected, and eradication of weed hosts help reduce the inoculum for subsequent plantings of susceptible crops.							
Chlorothalonil (Bravo)	M5	Protectant	1	A	ALL	Registered in cucurbits for control of Downy Mildew, Gummy Stem Blight, Anthracnose, Alternaria Leaf Blight and Target Leaf Spot and suppression of Belly Rot. [Max. no. of applications not specified; re-treatment interval: 7 - 14 d]	R3
Dimethomorph (Acrobat) BASF	40	Protectant	7	A	ALL	Registered in cucurbits for control of Downy Mildew, Anthracnose, Gummy Stem Blight, Alternaria Leaf Spot and Septoria Spot. [Max. 4 applications per crop; re-treatment interval: 7-10 d]	-
Dimethomorph + Mancozeb (Acrobat WDG) BASF	40+M3	Protectant	7	A	QLD & NT	Registered in cucurbits for control of Downy Mildew, Anthracnose, Gummy Stem Blight, Alternaria Leaf Spot and Septoria Spot. [Max. 4 applications per crop; re-treatment interval: 7-10 d]	R2
Mancozeb + Metalaxyl-M (Ridomil Gold MZ) Syngenta	M3+4	Protectant & Curative	7	A	QLD	Registered in cucurbits (field) for control of Downy Mildew, Anthracnose, Gummy Stem Blight, Alternaria Leaf Spot and Septoria Leaf Spot. [Max. 4 applications per crop; apply 2 consecutive applications at re-treatment interval of 7-10 d]	R2
<i>Bacillus amyloliquifaciens</i> (Serenade Opti) Bayer	BM 02	Biological	NR	P		Registered for suppression of Bacterial Spot in capsicum, chilli and tomato, Anthracnose and Stem End Rot in avocado and mango, and Botrytis in grapevines and strawberries. US registration for control of Alternaria in berries, brassica vegetables, citrus, bulb vegetables, herbs/spices, root/tuber and corm vegetables, stone fruit and tree nuts.	-
<i>Bacillus amyloliquifaciens</i> strain MBI 600 (Serifel) BASF	BM 02	Biological	NR	P		Registered for control of Botrytis in grapevines and strawberries. US registration for control of Alternaria in artichoke, asparagus, berries, brassica leafy vegetables, bulb vegetables, citrus, cucurbits, pome fruit, stone fruit and tobacco.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Florypicoxamid (Adavelt) Corteva	21	Protective & curative		P		New active in development from Corteva with activity on Septoria, Powdery Mildew, Botrytis, Anthracnose, Alternaria , Scab, Monilinia, Rust and <i>Mycosphaerella</i> spp. Scheduled for JMPR evaluation in 2023.	-
Fluazinam (Shirlan) Syngenta	29	Protective		P		Registered in Brassica vegetables for control of Club Root. US registration for control of Alternaria in carrots.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of Alternaria in almond, Brassica leafy greens, bulb vegetables, cucurbits, pistachio, tree nuts and sunflower.	R3
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative		P		Registered for control of Alternaria , Black Spot and Powdery Mildew in apples, Black Spot in pears, Blossom Blight, Brown Rot, Hull Rot, Shot Hole and Rust in stone fruit, and various leaf diseases in tropical fruits. US registration for control of Alternaria in almond, Brassica vegetables, Brassica leafy vegetables, carrot, citrus, pome fruit, small vine climbing fruit except kiwi fruit, leafy greens, cucurbits, tree nuts, fruiting vegetables & root vegetables except sugar beet.	-
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered for control of Alternaria Leaf Spot, Black Spot, Brown Rot Nut Scab, Shot Hole and Rust in almond, Brown Rot in cherries and Husk Spot in macadamia. US registration for control of Alternaria Leaf Blight , Powdery Mildew, Anthracnose, Cercospora Leaf Spot, Gummy Stem Blight, Microdochium Blight, Target Leaf Spot and suppression of Downy Mildew in cucurbits.	-
NUL3446 Nufarm	TBC	TBC		P		New active in development from Nufarm with activity on Alternaria spp.	-
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Protectant & Curative		P		Registered for control of Botrytis in berries and grapes, and Botrytis and Sclerotinia in leafy vegetables and potato. US registration for control of Alternaria in berries, brassica vegetables, bulb vegetables, carrots, cucurbits, fruiting vegetables, grape and small fruit vine climbing (except fuzzy kiwifruit), specific leaf petioles, specific leafy greens, root and tuber vegetables, lemon and lime, mustard greens, pistachio, potato, root vegetables and tuberous and corm vegetables.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Anthracnose (<i>Colletotrichum orbiculare</i>)							
Priority: Low							
Anthracnose was ranked as a low priority in QLD, NSW & WA. Can be seed-borne and carries over on crop residue in the soil. It is spread in water droplets and is favoured by warm, humid weather.							
Chlorothalonil (Bravo)	M5	Protectant	1	A	ALL	Registered in cucurbits for control of Downy Mildew, Gummy Stem Blight, Anthracnose , Alternaria Leaf Blight and Target Leaf Spot and suppression of Belly Rot. [Max. no. of applications not specified; re-treatment interval: 7 - 14 d]	R3
Copper Oxychloride	M1	Protectant	1	A	ALL	Registered in cucurbits for control of Angular Leaf Spot, Bacterial Leaf Spot, Downy Mildew, Anthracnose and Gummy Stem Blight. [Max. no. of applications not specified; re-treatment interval: 7-10 d]	-
Dimethomorph (Acrobat) BASF	40	Protectant	7	A	ALL	Registered in cucurbits for control of Downy Mildew, Anthracnose , Gummy Stem Blight, Alternaria Leaf Spot and Septoria Spot. [Max. 4 applications per crop; re-treatment interval: 7-10 d]	-
Dimethomorph + Mancozeb (Acrobat WDG) BASF	40+M3	Protectant	7	A	QLD & NT	Registered in cucurbits for control of Downy Mildew, Anthracnose , Gummy Stem Blight, Alternaria Leaf Spot and Septoria Spot. [Max. 4 applications per crop; re-treatment interval: 7-10 d]	R2
Mancozeb	M3	Protectant	7	A	ALL	Registered in cucurbits (field) for control of Anthracnose , Downy Mildew, Gummy Stem Blight, and Septoria Spot. [Max. no. of applications not specified; re-treatment interval: 7-10 d]	R2
Mancozeb + Metalaxyl-M (Ridomil Gold MZ) Syngenta	M3+4	Protectant & Curative	7	A	QLD	Registered in cucurbits (field) for control of Downy Mildew, Anthracnose , Gummy Stem Blight, Alternaria Leaf Spot and Septoria Leaf Spot. [Max. 4 applications per crop; apply 2 consecutive applications at re-treatment interval of 7-10 d]	R2
Propineb + Oxadixyl (Rebound) Kiwi Rural Trading	4+M3	Protectant	3	A	ALL	Registered in cucurbits for the control of Downy Mildew, Gummy Stem Blight, and Anthracnose . [Max. no. of applications not specified; 2 sequential applications; re-treatment interval: 7 – 10 d]	R2
Zineb	M3	Protectant	7	A	ALL	Registered in cucurbits for the control of Downy Mildew and Anthracnose . [Max. no. of applications not specified; re-treatment interval: 7 d]	R2

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
<i>Aureobasidium pullulans</i> (Botector) Nufarm	BM 02	Biological	NR	P-A		Registered in cucurbits (field & protected) for control of <i>Botrytis</i> and suppression of <i>Sclerotinia</i> spp. US registration for the control of Anthracnose in berries, stone fruit, almond, fruiting vegetables, cucurbits, leafy vegetables, ornamentals and hops.	-
<i>Bacillus amyloliquefaciens</i> (Serenade Opti) Bayer	BM 02	Biological		P		Registered for control of Anthracnose in avocado and several tropical fruits. US registration for the control of Anthracnose in berries, citrus, fruiting vegetables, herbs/spices, pome fruit, stone fruit and tree nuts.	-
<i>Bacillus amyloliquefaciens strain MBI 600</i> (Serifel) BASF	BM 02	Biological	NR	P		Registered for control of Botrytis in grapevines and strawberries. US registration for control of Anthracnose in artichoke, asparagus, berries, citrus, cucurbits, fruiting vegetables, pome fruit, stone fruit, tobacco, root and tuber vegetables (except sugar beet) and tree nuts.	-
BLAD (ProBlad Plus)	BM 01	Biological	NR	P		Registered for control of Brown Rot and Blossom Blight in stone fruit. US registration for control of Anthracnose in grapes and strawberries, and for control of Powdery Mildew in cucurbits.	-
Florypicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New active in development from Corteva with activity on Septoria, Powdery Mildew, Botrytis, Anthracnose , Alternaria, Scab, Monilinia, Rust and <i>Mycosphaerella</i> spp. Scheduled for JMPR evaluation in 2023.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of Anthracnose in almond, cucurbits and tree nuts.	R3
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protective & Curative		P		Registered for control of Anthracnose and Stem End Rot in tropical and sub-tropical fruit. US registration for control of Anthracnose in almond, berries, cherry, citrus, specific cucurbits, tree nuts, tomato and root vegetables (except sugar beet).	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered for control of Alternaria Leaf Spot, Black Spot, Brown Rot Nut Scab, Shot Hole and Rust in almond, Brown Rot in cherries and Husk Spot in macadamia. US registration for control of Alternaria Leaf Blight, Powdery Mildew, Anthracnose , Cercospora Leaf Spot, Gummy Stem Blight, Microdochium Blight, Target Leaf Spot and suppression of Downy Mildew in cucurbits.	-
Isofetamid (Kenja) ISK / AgNova	7	Protective & Curative		P	ALL	Registered for control of Botrytis Grey Mould in berries. US registration for control of Anthracnose in almond, grapes and low-growing berries.	-
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Protectant & Curative		P		Registered for control of Botrytis in berries and grapes, and Botrytis and Sclerotinia in leafy vegetables and potato. US registration for control of Anthracnose in berries and tuberous and corm vegetables, suppression of Anthracnose in lemons and limes, potato, and control of Alternaria, Cercospora, Gummy Stem Blight, Powdery Mildew, Scab, Septoria, Target Spot, Grey Mould and suppression of Fusarium Wilt in cucurbits.	R3
Grey Mould (<i>Botrytis cinerea</i>)							
Priority: Low							
Grey Mould was ranked as a moderate priority in QLD, NSW & WA. It can affect plants at most stages of production. Affected fruit become water-soaked and soft and are rapidly covered with a thick grey mould. Other plant parts such as stems can also be affected. <i>Botrytis</i> also causes secondary rots on fruit and vegetables in storage or transit and in the marketplace.							
<i>Aureobasidium pullulans</i> (Botector) Nufarm	BM 02	Biological	NR	A		Registered in cucurbits (field & protected) for control of Botrytis and suppression of <i>Sclerotinia</i> spp. [Max. 5 applications per crop; re-treatment interval: 7 – 10 d]	-
Penthiopyrad (Fontelis) Corteva	7	Protectant	1	A	ALL	Registered in cucurbits (field and protected) for control of Botrytis Grey Mould , Powdery Mildew, and Gummy Stem Blight. [Max. no. of applications not specified; 2 sequential applications; re-treatment interval: 7 – 14 d]	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
<i>Bacillus amyloliquefaciens</i> (Serenade Opti) Bayer	BM 02	Biological	NR	P		Registered for suppression of Bacterial Spot in capsicum, chilli and tomato, Anthracnose and Stem End Rot in avocado and mango, and Botrytis in grapevines and strawberries. US registration for control of Botrytis in artichoke, asparagus, berries, bulb vegetables, fruiting vegetables, grapes, cucurbits, grapes, herbs/spices, legume vegetables, root/tuber and corm vegetables, stone fruit and kiwi.	-
<i>Bacillus amyloliquefaciens strain MBI 600</i> (Serifel) BASF	BM 02	Biological	NR	P		Registered for control of Botrytis in grapevines and strawberries. US registration for control of Botrytis in artichoke, asparagus, berries, brassica leafy vegetables, bulb vegetables, fruiting vegetables, grapes, leafy vegetables, legume vegetables, pome fruit, stone fruit and tobacco.	-
BLAD (ProBlad Plus)	BM 01	Biological	NR	P		Registered for control of Brown Rot and Blossom Blight in stone fruit. US registration for control of Botrytis in fruiting vegetables, grapes, strawberries and ornamentals.	-
Cyprodinil + Fludioxonil (Switch) Syngenta	9+12	Protective & Curative		P		Registered for control of Sclerotinia, Botrytis and other diseases in several vegetable crops including leafy vegetables, peas, beans, leafy vegetables & lettuce. US registration for control of Botrytis in beans (dried & succulent except cowpea), berries, grapes and small fruit vine climbing (except fuzzy kiwifruit), herbs, leafy greens, bulb vegetables, pistachio and fruiting vegetables, and control of Alternaria, Gummy Stem Blight and Powdery Mildew in cucurbits.	R3
DC-126 Bayer	TBC			P		New product from Bayer with Botrytis activity.	-
Fenpyrazamine (Prolectus) Sumitomo	17	Protectant & Curative		P		Registered for Botrytis control in grapes. US registration for control of Botrytis in berries, ginseng, lettuce, pistachio, small fruit vine climbing (except fuzzy kiwifruit) and ornamentals.	-
Florypicoxamid (Adavelt) Corteva	21	Protective & Curative		P		New active in development from Corteva with activity on Septoria, Powdery Mildew, Botrytis , Anthracnose, Alternaria, Scab, Monilinia, Rust and <i>Mycosphaerella</i> spp. Scheduled for JMPR evaluation in 2023.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of Botrytis in almond, artichoke, berries, brassica vegetables, Brassica leafy greens, stone fruit, dill seed, pome fruit, small fruit vine climbing (except fuzzy kiwifruit), herbs, hops, leafy greens, cucurbits, pistachio, fruiting vegetables and root vegetables (except sugar beet).	R3
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered for control of Alternaria Leaf Spot, Black Spot, Brown Rot Nut Scab, Shot Hole and Rust in almond, Brown Rot in cherries and Husk Spot in macadamia. US registration for control Botrytis spp. in bulb vegetables, leafy vegetables, pome fruit, stone fruit, strawberries and tree nuts, and for control of Alternaria Leaf Blight, Powdery Mildew, Anthracnose, Cercospora Leaf Spot, Gummy Stem Blight, Microdochium Blight, Target Leaf Spot and suppression of Downy Mildew in cucurbits.	-
Isofetamid (Kenja) ISK / AgNova	7	Protectant		P		Registered for control of Botrytis in berries.	-
NUL3195 Nufarm	TBC			P		New product from Nufarm with Botrytis activity.	-
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Protective & Curative		P		Registered for control of Botrytis in berries, grapes and strawberries and control of Botrytis and <i>Sclerotinia</i> in leafy vegetables, lettuce and potatoes. US registration for control of Botrytis in berries, bulb vegetables, cucurbits, grapes and small fruit vine climbing (except fuzzy kiwifruit), specific leaf petioles, specific leafy greens, pistachio, tuberous and corm vegetables, and suppression of Botrytis in fruiting vegetables and potatoes.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Rhizoctonia Ground Rot (<i>Rhizoctonia solani</i>)							
Priority: Low							
Rhizoctonia Ground Rot was ranked as a low priority in QLD, NSW & WA. A common soil-borne disease, the symptoms can vary from water-soaked cankers in stems and roots to damaged fruit that is growing near the ground.							
1,3-dichloropropene + Chloropicrin (Telone C-35)	8B	Soil fumigant	NR	A	ALL (Restricted use TAS, VIC & SA)	Registered in various crops including vegetables for control of 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. Restricted chemical. [Users may require fumigator license]	-
Chlorothalonil (Bravo)	M5	Protectant	1	A	ALL	Registered in cucurbits for control of Downy Mildew, Gummy Stem Blight, Anthracnose, Alternaria Leaf Blight and Target Leaf Spot and suppression of Belly Rot (<i>Rhizoctonia solani</i>) . [Max. no. of applications not specified; re-treatment interval: 7 - 14 d]	R3
Dazomet (Basamid)	8F	Soil fumigant	NR	A	ALL	Registered in broadacre seed beds for control of soil fungi (including <i>Pythium</i> , <i>Phytophthora</i> , <i>Fusarium</i> , and <i>Verticillium</i>), nematodes (cyst and non-cyst forming), soil insects and germinating seeds of weeds.	-
Metham Sodium	-	Fumigant	NR	A	ALL	Registered in food crops as a pre-plant fumigant for control of fungal diseases including <i>Rhizoctonia</i> , <i>Pythium</i> , <i>Fusarium</i> , <i>Phytophthora</i> , <i>Verticillium</i> , <i>Sclerotinia</i> and Club Root of crucifers. Applied as a soil injection, soil surface spray in front of a rotary tiller or through approved trickle irrigation systems.	-
<i>Streptomyces lydicus</i> (Actinovate)	BM 02	Biological	NR	A	ALL	Registered in cucurbits for suppression of Powdery Mildew and in vegetables for control of <i>Fusarium</i> , <i>Rhizoctonia</i> and <i>Pythium</i> as seed treatment in vegetables.	-
<i>Bacillus amyloliquefaciens</i> Strain QST 713 (Serenade Prime Soil Ameliorant & Biofungicide) Bayer	BM 02	Biological	NR	P-A	ALL	Registered in vegetables for application to soil to improve bioavailability of soil resources to horticultural crops.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
<i>Bacillus amyloliquefaciens</i> strain MBI 600 (Serifel) BASF	BM 02	Biological	NR	P		Registered for control of Botrytis in grapevines and strawberries. US registration for control of Rhizoctonia spp. in artichoke, asparagus, brassica leafy vegetables, bulb vegetables, cucurbits, corn, fruiting vegetables, leafy vegetables, legume vegetables, oilseeds, soybean, strawberries and root and tuber vegetables.	-
Fludioxonil + Metalaxyl-M (Maxim XL) Syngenta	12+4	Protectant & Curative		P		Registered for the control of Rhizoctonia Rot in Canola seedlings and for control of Damping Off in canola, industrial hemp, maize, oilseed mustard, silverbeet, sorghum, spinach and sweet corn.	R3
Fludioxonil + Sedaxane (Vibrance Premium Seed Treatment) Syngenta	12+7	Protectant & Curative		P		Registered in potatoes for control of Black Scurf (Rhizoctonia), Silver Surf, Black Rot, Gangrene and Fusarium Dry Rot and suppression of Scab. Hort innovation is conducting research for use in beetroot to control Rhizoctonia .	R3
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of Rhizoctonia in cucurbits and for suppression of Rhizoctonia in Brassica leafy vegetables.	R3
NUL3163 Nufarm	TBC			P		New active in development from Nufarm with activity on <i>Fusarium</i> , <i>Pythium</i> & Rhizoctonia .	-
Penflufen+ Trifloxystrobin (Evergol Extend) Bayer	7+11	Protectant		P		Registered for control of Rhizoctonia spp. in canola, forage brassicas, pastures and cotton.	-
Thiophanate-Methyl + Etridiazole (Banrot)	1+14	Protectant		P		Registered in container grown ornamentals and in ground bedding plants as a post plant soil drench for control of <i>Pythium</i> , <i>Phytophthora</i> , Rhizoctonia and <i>Thielaviopsis</i> .	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Septoria Spot (<i>Septoria cucurbitacearum</i>)							
Priority: Low							
Septoria Spot was ranked as a low priority in QLD, NSW & WA. Light brown irregular spots occur between the leaf veins which expand rapidly and cover the leaves. The fungus can survive on the old leaves removed at harvest, on weeds, and as spores on seed. The use of drip irrigation is recommended rather than sprinklers.							
Dimethomorph (Acrobat) BASF	40	Protectant	7	A	ALL	Registered in cucurbits for control of Downy Mildew, Anthracnose, Gummy Stem Blight, Alternaria Leaf Spot and Septoria Spot . [Max. 4 applications per crop; re-treatment interval: 7-10 d]	-
Dimethomorph + Mancozeb (Acrobat WDG) BASF	40+M3	Protectant	7	A	QLD & NT	Registered in cucurbits for control of Downy Mildew, Anthracnose, Gummy Stem Blight, Alternaria Leaf Spot and Septoria Spot . [Max. 4 applications per crop; re-treatment interval: 7-10 d]	R2
Mancozeb	M3	Protectant	7	A	ALL	Registered in cucurbits (field) for control of Anthracnose, Downy Mildew, Gummy Stem Blight, and Septoria Spot . [Max. no. of applications not specified; re-treatment interval: 7-10 d]	R2
Mancozeb + Metalaxyl-M (Ridomil Gold MZ) Syngenta	M3+4	Protectant & Curative	7	A	QLD	Registered in cucurbits (field) for control of Downy Mildew, Anthracnose, Gummy Stem Blight, Alternaria Leaf Spot and Septoria Leaf Spot . [Max. 4 applications per crop; apply 2 consecutive applications at re-treatment interval of 7-10 d]	R2
Copper	M1	Protectant	1	P-A	ALL	Registered in cucurbits for control of Angular Leaf Spot, Bacterial Leaf Spot, Downy Mildew, Anthracnose and Gummy Stem Blight. Registered for control of Septoria Spot in citrus, passionfruit, blackcurrant, flowers, parsnips and tomatoes.	-
Florylpicoxamid (Adavelt) Corteva	21	Protective & Curative		P		New active in development from Corteva with activity on Septoria , Powdery Mildew, Botrytis, Anthracnose, Alternaria, Scab, Monilinia, Rust and <i>Mycosphaerella</i> spp. Scheduled for JMPR evaluation in 2023.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protective		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of Septoria Spot in dry and succulent beans and pistachio, and for control of Powdery Mildew, Alternaria Leaf Spot Gummy Stem Blight, Belly Rot and Anthracnose in cucurbits.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered for control of Alternaria Leaf Spot, Black Spot, Brown Rot Nut Scab, Shot Hole and Rust in almond, Brown Rot in cherries and Husk Spot in macadamia. US registration for control of Septoria Spot in leafy vegetables, and for control of Alternaria Leaf Blight, Powdery Mildew, Anthracnose, Cercospora Leaf Spot, Gummy Stem Blight, Microdochium Blight, Target Leaf Spot and suppression of Downy Mildew in cucurbits.	-
Target Leaf Spot (<i>Cercospora citrulline</i>)							
Priority: Low							
Target Leafspot was ranked as a low priority in QLD, NSW & WA. This disease is seed borne and can survive in crop trash. Disease free seeds and seedlings are essential for preventing the spread of this disease.							
Chlorothalonil (Bravo)	M5	Protectant	1	A	ALL	Registered in cucurbits for control of Downy Mildew, Gummy Stem Blight, Anthracnose, Alternaria Leaf Blight and Target Leaf Spot and suppression of Belly Rot. [Max. no. of applications not specified; re-treatment interval: 7 - 14 d]	R3
Hydrogen Peroxide + Peroxyacetic Acid (Peratec Plus)	M	Contact	1	P-A	ALL	Registered in cucurbits including pumpkin for control of Powdery Mildew. Registered for control of Cercospora Leaf Spot in celery.	-
Mancozeb	M3	Protectant	7	P-A	ALL	Registered in cucurbits (field) for control of Alternaria Spot, Anthracnose, Downy Mildew, Ring Spot, Gummy Stem Blight, and Septoria Spot. Registered for control of Cercospora Leaf Spot in carrots, spinach, silverbeet and beetroot.	R2
Zineb	M3	Protectant	7	P-A	ALL	Registered in cucurbits for the control of Downy Mildew and Anthracnose. Registered for the control of Cercospora Leaf Spot in bananas, beets, carrots, cauliflower, cabbages and celery.	R2
Azoxystrobin + Difenconazole (Amistar Top) Syngenta	3+11	Protective & curative		P		Registered for control of Cercospora spp. in carrots.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Florypicoxamid (Adavelt) Corteva	21	Protective & curative		P		New active in development from Corteva with activity on Septoria, Powdery Mildew, Botrytis, Anthracnose, Alternaria, Scab, Monilinia, Rust and <i>Mycosphaerella</i> spp. Activity on Cercospora unknown. Scheduled for JMPR evaluation in 2023.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protective		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of Cercospora spp. in Brassica leafy vegetables and okra, and for control of Powdery Mildew, Alternaria Leaf Spot Gummy Stem Blight, Belly Rot and Anthracnose in cucurbits.	R3
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative		P		Registered for control of <i>Alternaria</i> , Black Spot and Powdery Mildew in apples, Black Spot in pears, Blossom Blight, Brown Rot, Hull Rot, Shot Hole and Rust in stone fruit, and various leaf diseases in tropical fruits. US registration for control of Cercospora in Brassica vegetables, Brassica leafy vegetables, carrot and leaf petioles.	-
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered for control of Alternaria Leaf Spot, Black Spot, Brown Rot Nut Scab, Shot Hole and Rust in almond, Brown Rot in cherries and Husk Spot in macadamia. US registration for control of Cercospora in cucurbits, leafy vegetables and root vegetables (except sugar beet).	-
Mefentrifluconazole (Belanty) BASF	3	Protectant & Curative		P		Registered for control of Black Spot in apples and Powdery Mildew in grapes. US registration for control of Cercospora in corn, legume vegetables, peanuts, sorghum, millet, soybean and sugar beet.	-
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Protective & Curative		P		Registered for control of <i>Botrytis</i> in berries, grapes and strawberries and control of <i>Botrytis</i> and <i>Sclerotinia</i> in leafy vegetables, lettuce and potatoes. US registration for control of Cercospora spp. in specific brassica vegetables, carrots, cucurbits, specific leaf petioles, root and tuber vegetables, mustard greens (suppression) and watercress.	R3

4.2 Insect and mite pests of pumpkin

4.2.1 Insect and mite pest priorities

Common name	Scientific name
High	
Green Peach Aphid	<i>Myzus persicae</i>
Cabbage Aphid	<i>Brevicoryne brassicae</i>
Currant Lettuce Aphid	<i>Nasonovia ribis-nigri</i>
Melon Aphid	<i>Aphis gossypii</i>
Silverleaf Whitefly	<i>Bemisia tabaci</i> Biotype B
Moderate	
Two-Spotted Mite	<i>Tetranychus urticae</i>
Cotton Bollworm / Corn Earworm	<i>Helicoverpa armigera</i>
Native Budworm	<i>Helicoverpa punctigera</i>
Root Knot Nematode	<i>Meloidogyne</i> spp.
Western Flower Thrips	<i>Frankliniella occidentalis</i>
Onion Thrips	<i>Thrips tabaci</i>
Tomato Thrips	<i>Frankliniella schultzei</i>
Plague Thrips	<i>Thrips imaginis</i>
Western Flower Thrips	<i>Frankliniella occidentalis</i>
Low	
Ants	Formicidae
Cucumber Moth	<i>Diaphania indica</i>
Cutworms	<i>Agrotis</i> spp.
Fungus Gnats	<i>Sciaridae</i> spp.
Green Vegetable Bug	<i>Nezara viridula</i>
Jassids / Leafhoppers	Cicadellidae
Mealybug	Pseudococcidae
Black Field Crickets	<i>Teleogryllus commodus</i>
Mole Crickets	<i>Gryllotalpidae</i>
Wingless Grasshopper	<i>Phaulacridium vittatum</i>
Pumpkin Beetle	<i>Aulacophora hilaris</i>

Other new incursions of an exotic pest which pose a potential threat.

Common name	Scientific name
Unknown Priority	
Fall Armyworm	<i>Spodoptera frugiperda</i>
Tomato Potato Psyllid	<i>Bactericera cockerelli</i>
Leafminer species	<i>Liriomyza spp.</i>

The highest priority insect pests identified by the survey are Aphids & Silverleaf whitefly. Available and potential products for all these insects and other pests are in Section 4.2.2.

Resistance to some insect groups has reduced control options despite a range of actives registered. Additionally, not all actives have broad registrations across Lepidoptera. Growers should not exceed the maximum number of applications permitted on the insecticide label.

Resistance Management

There are several insecticide management strategies that apply to cucurbits on the CropLife website⁶, including Silverleaf Whitefly, Mites, Thrips & Aphids.

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

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

4.2.2 Available and potential products for priority insects and mites

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

Availability		Regulatory risk (refer to Appendix 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
Green Peach Aphid (<i>Myzus persicae</i>) Cabbage Aphid (<i>Brevicoryne brassicae</i>) Currant Lettuce Aphid (<i>Nasonovia ribis-nigri</i>) Melon Aphid (<i>Aphis gossypii</i>) Priority: High								
Aphids were ranked as a high priority in QLD & NSW and as a moderate priority in WA. Aphids suck on sap, causing loss of vigour, and in some cases yellowing, stunting or distortion of plant parts. Honeydew can cause sooty mould to develop on leaves. Aphids are important disease vectors in cucurbits.								
Afidopyropen (Versys) BASF	9D	Ingestion	1	A	ALL	Registered in cucurbits for the control of Green Peach Aphid, Cabbage Aphid, Currant Lettuce Aphid and suppression of Silverleaf Whitefly. [Max. 2 applications per crop; re-treatment interval 14 d]	L Bee:L	-
<i>Beauveria bassiana</i> (Velifer) BASF	UNF	Biological	NR	A	ALL	Registered in protected vegetables and ornamentals for suppression of various pests including: Western Flower Thrips, Onion Thrips, Greenhouse Whitefly, Silverleaf Whitefly, Sweet Potato Whitefly, Green Peach Aphid & Two-Spotted Spider Mites. [Max. 3 application per crop; re-treatment interval 3-14 d]	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Cyantraniliprole (Benevia) FMC	28	Ingestion	1	A	ALL	Registered in cucurbits including pumpkins for the control of Melon Aphid , Silverleaf Whitefly, Cotton Bollworm, Cucumber Moth, Native Budworm and suppression of Western Flower Thrips. Apply sequentially for maximum efficacy. [Max. 2 applications per crop; re-treatment interval 7-10 d]	L-M Bee:VH	-
Diafenthiuron + Cyantraniliprole (Minecto Forte) Syngenta	12A+28	Contact & Ingestion	1	A	ALL	Registered in cucurbits and fruiting vegetables (field only) for control of Silverleaf Whitefly, Heliothis, Potato Moth, Cucumber Moth, Cluster Caterpillar, Green Peach Aphid , Two-Spotted Mite and suppression of Western Flower Thrips, Tomato Thrips & Plague Thrips [Max. 2 applications per crop; do not apply consecutive applications; re-treatment interval 28 d].	M Bee:VH	-
Fonicamid (Mainman) UPL	9C	Ingestion	1	A	ALL	Registered in cucurbits for control of Green Peach Aphid, Melon Aphid , and Silverleaf Whitefly. [Max. 3 applications per crop; re-treatment interval 14 d]	M Bee:L	-
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids , Caterpillars, Earwigs, Whitefly, Thrips and Leafhoppers. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-
Imidacloprid (Confidor 200SC) Bayer	4A	Contact & Ingestion	1	A	ALL	Registered in cucurbits for control of Green Peach Aphid as a foliar treatment. [Max. no. of applications & re-treatment intervals not specified]	M Bee:M	R2
Maldison	1B	Contact	3	A	ALL	Registered in vegetables including cucurbits for control of Aphid , Green Vegetable Bug, Jassid, Leafhopper, Rutherglen Bug, Redlegged Earth Mite (excl. TAS) & 28-Spotted Ladybird (excl. TAS) [Apply at first sight of infestation: max no. of applications not specified]	H Bee:H	R3
Petroleum Oil	UN	Contact	1	A	ALL	Registered in cucurbits (field & protected) for control of Aphids , Mites, Thrips and Leafhopper. [Max. 4 applications per season; re-treatment intervals not specified]	VL Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Pirimicarb (Aphidex)	1A	Contact & Ingestion	2	A	ALL	Registered in cucurbits for control of Aphids . [Max. no. of applications not specified; re-treatment 5-10 d]	VL Bee:VL	R3
Potassium Salts of Fatty Acids (Natrasoap)	-	Contact	NR	A	ALL	Registered in vegetables for control of Aphids , Thrips, Mealybug, Two-Spotted Mites, Spider Mite and Whitefly. Apply when temperatures are cooler. [Max no. of applications not specified; re-treatment interval 5-7 d]	L Bee:L	-
Pymetrozine (Chess) Syngenta	9B	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. [Max. 2 applications per crop; re-treatment interval 7 d]	L Bee:VL	R3
Spirotetramat (Movento 240 SC) Bayer	23	Ingestion	1	A	ALL	Registered in cucurbits for the control of Silverleaf Whitefly, Green Peach Aphid and Cotton Aphid . [Max 3 applications per crop; re-treatment interval 7 d]	M Bee:VL	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	1	A	ALL	Registered in cucurbits (field grown only) for control of Green Peach Aphid, Melon Aphid and Greenhouse Whitefly and suppression of Rutherglen Bug. Do not use if honeybees are foraging. [Max. no. of applications not specified; re-treatment interval 7-10 d]	M Bee:VH	-
Emulsifiable Botanical Oil (Eco-Oil)	-	Contact		P-A		Registered in vegetables for control of Greenhouse Whitefly. Registered for control of Aphids in tomatoes, cucumbers, capsicums, strawberries and ornamentals.	L Bee:L	-
Dimpropridaz (Axalion) BASF	TBC			P		BASF has applied for registration in leafy vegetables, brassica vegetables and fruiting vegetables, including cucurbits to control Whitefly, Aphids and Thrips. Pending regulatory approvals, first market introduction in Australia is expected by late 2022 or early 2023.	-	-
Flupyradifurone (Sivanto 200 SL) Bayer	4D	Contact & Ingestion		P		Registered in macadamia for control of Macadamia Lace Bug, Banana Spotting Bug, Fruit Spotting Bug and suppression of Scirtothrips. US registration for control of Green Peach Aphid in cucurbits.	L Bee:VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Novaluron + Acetamiprid (Cormoran) Adama	15+4A	Contact & Ingestion		P		Registered for control of Green Peach Aphid in stone fruit.	M Bee:M	R2
Silverleaf Whitefly (<i>Bemisia tabaci</i>)								
Priority: High								
Silverleaf Whitefly was ranked as a high priority in QLD & NSW and as a moderate priority in WA. High reproduction rate and short generation time results in large numbers that can retard plants simply through feeding. A significant problem is SLW's ability to develop resistance very quickly when insecticides are used repeatedly. They are also vectors for plant viruses.								
Afidopyropen (Versys) BASF	9D	Ingestion	1	A	ALL	Registered in cucurbits for the control of Green Peach Aphid, Cabbage Aphid, Currant Lettuce Aphid and Cotton/Melon Aphids and suppression of Silverleaf Whitefly . [Max. 2 applications per crop; re-treatment interval 14 d]	L Bee:L	-
<i>Beauveria bassiana</i> (Velifer) BASF	UNF	Biological	NR	A	ALL	Registered in protected vegetables and ornamentals for suppression of various pests including: Western Flower Thrips, Onion Thrips, Greenhouse Whitefly, Silverleaf Whitefly , Sweet Potato Whitefly, Green Peach Aphid & Two-Spotted Spider Mites. [Max. 3 application per crop; re-treatment interval 3-14 d]	L Bee:L	-
Bifenthrin (Talstar)	3A	Contact	1	A	QLD, NSW, NT & WA	Registered in cucurbits (field grown only) for control of Native Budworm, Corn Earworm, Cucumber Moth and Silverleaf Whitefly . Adult insects should be targeted. [Max. 2 applications per crop; re-treatment interval not specified]	VH Bee:H	R3
Chlorpyrifos (Lorsban)	1B	Contact	5	A	NSW, WA & ACT	Registered in cucurbits for control of Whiteflies . [Max. no. of applications not specified; re-treatment interval 10-14 d]	H Bee:H	R1

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Cyantraniliprole (Benevia) FMC	28	Ingestion	1	A	ALL	Registered in cucurbits for the control of Melon Aphid, Silverleaf Whitefly , Cotton Bollworm, Cucumber Moth, Native Budworm & suppression Of Western Flower Thrips. [Max. 2 applications per crop; re-treatment interval 7-10 d]	M Bee:VH	-
Diafenthiuron + Cyantraniliprole (Minecto Forte) Syngenta	12A+28	Contact & Ingestion	1	A	ALL	Registered in cucurbits and fruiting vegetables. (field only) for control of Silverleaf Whitefly , Heliiothis, Potato Moth, Cucumber Moth, Cluster Caterpillar, Green Peach Aphid, Two-Spotted Mite and suppression of Western Flower Thrips, Tomato Thrips & Plague Thrips [Max. 2 applications per crop; do not apply consecutive applications; re-treatment interval 28 d].	M Bee:VH	-
Flonicamid (Mainman) UPL	9C	Ingestion	1	A	ALL	Registered in cucurbits for control of Green Peach Aphid, Melon Aphid and Silverleaf Whitefly . [Max. 3 applications per crop; re-treatment interval 14 d]	M Bee:L	-
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, Caterpillars, Earwigs, Whitefly , Thrips and Leafhoppers. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-
Imidacloprid (Confidor Guard) Bayer	4A	Contact & Ingestion	NR	A	ALL	Registered in cucurbits for control of Silverleaf Whitefly as a soil application. [Max. no. of applications & re-treatment intervals not specified]	M Bee:M	R2
Petroleum Oil PER12221	UN	Contact	1	A	ALL (excl. VIC)	Permitted for use in cucurbits for control of Greenhouse Whitefly and Silverleaf Whitefly . [Max. no. of applications and re-treatment intervals not specified]	VL Bee:L	-
Potassium Salts of Fatty Acids (Natrasoap)	-	Contact	NR	A	ALL	Registered in vegetables for control of Aphids, Thrips, Mealybug, Two-Spotted Mites, Spider Mite and Whitefly . Apply when temperatures are cooler. [Max no. of applications not specified; re-treatment interval 5-7 d]	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Pymetrozine (Chess) Syngenta	9B	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. [Max. 2 applications per crop; re-treatment interval 7 d]	L Bee:VL	R3
Pyriproxyfen (Admiral) Sumitomo	7C	Ingestion / IGR	1 NG	A	ALL	Registered in cucurbits for control of Silverleaf Whitefly biotype B) and Greenhouse Whitefly. [Max. 2 applications per season; re-treatment interval 14 d]	VL Bee:L	-
Spirotetramat (Movento 240 SC) Bayer	23	Ingestion	1	A	ALL	Registered in cucurbits for the control of Silverleaf Whitefly , Green Peach Aphid and Cotton Aphid. [Max 3 applications per crop; re-treatment interval 7 d]	M Bee:VL	-
Buprofezin (Applaud) Corteva	16	Ingestion / IGR		P		Registered for control of Silverleaf Whitefly & Greenhouse Whitefly in cotton and tomato. Permitted for use in selected cucurbits for control of Greenhouse Whitefly, Sweet Potato Whitefly & Silverleaf Whitefly .	L Bee:L	-
<i>Clitoria ternatea</i> Extract (Sero-X) Growth Agriculture	-	Biological	NR	P		Registered for control of <i>Helicoverpa</i> spp., Green Mirids and Silverleaf Whitefly in cotton and for control of Diamondback Moth in brassica leafy vegetables.	L Bee:VL	-
Dimpropridaz (Axalion) BASF	TBC			P		BASF has applied for registration in leafy vegetables, brassica vegetables and fruiting vegetables, including cucurbits to control Whitefly , Aphids and Thrips. Pending regulatory approvals, first market introduction in Australia is expected by late 2022 or early 2023.	-	-
Flupyradifurone (Sivanto 200 SL) Bayer	4D	Contact & Ingestion		P		Registered in macadamia for control of Macadamia Lace Bug, Banana Spotting Bug, Fruit Spotting Bug and suppression of Scirtothrips. US registration for control of Whitefly in cucurbits.	L Bee:VL	-
NUL3145 Nufarm	TBC			P		New product from Nufarm with activity on Scale, Nematodes, Mealybug and Whitefly .	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Two-Spotted Mite (<i>Tetranychus urticae</i>)								
Priority: Moderate								
Two-Spotted Mite was ranked as moderate priority in QLD & NSW, and as a low priority in WA. Mites feed on aerial parts of the plant with the damage caused providing entry points for soil-borne disease. Two-Spotted Mite causes minor and infrequent damage to the aerial parts of the plant. Predatory mites (<i>Phytoseiulus persimilis</i>) which attack two-spotted mites are commercially available to release in crops.								
<i>Beauveria bassiana</i> (Velifer) BASF	UNF	Biological	NR	A	ALL	Registered in protected vegetables and ornamentals for suppression of various pests including: Western Flower Thrips, Onion Thrips, Greenhouse Whitefly, Silverleaf Whitefly, Sweet Potato Whitefly, Green Peach Aphid & Two-Spotted Spider Mites . [Max. 3 application per crop; re-treatment interval 3-14 d]	L Bee:L	-
Bifenazate (Acramite) UPL	20D	Contact	1	A	ALL	Registered in cucurbits for control of Two-Spotted Mite and Bryobia Mite. [Max. 1 application per season]	L Bee:H	-
Diafenthiuron + Cyantraniliprole (Minecto Forte) Syngenta	12A+28	Contact & Ingestion	1	A	ALL	Registered in cucurbits and fruiting vegetables (field only) for control of Silverleaf Whitefly, Heliothis, Potato Moth, Cucumber Moth, Cluster Caterpillar, Green Peach Aphid, Two-Spotted Mite and suppression of Western Flower Thrips, Tomato Thrips & Plague Thrips [Max. 2 applications per crop; do not apply consecutive applications; re-treatment interval 28 d].	M Bee:VH	-
Etoxazole (Paramite) Sumitomo PER82460	10B	Contact	7	A	ALL (excl. VIC)	Permitted for use in cucurbits (field & protected) for control of Two-Spotted Mite and Tomato Red Spider Mite. [Max. 1 application per crop]	L Bee:VL	-
Hexythiazox (Calibre) Nufarm PER14765	10A	Contact & Ingestion	3	A	ALL (excl. VIC)	Permitted for use in cucurbits (field & protected) for control of Tomato Russet Mite, Broad Mite, Tomato Red Mite and Two Spotted Mite . [Max. 1 application per crop]	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Petroleum Oil	UN	Contact	1	A	ALL	Registered in cucurbits (field & protected) for control of Aphids, Mites , Thrips and Leafhopper. [Max. 4 applications per season; re-treatment intervals not specified]	VL Bee:L	-
Potassium Salts of Fatty Acids (Natrasoap)	-	Contact	NR	A	ALL	Registered in vegetables for control of Aphids, Thrips, Mealybug, Two-Spotted Mites , Spider Mite and Whitefly. Apply when temperatures are cooler. [Max no. of applications not specified; re-treatment interval 5-7 d]	L Bee:L	-
Propargite (Omite)	12C	Contact	7	A	ALL	Registered in vegetables (field & protected) for control of Two Spotted Mite . Apply at first appearance and repeat as necessary. [Max no. of applications per crop and re-treatment interval not specified]	M Bee:L	R3
Sulphur	UN	Contact	NR	A	VIC, TAS, SA & WA	Registered in vegetables (field & protected) for control of Two-Spotted Mite . [Max no. of applications not specified; re-treatment interval 14-21 d]	L Bee:L	-
Acequinocyl (Kanemite) UPL	20B	Contact & Ingestion		P		Registered for control of Two-Spotted Mite in pome and stone fruit. Canadian registration for control of Two-Spotted Spider Mite and Spruce Spider Mites in greenhouse ornamentals, and Two-Spotted Spider Mite in greenhouse tomato, pepper, eggplant & cucumber.	L Bee:L	-
Cyflumetofen (Danisaraba) BASF	25A	Contact		P		BASF is seeking registration in Australia for the control of Spider Mites in various crops.	L Bee:L	-
Spiromesifen (Oberon) Bayer	23	Ingestion		P		Australian Registration pending for control of Mites in various vegetables crops, including cucurbits. Hort Innovation project ST19020 is undertaking data generation for a new label registration to control Two-Spotted Mite in cucurbits.	M Bee:VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2023 for control of Thrips, Bugs, Mites and Caterpillars.	-	-
Cotton Bollworm / Corn Earworm (<i>Helicoverpa armigera</i>) Native Budworm (<i>Helicoverpa punctigera</i>) Priority: Moderate <i>Helicoverpa</i> was ranked as a moderate priority in QLD and as a low priority in NSW & WA. <i>Helicoverpa armigera</i> is generally regarded as the more serious pest because of its greater capacity to develop resistance to insecticides, broader host range, and persistence in cropping areas from year to year. Larvae feed on leaves but are most damaging when feeding on growing terminals, buds, flowers & fruit. Damage also occurs through bud/fruit shedding and reduced quality.								
<i>Bacillus thuringiensis subsp. kurstaki</i> (DiPel)	11A	Biological	NR	A	ALL	Registered in vegetables for control of Caterpillars, including Helicoverpa spp. [Apply a minimum of 2 sprays, 3 d apart; re-treatment interval 3-5 d]	VL Bee:L	-
Bifenthrin (Talstar)	3A	Contact	1	A	QLD, NSW, NT & WA	Registered in cucurbits (field grown only) for control of Native Budworm, Corn Earworm , Cucumber Moth and Silverleaf Whitefly. Target larvae < 5 mm in length. [Max. 2 applications per crop; re-treatment interval not specified]	VH Bee:H	R3
Chlorantraniliprole (Coragen) FMC	28	Ingestion	1	A	ALL	Registered in cucurbits for the control of Cotton Bollworm, Native Budworm and Cucumber Moth. [Max. 3 applications per crop, no more than 2 consecutive; re-treatment interval 5 d]	L Bee:VL	-
Cyantraniliprole (Benevia) FMC	28	Ingestion	1	A	ALL	Registered in cucurbits for the control of Melon Aphid, Silverleaf Whitefly, Cotton Bollworm , Cucumber Moth, Native Budworm & suppression Of Western Flower Thrips. [Max. 2 applications per crop; re-treatment interval 7-10 d]	M Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Diafenthiuron + Cyantraniliprole (Minecto Forte) Syngenta	12A+28	Contact & Ingestion	1	A	ALL	Registered in cucurbits and fruiting vegetables. (field only) for control of Silverleaf Whitefly, Heliothis , Potato Moth, Cucumber Moth, Cluster Caterpillar, Green Peach Aphid, Two-Spotted Mite and suppression of Western Flower Thrips, Tomato Thrips & Plague Thrips [Max. 2 applications per crop; do not apply consecutive applications; re-treatment interval 28 d].	M Bee:VH	-
Diazinon	1B	Contact	14 G:14	A	ALL (excl. TAS)	Registered in pumpkin for control of Caterpillars and Cutworms. [Max no. of applications and re-treatment interval not specified]	H Bee:H	R3
Emamectin (Proclaim Opti) Syngenta	6	Ingestion	3 NG	A	ALL	Registered in cucurbits (field & protected) for control of Heliothis , Cluster Caterpillar and Cucumber Moth. [Max. 4 applications per crop; re-treatment interval 7 d]	M Bee:H	-
Flubendiamide (Belt) Bayer	28	Ingestion	1	A	ALL	Registered in cucurbits for the control of Helicoverpa spp. and Cucumber Moth. [Max. 3 applications per crop; re-treatment interval 7-14 d]	L-M Bee:L	-
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, Caterpillars , Earwigs, Whitefly, Thrips and Leafhoppers. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-
Helicoverpa NPV (Vivus Max) AgBiTech	31	Biological	NR	A	ALL	Registered in cucurbits for control of Helicoverpa spp. Effective on larvae of <7 mm. [Max no. of applications not specified; re-treatment interval 2-3 d]	VL Bee:L	-
Indoxacarb (Avatar eVo) FMC	28	Ingestion	3 NG	A	ALL	Registered in cucurbits (field) for control of Cotton Bollworm, Native Budworm and Cluster Caterpillar. [Max. 3 applications per crop, no more than 2 consecutive; min. re-treatment interval 7 d]	M Bee:H	R3
Methomyl (Lannate) PER82428	1A	Contact	3	A	ALL	Permitted in cucurbits (field) for control of Helicoverpa spp. , Cucumber Moth, Cluster Caterpillar, Loopers, Webworm, Rutherglen Bug and Thrips including Western Flower Thrips. [Max. 6 applications per season; re-treatment intervals not specified]	VL Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spinetoram (Success Neo) Corteva	5	Ingestion	3	A	ALL	Registered in cucurbits (field & protected) for control of Helicoverpa , Cucumber Moth & Western Flower Thrips. [Max 4 applications per crop; re-treatment interval: 7-14 d]	M Bee:H	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	3 G:14	A	ALL	Registered in cucurbits (field & protected) for control of Cucumber Moth, Helicoverpa & Western Flower Thrips. [Max. 4 applications per season; re-treatment interval 7-14 d]	L Bee:L	-
Broflanilide (Vedira) BASF	30	Contact & Ingestion		P		Pending registration as an ant bait. It also has potential uses as a seed treatment for the control of Wireworms, and a foliar treatment for the control of chewing pests in various crops.	-	-
<i>Clitoria ternatea</i> Extract (Sero-X) Growth Agriculture	-	Biological		P		Registered in cotton for control of Helicoverpa spp. , Green Mirids and Silverleaf Whitefly and in brassica leafy vegetables for control of Diamondback Moth. Label extension has been submitted seeking to add new uses for control of Silverleaf Whitefly and Thrips in brassicas and cucurbits.	L Bee VL	-
Indoxacarb + Novaluron (Plemax) Adama	22A+15	Contact & Ingestion		P		Registered for the control of various Lepidoptera, including Helicoverpa spp. in brassica vegetables, leafy vegetables and fruiting vegetables.	M Bee:H	R3
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera , Bugs, Beetles/Weevils, Fruit Fly and Thrips.	-	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2023 for control of Thrips, Bugs, Mites and Caterpillars .	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Root Knot Nematode (<i>Meloidogyne</i> spp.)								
Priority: Moderate								
Root Knot Nematodes were ranked as moderate priority in QLD and as a low priority in NSW & WA. They are minute, worm-like animals that are quite common in soil. The juveniles hatch from eggs, move through the soil and invade roots near the root tip. Affected plants have an unthrifty appearance and often show symptoms of stunting, wilting or chlorosis. Soil fumigation, use of nematode free transplants and crop rotation are all important management options.								
1,3-dichloropropene + Chloropicrin (Telone C-35)	8B	Soil fumigant	NR	A	ALL (Restricted use TAS, VIC & SA)	Registered in various crops including vegetables for control of 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. Restricted chemical. [Users may require fumigator license]	-	-
Abamectin (Tervigo) Syngenta	6	Contact	NR	A	ALL	Registered in cucurbits for control of Root Knot Nematode . [Max. 4 applications; re-treatment interval 14 d]	M Bee:H	-
Dazomet (Basamid)	8F	Soil fumigant	NR	A	ALL	Registered in broadacre seed beds for control of soil fungi (including <i>Pythium</i> , <i>Phytophthora</i> , <i>Fusarium</i> , and <i>Verticillium</i>), nematodes (cyst and non-cyst forming), soil insects and germinating seeds of weeds.	-	-
Fluensulfone (Nimitz) Adama	-	Contact	NR	A	ALL	Registered in cucurbits (transplanted crops only) for control of Root Knot Nematode . Apply a minimum of 7 d before transplanting.	L Bee:L	-
Fluopyram (Velum Prime) Bayer	-			P		Pending registration for control of nematodes in various crops. US registration for control of nematodes in cucurbits.	L Bee:L	-
Fluazaindolizine (Reklemel, Salibro) Corteva	New			P		New MOA nematicide under development in AU by Corteva, to be launched globally in 2021.		-
NUL3145 Nufarm	TBC			P		New product in development from Nufarm with activity on Scale, Nematodes, Mealybug and Whitefly.		-
SYNSTN1 Syngenta	TBC			P		New nematicide in development from Syngenta.		-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Western Flower Thrips (<i>Frankliniella occidentalis</i>) Onion Thrips (<i>Thrips tabaci</i>) Tomato Thrips (<i>Frankliniella schultzei</i>) Plague Thrips (<i>Thrips imaginis</i>) Priority: Moderate								
Thrips were ranked as a moderate priority in QLD and as a low priority in NSW & WA. Western Flower Thrips develop resistance more easily than other thrips species. They are a vector for many viruses including Tomato Spotted Wilt Virus. MT16009 IPM Project Recommends: The use of predatory thrips, mites & bug releases, control flowering weeds, mulch and use of certified seed.								
<i>Beauveria bassiana</i> (Velifer) BASF	UNF	Biological	NR	A	ALL	Registered in protected vegetables and ornamentals for suppression of various pests including: Western Flower Thrips, Onion Thrips , Greenhouse Whitefly, Silverleaf Whitefly, Sweet Potato Whitefly, Green Peach Aphid & Two-Spotted Spider Mites. [Max. 3 application per crop; re-treatment interval 3-14 d]	L Bee:L	-
Cyantranilprole (Benevia) FMC	28	Ingestion	1	A	ALL	Registered in cucurbits for the control of Melon aphid, Silverleaf Whitefly, Cotton Bollworm, Cucumber Moth, Native Budworm & suppression of Western Flower Thrips . [Max. 2 applications per crop; re-treatment interval 7-10 d]	M Bee:VH	-
Diafenthiuron + Cyantranilprole (Minecto Forte) Syngenta	12A+28	Contact & Ingestion	1	A	ALL	Registered in cucurbits and fruiting vegetables (field only) for control of Silverleaf Whitefly, Heliothis, Potato Moth, Cucumber Moth, Cluster Caterpillar, Green Peach Aphid, Two-Spotted Mite and suppression of Western Flower Thrips, Tomato Thrips & Plague Thrips . [Max. 2 applications per crop; do not apply consecutive applications; re-treatment interval 28 d].	M Bee:VH	-
Diazinon	1B	Contact	14 G:14	A	ALL (excl. TAS)	Registered in cucurbits for control of Thrips . [Max no. of applications and re-treatment interval not specified]	H Bee:VH	R3
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, Caterpillars, Earwigs, Whitefly, Thrips and Leafhoppers. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Methomyl (Lannate) PER82428	1A	Contact	3	A	ALL	Permitted in cucurbits (field) for control of <i>Helicoverpa</i> spp., Cucumber Moth, Cluster Caterpillar, Loopers, Webworm, Rutherglen Bug and Thrips including Western Flower Thrips . [Max. 6 applications per season; re-treatment intervals not specified]	VL Bee:L	-
Petroleum Oil	UN	Contact	1	A	ALL	Registered in cucurbits (field & protected) for control of Aphids, Mites, Thrips and Leafhopper. [Max. 4 applications per season; re-treatment intervals not specified]	VL Bee:L	-
Potassium Salts of Fatty Acids (Natrasoap)	-	Contact	NR	A	ALL	Registered in vegetables for control of Aphids, Thrips , Mealybug, Two-Spotted Mites, Spider Mite and Whitefly. Apply when temperatures are cooler. [Max no. of applications not specified; re-treatment interval 5-7 d]	L Bee:L	-
Spinetoram (Success Neo) Corteva	5	Ingestion	3	A	ALL	Registered in cucurbits (field & protected) for control of <i>Helicoverpa</i> , Cucumber Moth & Western Flower Thrips . [Max 4 applications per crop; re-treatment interval: 7-14 d]	M Bee:H	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	3 G:14	A	ALL	Registered in cucurbits (field & protected) for control of Cucumber Moth, <i>Helicoverpa</i> & Western Flower Thrips . [Max. 4 applications per season; re-treatment interval 7-14 d]	L Bee:L	-
Spirotetramat (Movento 240 SC) Bayer	23	Ingestion	1	P-A	A	Registered in cucurbits for control of Cotton Aphid, Green Peach Aphid & Silverleaf Whitefly. Registered for control of various thrips in green beans, celery, rhubarb, herbs, bulb vegetables, and lettuce.	M Bee:VL	-
Dimpropridaz (Axalion) BASF	TBC			P		BASF has applied for registration in leafy vegetables, brassica vegetables and fruiting vegetables, including cucurbits to control Whitefly, Aphids and Thrips . Pending regulatory approvals, first market introduction in Australia is expected by late 2022 or early 2023.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Flupyradifurone (Sivanto 200 SL) Bayer	4D	Contact & Ingestion		P		Registered in macadamia for control of Macadamia Lace Bug, Banana Spotting Bug, Fruit Spotting Bug and suppression of Scirtothrips. US registration for suppression of Thrips in berries, citrus, fruiting vegetables, tropical and subtropical fruit, and control of Leafhoppers, Aphids, Squash Bug and Whitefly in cucurbits.	L Bee:VL	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and Thrips .	-	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2023 for Thrips , Bugs, Mites and Caterpillars	-	-
Ants (Formicidae)								
Priority: Low								
Ants were ranked as a low priority in QLD, NSW & WA. Chewing mouth parts can damage tender parts of the plants including flowers. This can lead to secondary fungal infections which can affect the yield and quality of crop.								
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants , Aphids, Caterpillars, Earwigs, Whitefly, Thrips and Leafhoppers. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-
Broflanilide (Vedira) BASF	30	Contact & Ingestion		P		Pending registration as an Ant bait.	H Bee:VH	-
Metaflumizone (Siesta Ant Bait) BASF	22B	Ingestion		P		Pending registration as an Ant bait.	M Bee:M	-
Pyriproxyfen (Distance Ant Bait) Sumitomo	7C	IGR / Bait		P		Registered in fruit crops for control of invasive and nuisance Ants .	VL Bee L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Cucumber Moth (<i>Diaphania indica</i>)								
Priority: Low								
Cucumber Moth was ranked as a low priority in QLD, NSW & WA. Larvae cause damage by rolling the leaves with silken threads and eating the leaves between the veins. They also attack flowers and reduce fruit set and fruit quality.								
Bifenthrin (Talstar)	3A	Contact	1	A	QLD, NSW, NT & WA	Registered in cucurbits (field grown only) for control of Native Budworm, Corn Earworm, Cucumber Moth and Silverleaf Whitefly. Adult insects should be targeted. [Max. 2 applications per crop; re-treatment interval not specified]	VH Bee:H	R3
Chlorantraniliprole (Coragen) FMC	28	Ingestion	1	A	ALL	Registered in cucurbits for the control of Cotton Bollworm, Native Budworm and Cucumber Moth . [Max. 3 applications per crop, no more than 2 consecutive; re-treatment interval 5 d]	L Bee:VL	-
Cyantraniliprole (Benevia) FMC	28	Ingestion	1	A	ALL	Registered in cucurbits for the control of Melon Aphid, Silverleaf Whitefly, Cotton Bollworm, Cucumber Moth , Native Budworm & suppression Of Western Flower Thrips. [Max. 2 applications per crop; re-treatment interval 7-10 d]	M Bee:VH	-
Diafenthiuron + Cyantraniliprole (Minecto Forte) Syngenta	12A+28	Contact & Ingestion	1	A	ALL	Registered in cucurbits and fruiting vegetables. (field only) for control of Silverleaf Whitefly, Heliothis, Potato Moth, Cucumber Moth , Cluster Caterpillar, Green Peach Aphid, Two-Spotted Mite and suppression of Western Flower Thrips, Tomato Thrips & Plague Thrips [Max. 2 applications per crop; do not apply consecutive applications; re-treatment interval 28 d].	M Bee:VH	-
Diazinon	1B	Contact	14 G:14	A	ALL (excl. TAS)	Registered in pumpkin for control of Caterpillars and Cutworms. [Max no. of applications and re-treatment interval not specified]	H Bee:H	R3
Enamectin (Proclaim Opti) Syngenta	6	Ingestion	3 NG	A	ALL	Registered in cucurbits (field & protected) for control of Heliothis, Cluster Caterpillar and Cucumber Moth . [Max. 4 applications per crop; re-treatment interval 7 d]	M Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Flubendiamide (Belt) Bayer	28	Ingestion	1	A	ALL	Registered in cucurbits for the control of <i>Helicoverpa</i> spp. and Cucumber Moth . [Max. 3 applications per crop; re-treatment interval 7-14 d]	L-M Bee:L	-
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, Caterpillars , Earwigs, Whitefly, Thrips and Leafhoppers. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-
Methomyl (Lannate) PER82428	1A	Contact	3	A	ALL	Permitted in cucurbits (field) for control of <i>Helicoverpa</i> spp., Cucumber Moth , Cluster Caterpillar, Loopers, Webworm, Rutherglen Bug and Thrips including Western Flower Thrips. [Max. 6 applications per season; re-treatment intervals not specified]	VL Bee:L	-
Spinetoram (Success Neo) Corteva	5	Ingestion	3	A	ALL	Registered in cucurbits (field & protected) for control of <i>Helicoverpa</i> , Cucumber Moth & Western Flower Thrips. [Max 4 applications per crop; re-treatment interval: 7-14 d]	M Bee:H	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	3 G:14	A	ALL	Registered in cucurbits (field & protected) for control of Cucumber Moth , <i>Helicoverpa</i> & Western Flower Thrips. [Max. 4 applications per season; re-treatment interval 7-14 d]	L Bee:L	-
Indoxacarb (Avatar eVo) FMC	28	Ingestion	3 NG	P-A	ALL	Registered in cucurbits (field) for control of Cotton Bollworm, Native Budworm and Cluster Caterpillar.	M Bee:H	R3
Indoxacarb + Novaluron (Plemax) Adama	22A+15	Contact & stomach		P		Registered for control of various Lepidoptera in brassica vegetables, leafy vegetables and fruiting vegetables.	L Bee:H	R3
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera , Bugs, Beetles/Weevils, Fruit Fly and Thrips.	-	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2023 for control of Thrips, Bugs, Mites and Caterpillars .	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Cutworms (<i>Agrotis</i> spp.)								
Priority: Low								
Cutworms were ranked as a low priority in QLD, NSW & WA. Cutworms are caterpillars that attack seedling crops by chewing through leaves and stems at ground level. This frequently results in loss of whole plants which has a significant impact on production. If insecticide control is required, application should be made late afternoon to evening to coincide with when the larvae are feeding.								
Chlorpyrifos (Lorsban)	1B	Contact	5	A	ALL	Registered in young vegetable plants for the control of Cutworms . Apply as a soil drench or boom spray. [Max no. of applications and re-treatment interval not specified]	H Bee:H	R1
Diazinon	1B	Contact	14 G:14	A	ALL (excl. TAS)	Registered in pumpkin for control of Caterpillars and Cutworms . [Max no. of applications and re-treatment interval not specified]	H Bee:H	R3
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, Caterpillars , Earwigs, Whitefly, Thrips and Leafhoppers. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-
Trichlorfon (Lepidex)	1B	Contact	2	A	QLD & NT	Registered in cucurbits for control of Cutworm . Apply in the late afternoon or night. [Max no. of applications and re-treatment interval not specified]	H Bee:H	R2
Fungus Gnats (Diptera)								
Priority: Low								
Fungus Gnats were ranked as a low priority in QLD, NSW & WA. Fungus gnats (<i>Bradysia</i> spp., Sciaridae) are small, mosquito-like flies which are a common problem in nurseries and greenhouses where propagation material and seedlings are being grown.								
<i>Bacillus thuringiensis</i> (Vertobac)	11A	Biological	NR	P		Permitted for control of Fungus Gnats in capsicums (protected situations only).	VL L-Bees	-
Green Vegetable Bug (<i>Nezara viridula</i>)								
Priority: Low								
Green Vegetable Bug was ranked as a low priority in QLD, NSW & WA.								
Maldison	1B	Contact	3	A	ALL	Registered in vegetables including cucurbits for control of Aphid, Green Vegetable Bug , Jassid, Leafhopper, Rutherglen Bug, Redlegged Earth Mite (excl. TAS) & 28-Spotted Ladybird (excl. TAS) [Apply at first sight of infestation: max no. of applications not specified]	H Bee:H	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Trichlorfon (Lepidex)	1B	Contact	2	A	ALL	Registered in vegetables for control of Green Vegetable Bug and Rutherglen Bug. Apply at first sight of infestation. [Max no. of applications not specified; re-treatment interval 7-10 d]	H Bee:H	R2
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	1	P-A	ALL	Registered in cucurbits (field grown only) for control of Green Peach Aphid, Melon Aphid and Greenhouse Whitefly and suppression of Rutherglen Bug. US registration for suppression of Stink Bugs in succulent, edible podded and dry beans.	M Bee:H	-
Flupyradifurone (Sivanto 200 SL) Bayer	4D	Contact & Ingestion		P		Registered in macadamia for control of Macadamia Lace Bug, Banana Spotting Bug, Fruit Spotting Bug and suppression of Scirtothrips. US registration for control of Leafhoppers, Aphids, Squash Bug and Whitefly in cucurbits.	L Bee:VL	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs , Beetles/Weevils, Fruit Fly and Thrips.	-	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2023 for Thrips, Bugs , Mites and Caterpillars.	-	-
Jassids / Leafhoppers (<i>Cicadellidae</i>)								
Priority: Low								
Jassids were ranked as a low priority in QLD, NSW & WA. Adult and nymph leafhoppers suck sap and inject toxins into the plant. Some species transmit diseases such as viruses and phytoplasmas. Perimeter sprays may be effective for minimising vector transmission.								
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, Caterpillars, Earwigs, Whitefly, Thrips and Leafhoppers . Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-
Maldison	1B	Contact	3	A	ALL	Registered in vegetables including cucurbits for control of Aphid, Green Vegetable Bug, Jassid, Leafhopper , Rutherglen Bug, Redlegged Earth Mite (excl. TAS) & 28-Spotted Ladybird (excl. TAS) [Apply at first sight of infestation: max no. of applications not specified]	H Bee:H	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Petroleum Oil	UN	Contact	1	A	ALL	Registered in cucurbits (field & protected) for control of Aphids, Mites, Thrips and Leafhopper . [Max. 4 applications per season; re-treatment intervals not specified]	VL Bee:L	-
Sulfoxaflor (Transform) Corteva	4C	Contact and Ingestion	1	P-A	ALL	Registered in cucurbits (field grown only) for control of Green Peach Aphid, Melon Aphid and Greenhouse Whitefly and suppression of Rutherglen Bug. US registration for control of Leafhoppers in berries, pome fruit and root and tuber vegetables.	M Bee:H	-
Buprofezin (Applaud) Corteva	16	Ingestion / IGR		P		Registered for control of Leafhopper in citrus.	L Bee:L	-
Flupyradifurone (Sivanto 200 SL) Bayer	4D	Contact & Ingestion		P		Registered in macadamia for control of Macadamia Lace Bug, Banana Spotting Bug, Fruit Spotting Bug and suppression of Scirtothrips. US registration for control of Leafhoppers in cucurbits.	L Bee:VL	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs , Beetles/Weevils, Fruit Fly and Thrips.	-	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2023 for Thrips, Bugs , Mites and Caterpillars.	-	-
Mealybug (<i>Pseudococcidae</i>)								
Priority: Low								
Mealybugs were ranked as a low priority in QLD, NSW & WA. Mealybugs are small insects covered with a white mealy coating. The bugs feed by sucking on plant sap and they excrete a sticky substance called honey dew which ants like to feed on. The honeydew also provides a perfect medium for sooty mould growth. It can downgrade the quality of the fruit if left uncontrolled.								
Potassium Salts of Fatty Acids (Natrasoap)	-	Contact	NR	A	ALL	Registered in vegetables for control of Aphids, Thrips, Mealybug , Two-Spotted Mites, Spider Mite and Whitefly. Apply when temperatures are cooler. [Max no. of applications not specified; re-treatment interval 5-7 d]	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Fonicamid (Mainman) UPL	9C	Ingestion	1 NG	P-A	ALL	Registered in cucurbits for control of Aphids and Silverleaf Whitefly. Registered for control of Mealybugs in apples and pears.	M Bee:L	-
Spirotetramat (Movento 240 SC) Bayer	23	Ingestion	1	P-A	A	Registered in cucurbits for control of Cotton Aphid, Green Peach Aphid & Silverleaf Whitefly. Registered for control of Mealybugs in citrus, cotton, grapes, mango, passionfruit, pome fruit and stone fruit.	M Bee:VL	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	1	P-A	ALL	Registered in cucurbits (field grown only) for control of Green Peach Aphid, Melon Aphid and Greenhouse Whitefly and suppression of Rutherglen Bug. Registered for control of Mealybugs in citrus, cotton, grapes, nashi pear and pome fruit.	M Bee:VH	-
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Contact & Ingestion / IGR		P		Registered for control of Mealybugs in citrus, grapes and macadamia.	M Bee:M	R2
Buprofezin (Applaud) Corteva	16	Ingestion / IGR		P		Registered for control of Mealybug in citrus, cotton, custard apple, grapes, passionfruit, pear and persimmon.	L Bee:L	-
Flupyradifurone (Sivanto 200 SL) Bayer	4D	Contact & Ingestion		P		Registered in macadamia for control of Macadamia Lace Bug, Banana Spotting Bug, Fruit Spotting Bug and suppression of Scirtothrips. US registration for control of Leafhoppers, Aphids, Squash Bug and Whitefly in cucurbits.	L Bee:VL	-
NUL3145 Nufarm	TBC			P		New product from Nufarm with activity on Scale, Nematodes, Mealybug and Whitefly .	-	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2023 for Thrips, Bugs , Mites and Caterpillars.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Black Field Crickets (<i>Teleogryllus commodus</i>)								
Mole Crickets (<i>Gryllotalpidae</i>)								
Priority: Low								
Crickets were ranked as a low priority in QLD, NSW & WA. They have a voracious appetite and can cause severe damage to foliage if the numbers get high. Damage is limited to feeding on newly established plants and reducing plant populations.								
Chlorpyrifos (Lorsban)	1B	Contact	5	A	QLD & WA	Registered in young vegetable plants for the control of Field Crickets and Mole Crickets . Apply as a soil drench or boom spray. [Max no. of applications and re-treatment interval not specified]	H Bee:H	R1
Dazomet (Basamid)	8F	Soil fumigant	NR	A	ALL	Registered in broadacre seed beds for control of soil fungi (including <i>Pythium</i> , <i>Phytophthora</i> , <i>Fusarium</i> , and <i>Verticillium</i>), nematodes (cyst and non-cyst forming), soil insects and germinating seeds of weeds.	-	-
Fipronil (Regent)	2B	Contact		P		Registered for control of Mole Crickets in potatoes.	M H-Bees	R3
Wingless Grasshopper (<i>Phaulacridium vittatum</i>)								
Priority: Low								
Wingless Grasshopper was ranked as a low priority in QLD, NSW & WA. They have a voracious appetite and can cause severe damage to foliage if the numbers get high. Damage is limited to feeding on newly established plants and reducing plant populations.								
Fenitrothion	1B	Contact		P		Registered for the control of a range of grasshoppers and locusts. in cabbage.	H Bee:H	-
Pumpkin Beetle (<i>Aulacophora hilaris</i>)								
Priority: Low								
Pumpkin Beetle was ranked as a low priority in QLD, NSW & WA. Larvae are soil dwelling and adults have strong nocturnal activity. Adults chew plants at or just beneath ground level and may chew right through the plant.								
Dazomet (Basamid)	8F	Soil fumigant	NR	A	ALL	Registered in broadacre seed beds for control of soil fungi (including <i>Pythium</i> , <i>Phytophthora</i> , <i>Fusarium</i> , and <i>Verticillium</i>), nematodes (cyst and non-cyst forming), soil insects and germinating seeds of weeds.	-	-
Maldison	1B	Contact	3	A	SA, NSW, VIC, WA & NT	Registered in cucurbits for control of Pumpkin Beetle . [Max. no. of applications and re-treatment interval not specified]	H Bee:H	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spinosad (Entrust Organic) Corteva	5	Contact and ingestion	3 G:14	P-A	ALL	Registered in cucurbits for control of Cucumber Moth, Helicoverpa & Western Flower Thrips. US registration for control of various beetles in asparagus, brassica leafy vegetables, bulb vegetables, ornamentals, root and tuber vegetables, spices and fruiting vegetables.	L Bee:L	-
Cyantraniliprole + Thiamethoxam (Spinner) Syngenta	4A+28	Contact & Ingestion		P		Registered for control of Cutworms, Armyworms, African Black Beetle larvae, Argentinian Scarab larvae and Stem Weevil larvae in turf. Canadian registration for control of various beetles in potatoes, leafy vegetables and brassica vegetables.	M Bee:VH	R2
Tetraniliprole (Vayego) Bayer	28	Ingestion		P		Registered in Australia in multiple crops for various insect pests such as Beetles , Weevils & Lepidoptera. Hort Innovation has several projects underway towards assisting registration in minor crops.	M Bee:VH	-

Fall Armyworm (*Spodoptera frugiperda*)

Priority: Unknown

Fall Armyworm was not ranked as a pest in pumpkin. It is an exotic pest that is considered a potential threat that could affect most vegetable crops if allowed to spread. It is important to monitor crops for eggs and larvae of pest species by regular field scouting. Target sprays against mature eggs and newly hatched larvae before pests become entrenched.

Chlorantraniliprole (Coragen) FMC PER89259	28	Ingestion	1	A	ALL (excl. VIC)	Permitted for use in fruiting vegetables including cucurbits (field) for control of Fall Armyworm . [Max. 3 applications per crop; 2 consecutive; re-treatment interval 7 d]	L Bee:VL	-
Emamectin (Proclaim Opti) Syngenta PER89263	6	Ingestion	3 NG	A	ALL (excl. VIC)	Permitted for use in cucurbits (field & protected cropping) for control of Fall Armyworm . [Max 4 applications per crop; re-treatment interval: 7 d]	M Bee:H	-
Methomyl (Lannate) PER89293	1A	Contact	3	A	ALL (excl. VIC)	Permitted for use in fruiting vegetables including cucurbits (field only) for control of Fall Armyworm . [Max. 6 application per crop; re-treatment interval 7 d]	H Bee:H	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spinetoram (Success Neo) Corteva PER89241	5	Ingestion	3	A	ALL (excl. VIC)	Permitted for use in fruiting vegetables including cucurbits (field) for control of Fall Armyworm . [Max. 4 applications per crop; re-treatment interval 7-14 d]	M Bee:H	-
Spinosad (Entrust Organic) Corteva PER89870	5	Ingestion	3 G:14	A	ALL (excl. VIC)	Permitted for use in cucurbits (field & protected cropping) for control of Fall Armyworm . [Max. 4 applications per season; re-treatment interval 7-14 d]	L Bee:L	-
Indoxacarb (Avatar eVo) FMC	28	Ingestion	3 NG	P-A	ALL	Registered in cucurbits (field) for control of Cotton Bollworm, Native Budworm and Cluster Caterpillar. Permitted for control of Fall Armyworm in broccoli, brussels sprouts, cabbage (closed head varieties only), cauliflower, celery, capsicum, eggplant, peppers tomato (field or trellis), leafy vegetables and chinese leafy vegetables.	M Bee:H	R3
Amorphous Silica (Abrade) Grow Choice	-	Contact		P		Registered for control of <i>Spodoptera</i> spp. in fruiting vegetables and permitted for (PER90841) control of Fall Armyworm in sweet corn.	L Bee:L	-
Broflanilide (Vedira) BASF	30	Contact & Ingestion		P		Registration submitted concurrently in Australia, Canada, USA, and Mexico as a soil application and seed treatment against chewing insects such as ants, cockroaches and <i>Spodoptera</i> spp. BASF are seeking registrations in amenity turf initially, then potential horticultural crops thereafter.	H Bee:VH	-
Magnet Insect Attractant Technology PER89398	-	Attractant		P		Permitted for control of Fall Armyworm in cotton, cereal grains, sweet corn, pastures & oilseeds.	-	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera , Bugs, Beetles/Weevils, Fruit Fly and Thrips.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
<i>Spodoptera frugiperda</i> Multiple Nucleopolyhedrovirus (Fawligen) AgBiTech	31	Biological		P		Permitted for control of Fall Armyworm in legume vegetables, root & tuber vegetables & sweet corn.	VL Bee:L	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2023 for Thrips, Bugs, Mites and Caterpillars .	-	-
Tetraniliprole (Vayego) Bayer	28	Ingestion		P		Registered in Australia in multiple crops for various insect pests such as Beetles, Weevils & Lepidoptera . Hort Innovation has several projects underway towards assisting registration in minor crops. Indonesia registration for control of Liriomyza Leafminers and Fall Armyworm in vegetable crops.	M Bee:VH	-
Tomato Potato Psyllid (<i>Bactericera cockerelli</i>)								
Priority: Unknown								
Tomato Potato Psyllid was not ranked as a pest in pumpkin. It is an exotic pest that is considered a potential threat that could affect most vegetable crops if allowed to spread.								
Abamectin	6	Contact	3	P-A	ALL	Registered in zucchini for control of Two-Spotted Mite. Registered for control of Tomato Potato Psyllid in cut flowers, fruiting vegetables and nursery stock.	M Bee:H	-
Cyantraniliprole (Benevia) FMC PER84805	28	Ingestion	1 NG	P-A	ALL (excl. VIC)	Registered in cucurbits for the control of Melon Aphid, Silverleaf Whitefly, Cotton Bollworm, Cucumber Moth, Native Budworm & suppression Of Western Flower Thrips. Permitted for use in fruiting vegetables for control of Tomato Potato Psyllid .	M Bee:VH	-
Spinetoram (Success Neo) Corteva	5	Ingestion	1	P-A	ALL	Registered in cucurbits for the control of Cucumber Moth, <i>Helicoverpa</i> spp. and Western Flower Thrips. Permitted for control of Tomato Potato Psyllid in fruiting vegetables and root/tuber vegetables.	M Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spirotetramat (Movento 240 SC) Bayer	23	Ingestion	1	P-A	A	Registered in cucurbits for control of Cotton Aphid, Green Peach Aphid & Silverleaf Whitefly. Permitted for control of Tomato Potato Psyllid in potato, sweet potato, tomato, capsicum, chilli, pepper and eggplant.	M Bee:VL	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	1	P-A	ALL	Registered in cucurbits (field grown only) for control of Green Peach Aphid, Melon Aphid and Greenhouse Whitefly and suppression of Rutherglen Bug. Permitted for use in in fruiting vegetables (field) for control of Tomato Potato Psyllid .	M Bee:H	-
Spiromesifen (Oberon) Bayer	23	Ingestion		P		Australian registration pending for control of Mites in various vegetables crops, including cucurbits. US registration for control of Tomato Potato Psyllid in tuberous and corm vegetables. Hort Innovation project ST19020 is undertaking data generation for a new label registration to control Two-Spotted Mite in cucurbits.	M Bee:VL	-

Leafminers (*Liriomyza* spp.)

Priority: Unknown

Vegetable Leafminer was not ranked as a pest in pumpkin. Dipteran Leafminers (*Liriomyza* spp.) are exotic pests that have recently been detected and become problematic in Australia. For example, the Serpentine Leafminer was first detected in the Sydney area in October 2020 and has since been found in crops in SE Qld. As a group they are destructive pests and can cause significant economic loss through reduced yields and quality when uncontrolled.

Abamectin PER81876	4C	Contact & Ingestion	7 NG	A	ALL (excl. VIC)	Permitted for use in fruiting vegetables including cucurbits (field) for suppression of Leafminers including Vegetable Leafminer and Serpentine Leafminer . [Max. 2 application per crop; re-treatment interval 7-14 d]	M Bee:H	-
Cyromazine (Diptex 150 WP) PER81867	17	Insect Growth Regulator	7 NG	A	ALL	Permitted for use in fruiting vegetables including cucurbits for control of <i>Liriomyza</i> species, including: Vegetable Leafminer and Serpentine Leafminer . [Max. 6 applications per crop; re-treatment interval 7 d]	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spinetoram (Success Neo) Corteva PER91155	5	Ingestion	3	A	ALL (excl. VIC)	Permitted for use in cucurbits for control of <i>Liriomyza</i> species, including Vegetable Leafminer, Pea Leafminer / Serpentine Leafminer and American Serpentine Leafminer . [Max. 4 applications per crop; re-treatment interval 7-14 d]	M Bee:H	-
Spinosad (Entrust Organic) Corteva PER90928	5	Ingestion	3	A	ALL (excl. VIC)	Permitted for use in cucurbits for control of <i>Liriomyza</i> species, including Vegetable Leafminer, Pea Leafminer / Serpentine Leafminer and American Serpentine Leafminer . [Max. 6 applications per crop; re-treatment interval 7 d]	L Bee:L	-
Chlorantraniliprole (Coragen) FMC	28	Ingestion	1	P-A	ALL	Registered in cucurbits for the control of Cotton Bollworm, Native Budworm and Cucumber Moth. Permitted for control of Liriomyza Leafminers in spinach and silverbeet.	L Bee:VL	-
Emamectin (Proclaim Opti) Syngenta	6	Ingestion	3 NG	P-A	ALL	Registered in cucurbits (field & protected) for control of Heliothis, Cluster Caterpillar and Cucumber Moth. Permitted for control of <i>Liriomyza</i> species, including Vegetable Leafminer in Brassica vegetables.	M Bee:H	-
Spinetoram (Success Neo) Corteva	5	Ingestion	1	P-A	ALL	Registered in cucurbits for the control of Cucumber Moth, <i>Helicoverpa</i> spp. and Western Flower Thrips. Permitted for control of Liriomyza Leafminers in snow peas, sugar snap peas and green beans.	M Bee:H	-
Spirotetramat (Movento 240 SC) Bayer	23	Ingestion	1	P-A	ALL	Registered in cucurbits for control of Cotton Aphid, Green Peach Aphid & Silverleaf Whitefly. Permitted for control of Liriomyza Leafminers in snow peas, sugar snap peas, lettuce, parsley, eggplant, capsicum, chilli, tomato, green beans, celery and rhubarb.	M Bee:VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Tetraniliprole (Vayego 200 SC) Bayer	28	Ingestion		P		Registered in Australia in multiple crops for various insect pests such as Beetles, Weevils & Lepidoptera. Hort Innovation has several projects underway towards assisting registration in minor crops. Indonesia registration for control of Liriomyza Leafminers and Fall Armyworm in vegetable crops.	M Bee:VH	-

4.3 Weeds in pumpkins

4.3.1 Weed priorities

Common Name	Scientific Name
High	
Nutgrass	<i>Cyperus rotundus</i>
Blackberry Nightshade	<i>Solanum nigrum</i>
Fat Hen	<i>Chenopodium album</i>
Moderate	
Amaranthus	<i>Amaranthus</i> spp.
Pigweed	<i>Portulaca oleracea</i>
Low	
Grass Weeds	<i>Poaceae</i>

The high priority weed issues based on the feedback received were Blackberry nightshade, Fat hen and Nutgrass. Managing these weeds would be possible using herbicides mentioned in Appendix 3 or by various management practices such as soil fumigation, pre-crop spraying, spot spraying, or using mechanical devices.

For weed management, some growers transplant seedlings to plastic mulch beds, with drip irrigation. Growers generally use a pre-plant weed control (general knockdown herbicides) to prepare the paddock. Growers then either alternate the herbicides used or use them in combination for effective weed control. All the herbicides registered/permited are either pre-emergent herbicides or early post-emergent herbicides. Most weeds can be controlled with currently available herbicides.

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 webpage⁷.

⁷ <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
Nutgrass (<i>Cyperus rotundus</i>)							
Priority: High							
Nutgrass was ranked as a high priority in QLD & NSW and as a moderate priority in WA. Prefers damp, water-logged soils but can survive for years underground during dry times. Herbicide options are limited and unreliable. Improve soil drainage if possible.							
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including Nutgrass .	NR	A	ALL	R3
Norflurazon (Zoliar) AgNova	F**		Registered for control of Nutgrass in asparagus, citrus, grapes, nuts, stone & pome fruits.		P		-
Blackberry Nightshade (<i>Solanum nigrum</i>)							
Priority: High							
Blackberry Nightshade was ranked as a high priority in QLD, as a moderate priority in NSW and as a low priority in WA. Prolific weed that is widely adapted and difficult to eradicate, mainly due to its long-term seed viability. Management options include soil fumigation, pre-crop spraying, spot spraying or using mechanical devices.							
Clomazone	Q**	Cucurbits / Pre-emergent residual	Registered in cucurbits for control of various broadleaf weeds, including Blackberry Nightshade .	NR	A	ALL	-

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Dimethenamid-P (Outlook) BASF	K**	Pumpkins / Residual / Pre-emergent	Registered in pumpkins for control of grass and broadleaf weeds including Blackberry Nightshade . Irrigation or rain is required within 7 d of application.	28	A	NR G:28	-
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including Blackberry Nightshade .	NR	A	ALL	R3
Paraquat + Diquat (SpraySeed)	L**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including Blackberry Nightshade .	1 G:1	A	ALL	R3
Aclonifen (Emerger) Bayer	H**	Pre-Emergence	Bayer is expected to seek registration for pre-emergent control of grass and broadleaf weeds in various vegetable crops. Registered in Europe for use in potatoes, legume vegetables and cereals. Blackberry Nightshade is listed as moderately susceptible at a high rate.		P		-
Chloridazon (Pyramin) BASF	C**		Registered for control of various grass and broadleaf weeds including Blackberry Nightshade in fodder beet, red beet and silver beet.		P		-
Chlorthal-Dimethyl (Dacthal)	D**		Registered for control of various grass and broadleaf weeds including Blackberry Nightshade in lettuce.		P		-
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including Blackberry Nightshade in Brassica vegetables, culinary herbs, rhubarb, spinach, silverbeet, spring onions, beans, sweet corn, sweet potato and fallow.		P		-
Norflurazon (Zoliar) AgNova	F**		Registered for control of grass and broadleaf weeds including Blackberry Nightshade in asparagus, citrus, grapes, nuts, stone & pome fruits.		P		-
NUL3438 Nufarm	TBC		New active in development, Nufarm claims activity on broadleaf weeds.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Oxyfluorfen (Goal)	G**		Registered for control of grass and broadleaf weeds, including Blackberry Nightshade in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
Phenmedipham (Betanal) Bayer	C**		Registered for control of grass and broadleaf weeds including Blackberry Nightshade in silverbeet and beetroot.		P		R3
Fat Hen (<i>Chenopodium album</i>)							
Priority: High							
Fat Hen was ranked as a high priority in QLD, as a moderate priority in NSW and as a low priority in WA. Herbicide control can be difficult and targeting weeds at early growth stages is critical.							
Clomazone	Q**	Cucurbits / Pre-emergent residual	Registered in cucurbits for control of various broadleaf weeds, including Fat Hen .	NR	A	ALL	-
Dimethenamid-P (Outlook) BASF	K**	Pumpkins / Residual / Pre-emergent	Registered in pumpkins for control of grass and broadleaf weeds including Fat Hen . Irrigation or rain is required within 7 d of application.	28	A	NR G:28	-
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including Fat Hen .	NR	A	ALL	R3
Paraquat + Diquat (SpraySeed)	L**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including Fat Hen .	1 G:1	A	ALL	R3
Aclonifen (Emerger) Bayer	H**	Pre-Emergence	Bayer is expected to seek registration for pre-emergent control of grass and broadleaf weeds in various vegetable crops. Registered in Europe for use in potatoes, legume vegetables and cereals. Fat Hen is listed as susceptible.		P		-
Bentazone (Basagran) BASF	C**		Registered in beans for control of several broad leaf weeds including Fat Hen . [Max no. of applications and re-treatment interval not specified]		P		-

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Chloridazon (Pyramin) BASF	C**		Registered for control of various grass and broadleaf weeds including Fat Hen in fodder beet, red beet and silver beet.		P		-
Chlorthal-Dimethyl (Dacthal)	D**		Registered for control of various grass and broadleaf weeds including Fat Hen in lettuce.		P		-
Dimethenamid-P (Outlook) BASF	K**		Registered for control of grass and broadleaf weeds including Fat Hen in sweet corn, beans, peas, pumpkins and kabocha.		P		-
Glufosinate- Ammonium (Basta) BASF	N**		Registered for control of grass and broadleaf weeds including Fat Hen in berries, tomatoes, beans and fallow.		P		R3
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including Fat Hen in Brassica vegetables, culinary herbs, rhubarb, spinach, silverbeet, spring onions, beans, sweet corn, sweet potato and fallow.		P		-
Norflurazon (Zoliar) AgNova	F**		Registered for control of grass and broadleaf weeds including Fat Hen in asparagus, citrus, grapes, nuts, stone & pome fruits.		P		-
NUL3438 Nufarm	TBC		New active in development, Nufarm claims activity on broadleaf weeds.		P		-
Oxyfluorfen (Goal)	G**		Registered for control of grass and broadleaf weeds, including Fat Hen in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
Phenmedipham (Betanal) Bayer	C**		Registered for control of grass and broadleaf weeds including Fat Hen in silverbeet and beetroot.		P		R3
Propachlor (Ramrod) Nufarm	K**		Registered for control of broadleaf and grass weeds including Fat Hen in Brassica vegetables		P		R3

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Amaranthus (<i>Amaranthus spp.</i>)							
Priority: Moderate							
Amaranthus was ranked as a moderate priority in QLD, NSW & WA. It is a short-lived annual weed that is a prolific seed producer.							
Clomazone	Q**	Cucurbits / Pre-emergent residual	Registered in cucurbits for control of various broadleaf weeds, including Amaranthus .	NR	A	ALL	-
Dimethenamid-P (Outlook) BASF	K**	Pumpkins / Residual / Pre-emergent	Registered in pumpkins for control of grass and broadleaf weeds including Amaranthus . Irrigation or rain is required within 7 d of application.	28	A	NR G:28	-
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including Amaranthus .	NR	A	ALL	R3
Paraquat + Diquat (SpraySeed)	L**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including Amaranthus .	1 G:1	A	ALL	R3
Chlorthal-Dimethyl (Dacthal)	D**		Registered for control of various grass and broadleaf weeds including Amaranthus in lettuce.		P		-
Dimethenamid-P (Outlook) BASF	K**		Registered for control of grass and broadleaf weeds including Amaranthus in sweet corn, beans, peas, pumpkins and kabocha.		P		-
Phenmedipham (Betanal) Bayer	C**		Registered for control of grass and broadleaf weeds including Amaranthus in silverbeet and beetroot.		P		R3
Glufosinate- Ammonium (Basta) BASF	N**		Registered for control of grass and broadleaf weeds including Amaranthus in berries, tomatoes, beans and fallow.		P		R3
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including suppression of Amaranthus in Brassica vegetables, culinary herbs, rhubarb, spinach, silverbeet, spring onions, beans, sweet corn, sweet potato and fallow.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
NUL3438 Nufarm	TBC		New active in development, Nufarm claims activity on broadleaf weeds.		P		-
Oxyfluorfen (Goal)	G**		Registered for control of grass and broadleaf weeds, including Amaranthus in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
Pigweed (<i>Portulaca oleracea</i>)							
Priority: Moderate							
Pigweed was ranked as a moderate priority in QLD, NSW & WA. Summer growing weed that competes aggressively in-crop and can be difficult to control with herbicides. Management options include soil fumigation, pre-crop spraying, spot spraying or using mechanical devices.							
Clomazone	Q**	Cucurbits / Pre-emergent residual	Registered in cucurbits for control of various broadleaf weeds, including Pigweed .	NR	A	ALL	-
Dimethenamid-P (Outlook) BASF	K**	Pumpkins / Residual / Pre-emergent	Registered in pumpkins for control of grass and broadleaf weeds including Pigweed . Irrigation or rain is required within 7 d of application.	28	A	NR G:28	-
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including Pigweed .	NR	A	ALL	R3
Paraquat + Diquat (SpraySeed)	L**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including Pigweed .	1 G:1	A	ALL	R3
Chloridazon (Pyramin) BASF	C**		Registered for control of various grass and broadleaf weeds including Pigweed in fodder beet, red beet and silver beet.		P		-
Chlorthal-Dimethyl (Dacthal)	D**		Registered for control of various grass and broadleaf weeds including Pigweed in lettuce.		P		-
Dimethenamid-P (Outlook) BASF	K**		Registered for control of grass and broadleaf weeds including Pigweed in sweet corn, beans, peas, pumpkins and kabocha.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Glufosinate-Ammonium (Basta) BASF	N**		Registered for control of grass and broadleaf weeds including Pigweed in berries, tomatoes, beans and fallow.		P		R3
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including suppression of Pigweed in Brassica vegetables, culinary herbs, rhubarb, spinach, silverbeet, spring onions, beans, sweet corn, sweet potato and fallow.		P		-
Norflurazon (Zoliar) AgNova	F**		Registered for control of grass and broadleaf weeds including Pigweed in asparagus, citrus, grapes, nuts, stone & pome fruits.		P		-
NUL3438 Nufarm	TBC		New active in development, Nufarm claims activity on broadleaf weeds.		P		-
Oxyfluorfen (Goal)	G**		Registered for control of grass and broadleaf weeds, including Pigweed in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
Phenmedipham (Betanal) Bayer	C**		Registered in silverbeet and beetroot for control of a range of weeds, including, Blackberry nightshade, Cape weed, Chickweed, Fat hen, Pigweed and Amaranthus. Apply when weeds are at 2-leaf stage. [Max no of applications and re-treatment interval not specified]		P		R3
Propachlor (Ramrod) Nufarm	K**		Registered for control of broadleaf and grass weeds including Pigweed in Brassica vegetables		P		R3

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Grass Weeds (<i>Poaceae</i>)							
Priority: Unknown							
Grass Weeds were not ranked as priority. They can compete aggressively in-crop, particularly as the crop is establishing ground cover.							
Dimethenamid-P (Outlook) BASF	K**	Pumpkins / Residual / Pre-emergent	Registered in pumpkins for control of grass and broadleaf weeds. Irrigation or rain is required within 7 d of application.	28	A	NR G:28	-
Fluazifop-P Butyl (Fusilade)	A***	Cucurbits / Selective post-emergent	Registered as a selective post-emergence application in cucurbits for control of grass weeds.	21	A	ALL	-
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds.	NR	A	ALL	R3
Paraquat + Diquat (SpraySeed)	L**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds.	1 G:1	A	ALL	R3
Quizalofop-P-Ethyl	A***	Cucurbits, pumpkins / Post- emergent grass selective	Registered in cucurbits including pumpkin for control of various grass weeds. Apply when weeds are actively growing.	63	A	ALL	R3
Sethoxydim (Sertin)	A***	Pumpkins / Post- emergent	Registered as a selective post-emergence application in pumpkins for control of grass weeds. Do not apply overhead irrigation within 2 h of application.	28	A	ALL	-
Glufosinate- Ammonium (Basta) BASF	N**		Registered for control of grass and broadleaf weeds in berries, tomatoes, beans and fallow.		P		R3
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds in Brassica vegetables, culinary herbs, rhubarb, spinach, silverbeet, spring onions, beans, sweet corn, sweet potato and fallow.		P		-
Norflurazon (Zoliar) AgNova	F**		Registered for control of grass and broadleaf weeds in asparagus, citrus, grapes, nuts, stone & pome fruits.		P		-
Propachlor (Ramrod) Nufarm	K**		Registered for control of broadleaf and grass weeds including Fat Hen in Brassica vegetables		P		R3

5. References

5.1 Information:

AgChem Access Priority Access Forum	https://www.agrifutures.com.au/national-rural-issues/agvet-chemicals/
Australian Pesticide and Veterinary Medicines Authority	www.apvma.gov.au
APVMA Chemical review	https://apvma.gov.au/chemicals-and-products/chemical-review/listing
APVMA MRLs	www.legislation.gov.au/Details/F2021C00380
APVMA Permit search	https://productsearch.apvma.gov.au/permits
APVMA Product search	https://productsearch.apvma.gov.au/products
AUSVEG	https://ausveg.com.au
Codex MRL database	http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/
Cotton Pest Management Guide 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

5.2 Abbreviations and Definitions:

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

5.3 Acknowledgements:

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

6. Appendices:

- Appendix 1. Products available for disease control in pumpkin
- Appendix 2. Products available for control of insects and mites in pumpkin
- Appendix 3. Products available for weed control in pumpkin
- Appendix 4. Current permits for use in pumpkin
- Appendix 5. Pumpkin Maximum Residue Limits (MRLs)
- Appendix 6. Pumpkin Agrichemical Regulatory Risk Assessment

Appendix 1. Products available for disease control in pumpkin

Active Ingredient (Trade Name)	Chem. group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
1,3-dichloropropene + Chloropicrin (Telone C-35)	8B	Field crops / Fumigant	Plant parasitic Nematodes, Symphylans, Wireworms, soil borne diseases (including Fusarium and Verticillium Wilts, Rhizoctonia, Pythium) & suppression of weeds.	ALL (Restricted use TAS, VIC & SA)	NR	-
<i>Aureobasidium pullulans</i> (Botector) Nufarm	BM 02	Cucurbits (field & protected)	<i>Botrytis</i> and suppression of Sclerotinia	ALL	NR	-
Azoxystrobin (Amistar)	11	Cucurbits	Powdery Mildew, Downy Mildew, and Gummy Stem Blight.	ALL	1	-
Azoxystrobin + Oxathiapiprolin (Orondis Flexi) Syngenta	11+49	Cucurbits / Pumpkin	Downy Mildew Suppression of Powdery Mildew, Gummy Stem Blight and <i>Sclerotinia</i> spp.	ALL	3 NG	-
Boscalid + Kresoxim-Methyl (Colliss) BASF	7+11	Cucurbits	Powdery Mildew	ALL	7	-
Bupirimate (Nimrod)	8	Cucurbits	Powdery Mildew (<i>Sphaerotheca fuliginea</i>)	ALL	1	-
Chlorothalonil (Bravo)	M5	Cucurbits	Downy Mildew, Gummy Stem Blight, Anthracnose, Alternaria Leaf Blight & Target Leaf Spot	ALL	1	R3
Copper Ammonium Acetate	M1	Cucurbits / Pumpkin	Bacterial Leaf Spot (<i>Xanthomonas</i> spp.), Downy Mildew & Angular Leaf Spot	ALL	1	-
Copper Hydroxide	M1	Cucurbits (field & protected)	Angular Leaf Spot, Bacterial Leaf Spot	ALL	1	-
Copper Octanoate	M1	Cucurbits	Powdery Mildew & Downy Mildew	ALL	1	-
Copper Oxychloride	M1	Cucurbits	Angular Leaf Spot & Bacterial Leaf Spot Downy Mildew, Anthracnose & Gummy Stem Blight	ALL NSW, ACT & WA	1	-

Active Ingredient (Trade Name)	Chem. group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Copper as Tribasic Copper Sulfate	M1	Cucurbits (field & protected)	Angular Leaf Spot, Bacterial Leaf Spot	ALL	1	-
Copper as Cuprous Oxide	M1	Cucurbits (field & protected)	Angular Leaf Spot, Bacterial Leaf Spot	ALL	1	-
Cyflufenamid (Flute) AgNova	U6	Cucurbits	Powdery Mildew	ALL	1	-
Dazomet (Basamid)	8F	Broadacre seed beds	Soil fungi (including <i>Pythium</i> , <i>Phytophthora</i> , <i>Fusarium</i> , and <i>Verticillium</i>), nematodes (cyst and non-cyst forming), soil insects and germinating seeds of weeds	ALL	NR	-
Dimethomorph (Acrobat) BASF	40	Cucurbits	Downy Mildew, Anthracnose, Gummy Stem Blight, Alternaria Leaf Spot, & Septoria Spot	QLD & NT	7	-
Dimethomorph + Mancozeb (Acrobat WDG) BASF	40+M3	Cucurbits	Downy Mildew	ALL	7	R2
			Anthracnose, Gummy Stem Blight, Alternaria Leaf Spot, Septoria Spot	QLD & NT		
Hydrogen Peroxide + Peroxyacetic Acid (Peratec Plus)	M	Cucurbits / Pumpkin	Powdery Mildew	ALL	1	-
Mancozeb	M3	Cucurbits / Pumpkin	Downy Mildew, Anthracnose, Gummy Stem Blight and Septoria Leaf Spot	ALL	7	R2
Mancozeb + Metalaxyl-M (Ridomil Gold MZ) Syngenta	M3+4	Cucurbits (field)	Downy Mildew	ALL	7	R2
			Anthracnose, Gummy Stem Blight, Alternaria Leaf Spot and Septoria Leaf Spot	QLD		
Metalaxyl-M (Ridomil Gold 25G) Syngenta	4	Cucurbits	Damping Off & Phytophthora	QLD, NSW, TAS, SA, WA & NT	7	-

Active Ingredient (Trade Name)	Chem. group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Metham Sodium	-	Soil fumigant	Nematodes, weed seeds, and various fungal diseases including <i>Rhizoctonia</i> , <i>Pythium</i> , <i>Fusarium</i> , <i>Phytophthora</i> , <i>Verticillium</i> , <i>Sclerotinia</i> and Club Root of crucifers.	ALL	NR	-
Metiram (Polyram) BASF	M3	Cucurbits (field & protected)	Downy Mildew and Gummy Stem Blight	ALL	7	R2
Metrafenone (Vivando) BASF	U8	Cucurbits	Powdery Mildew	ALL	7	-
Oxathiapiprolin (Zorvec Enicade) Corteva	49	Cucurbits / Pumpkin	Downy Mildew	ALL	1	-
Penthiopyrad (Fontelis) Corteva	7	Cucurbits / Pumpkin	Botrytis Grey Mould, Powdery Mildew, & Gummy Stem Blight	ALL	1	-
Phosphorous Acid	33	Cucurbits (field)	Downy Mildew	ALL	NR	-
Propamocarb Hydrochloride + Fluopicolide (Infinito) Bayer	28+43	Cucurbits (field & protected)	Downy Mildew	ALL	1	-
Propineb (Antracol) Bayer	M3	Cucurbits (field & protected)	Downy Mildew	ALL	3	R2
Propineb + Oxadixyl (Rebound) Kiwi Rural Trading	4 + M3	Cucurbits	Downy Mildew, Gummy Stem Blight, & Anthracnose	ALL	3	R2
Proquinazid (Talendo) Corteva	13	Cucurbits (field grown only)	Powdery Mildew	ALL	1	-

Active Ingredient (Trade Name)	Chem. group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Pyriofenone (Kusabi) AgNova	U8	Cucurbits (field)	Powdery Mildew	ALL	NR	-
<i>Streptomyces lydicus</i> (Actinovate)	BM 02	Cucurbits (field & protected)	Suppression of Powdery Mildew	ALL	NR	-
		Vegetables / Seed Treatment	Fusarium, Rhizoctonia, Pythium			
Sulphur	UN	Pumpkin	Powdery Mildew	ALL (excl. TAS)	NR	-
Tea Tree Oil (Timorex)	46	Cucurbits (field & protected)	Powdery Mildew	ALL	NR	-
Triadimefon	3	Cucurbits / Pumpkin	Powdery Mildew	NSW & WA	1	R3
Triadimenol (Bayfidan)	3	Cucurbits	Powdery Mildew	ALL	1	R3
Zineb	M3	Cucurbits	Downy Mildew & Anthracnose	ALL	7	R2

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

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP	Regulatory risk
1,3-dichloropropene + Chloropicrin (Telone C-35)	8B	Field crops / Fumigant	Plant parasitic Nematodes, Symphylans, Wireworms, soil borne diseases (including Fusarium and Verticillium Wilts, Rhizoctonia, Pythium) & suppression of weeds.	ALL (Restricted use TAS, VIC & SA)	NR	-
Abamectin (Tervigo) Syngenta	6	Cucurbits (field & protected)	Root-Knot Nematode	ALL	NR	-
Abamectin PER81876	6	Fruiting vegetables – Cucurbits (field)	Vegetable Leafminer (suppression only)	ALL (excl. VIC)	7 NG	-
Afidopyropen (Versys) BASF	9D	Cucurbits (field)	Green Peach Aphid, Cabbage Aphid, Currant Lettuce Aphid and Cotton/Melon Aphid; suppression of Silverleaf Whitefly	ALL	1	-
Alpha-Cypermethrin PER80138	3A	Cucurbit vegetables (field)	Cucumber Fruit Fly	ALL (excl. VIC)	1	-
<i>Bacillus thuringiensis subsp. kurstaki</i> (Dipel)	11A	Vegetables (field & protected)	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	-
<i>Beauveria bassiana</i> (Velifer) BASF	UNF	Protected vegetables & ornamentals	Suppression of various pests including: Western Flower Thrips, Onion Thrips, Greenhouse Whitefly, Silverleaf Whitefly, Sweet Potato Whitefly, Green Peach Aphid & Two-Spotted Spider Mites	ALL	NR	-
Bifenazate (Acramite) UPL	20D	Cucurbits (field)	Two-Spotted Mite and Bryobia Mite	ALL	3	-

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP	Regulatory risk
Bifenthrin (Talstar)	3A	Cucurbit vegetables (field)	Native Budworm, Corn Earworm, Cucumber Moth	ALL	1	R3
			Silverleaf Whitefly Biotype B	QLD, NSW, NT & WA		
Bifenthrin (Talstar) PER82374	3A	Cucurbits (field)	Brown Marmorated Stink Bug & Yellow Spotted Stink Bug	ALL	1	R3
Chlorantraniliprole (Coragen) FMC	28	Cucurbits (field & protected)	Cotton Bollworm, Native Budworm, and Cucumber Moth	ALL	1	-
Chlorantraniliprole (Coragen) FMC PER89259	28	Fruiting vegetables including cucurbits (field)	Fall Armyworm (<i>Spodoptera frugiperda</i>)	ALL (excl. VIC)	1	-
Chlorpyrifos (Lorsban)	1B	Cucurbits (field & protected)	Whitefly	NSW, WA & ACT	5	R1
		Young vegetables	Field and mole crickets (QLD & WA) & Cutworms (All States)	QLD & WA		
Chlorpyrifos (Lorsban) PER11768	1B	Pumpkin	African Black Beetle	ACT, QLD, SA, TAS, NT & WA	NR	R1
Clothianidin (Samurai) Sumitomo PER80101	4A	Cucurbits (field & protected)	Cucumber Fruit Fly	ALL	7 NG	R2
Cyantraniliprole (Benevia) FMC	28	Cucurbits (field)	Melon Aphid, Silverleaf Whitefly, Cotton Bollworm, Cucumber Moth, Native Budworm, and Western Flower Thrips (suppression only)	ALL	1	-
Cyromazine (Diptex 150 WP) PER81867	17	Cucurbits	<i>Liriomyza</i> spp. including Vegetable & Serpentine Leafminer	ALL	7 NG	-
Diafenthiuron + Cyantraniliprole	12A+28	Cucurbits (field)	Silverleaf Whitefly (<i>Bemisia tabaci</i>), Melon Aphid (<i>Aphis gossypii</i>), Cotton Bollworm (<i>Helicoverpa</i>	ALL	1	-

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP	Regulatory risk
(Minecto Forte) Syngenta			<i>armigera</i>), Native Budworm (<i>Helicoverpa punctigera</i>), Cucumber Moth (<i>Diaphania indica</i>), Cluster Caterpillar (<i>Spodoptera litura</i>), Green Peach Aphid (<i>Myzus persicae</i>), Two-Spotted Mite (<i>Tetranychus urticae</i>) Suppression of: Western Flower Thrips (<i>Frankliniella occidentalis</i>), Tomato Thrips (<i>Frankliniella schultzei</i>), Plague Thrips (<i>Thrips imaginis</i>)			
Diazinon	1B	Cucurbits (field)	Thrips	QLD, NSW, VIC, SA & WA	14 G:14	R3
		Pumpkins	Caterpillars, Cutworms	ALL (excl. TAS)		
Emamectin (Proclaim Opti) Syngenta	6	Cucurbits (field & protected)	Heliothis, Cluster Caterpillar, Cucumber Moth	ALL	3 NG	-
Emamectin (Proclaim Opti) Syngenta PER89263	6	Cucurbits (field & protected)	Fall Armyworm (<i>Spodoptera frugiperda</i>)	ALL (excl. VIC)	3	-
Emulsifiable Botanical Oil (Eco-Oil)	-	Vegetables	Greenhouse Whitefly	ALL	NR	-
Etoxazole (Paramite) Sumitomo PER82460	10B	Cucurbits / pumpkin	Two-spotted mites	ALL (excl. VIC)	7	-
Fonicamid (Mainman) UPL	9C	Cucurbits (field & protected)	Green Peach Aphid, Melon Aphid, & Silverleaf Whitefly	ALL	1 NG	-
Flubendiamide (Belt)	28	Cucurbits (field & protected)	<i>Helicoverpa</i> spp. & Cucumber Moth	ALL	1	-

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP	Regulatory risk
Bayer Fluensulfone (Nimitz) Adama	UN	Cucurbits / Transplanted Crops Only	Root-Knot Nematode	ALL	NR	-
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Vegetables(field)	Ants, Aphids, Caterpillars, Earwigs, Whitefly, Thrips and Leafhoppers. Suitable for organic growers	ALL	1	-
Helicoverpa NPV (Vivus Max) AgBiTech	31	Cucurbits (field & protected)	Cotton Bollworm, Corn Earworm, Tobacco Budworm and Native Budworm	ALL	NR	-
Hexythiazox (Calibre) Nufarm PER14765	10A	Cucurbits / pumpkin	Two spotted mite, tomato russet mite and broad mite	ALL (excl. VIC)	3	-
Imidacloprid (Confidor 200SC) Bayer	4A	Cucurbits (field) / Foliar Application	Green Peach Aphid	ALL	1 NG	R2
Imidacloprid (Confidor Guard) Bayer	4A	Cucurbits (field) / Soil Application	Silverleaf Whitefly including biotype B	ALL	NR	R2
Indoxacarb (Avatar eVo) FMC	22A	Cucurbits (field)	Cotton Bollworm, Native Budworm, Cluster Caterpillar	ALL	3 NG	R3
Maldison	1B	Cucurbits	Pumpkin Beetle	NSW, ACT, VIC, SA & WA	3	R3
		Vegetables	Aphid, Green Vegetable Bug, Jassid, Leafhopper, Rutherglen Bug, Redlegged Earth Mite (excl. TAS), 28-Spotted Ladybird (excl. TAS)	ALL		
Methomyl (Lannate) PER82428	1A	Cucurbits / pumpkin	<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
Methomyl (Lannate) PER89293	1A	Cucurbits	Fall armyworm (<i>Spodoptera frugiperda</i>)	ALL	3	R2
Petroleum Oil	UN	Cucurbits (field)	Aphids, Mites, Thrips, and Leafhopper Silverleaf Whitefly	ALL QLD	1	-
Petroleum Oil PER12221	UN	Cucurbits (field & protected)	Greenhouse Whitefly, Sweet Potato White Fly, Silverleaf Whitefly biotype B, and Whitefly biotype Q	ALL (excl. VIC)	1	-
Pirimicarb (Aphidex)	1A	Cucurbits (field)	Aphids	ALL	2	R3
Potassium Salts of Fatty Acids (Natrasoap)	-	Cucurbits (field & protected)	Aphids, Thrips, Mealybug, Two Spotted Mites, Spider Mite, and Whitefly	ALL	1	-
Propargite (Omite)	12C	Vegetables (field & protected)	Two-Spotted Mite Spider Mite	ALL QLD & WA	7	R3
Pymetrozine (Chess) Syngenta	9B	Cucurbits (field & protected)	Melon Aphid, Green Peach Aphid, Potato Aphid and Cowpea Aphid; and for suppression of Silverleaf Whitefly and Greenhouse Whitefly	ALL	3	R3
Pyriproxyfen (Admiral) Sumitomo	7C	Cucurbits (field & protected)	Silverleaf Whitefly biotype B	ALL	1 NG	-
Spinetoram (Success Neo) Corteva	5	Cucurbits (field & protected)	Cucumber Moth, <i>Helicoverpa</i> Spp. & Western Flower Thrips	ALL	3	-
Spinetoram (Success Neo) Corteva PER89241	5	Fruiting vegetables (including cucurbits)	Fall armyworm (<i>Spodoptera frugiperda</i>)	ALL (excl. VIC)	1	-
Spinetoram (Success Neo) Corteva PER91155	5	Cucurbits	Vegetable Leafminer (<i>Liriomyza sativae</i>), Pea Leafminer / Serpentine Leafminer (<i>Liriomyza huidobrensis</i>) American Serpentine Leafminer (<i>Liriomyza trifolii</i>).	ALL (excl. VIC)	3	-
Spinosad	5	Fruit trees, vegetables	Fruit Fly	ALL	NR	-

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP	Regulatory risk
(Naturalure) Corteva		& ornamentals				
Spinosad (Entrust Organic) Corteva	5	Cucurbits (field & protected)	Cucumber Moth, Helicoverpa & Western Flower Thrips	ALL	3 G:14	-
Spinosad (Entrust Organic) Corteva PER89870	5	Cucurbits	Fall armyworm (<i>Spodoptera frugiperda</i>)	ALL (excl. VIC)	3 G:14	-
Spinosad (Entrust Organic) Corteva PER90928	5	Cucurbits (field & protected)	Vegetable Leafminer (<i>Liriomyza sativae</i>), Pea Leafminer / Serpentine Leafminer (<i>Liriomyza huidobrensis</i>) American Serpentine Leafminer (<i>Liriomyza trifolii</i>).	ALL (excl. VIC)	3	-
Spirotetramat (Movento 240 SC) Bayer	23	Cucurbits (field and protected)	Cotton Aphid, Green Peach Aphid, and Silverleaf Whitefly biotype B	ALL	1	-
Sulfoxaflor (Transform) Corteva	4C	Cucurbits (field grown only)	Green Peach Aphid, Melon Aphid, Greenhouse Whitefly and suppression of Rutherglen Bug	ALL	1	-
Sulphur	UN	Vegetables (field & protected)	Powdery Mildew, Rust, Tomato Russet Mite, Bean Spider Mite	VIC, TAS, SA, WA & NSW	NR	-
			Two-Spotted Mite	VIC, TAS, SA & WA		
			Powdery Mildew, Rust, Tomato Russet Mite	QLD		
Trichlorfon (Lepidex)	1B	Vegetables (field & protected)	Cabbage White Butterfly, Cabbage Moth, Green Vegetable Bug, and Rutherglen Bug	ALL	2	R2
		Cucurbits (field & protected)	Cutworm	QLD, NT		

Appendix 3. Products available for weed control in pumpkin

Active ingredient (Trade Name)	Chem Group	Situation	Comment / Use / Weed	WHP (days)	States	Regulatory risk
Clomazone	Q**	Cucurbits / Pre-emergent residual	Apple of Peru, Blackberry Nightshade, Fat Hen, Pig Weed, Potato Weed, and Amaranth	NR	ALL	-
Dimethenamid-P (Outlook)	K**	Pumpkins	Broadleaf weeds including Amaranthus, Blackberry Nightshade, Fat Hen, Pigweed, Sowthistle and Ryegrass.	NR G:28	ALL	-
Fluazifop-P Butyl (Fusilade)	A***	Cucurbits / Grass selective post-emergent	Grass weeds	21	ALL	-
Glyphosate (Roundup)	M**	General seed bed preparation	Grass and broadleaf weeds as a pre-crop spray	NR	ALL	R3
Paraquat + Diquat (SpraySeed)	L**	General seed bed preparation	Grass and broadleaf weeds as a pre-crop spray	NR	ALL	R3
Quizalofop-P-Ethyl	A***	Cucurbits / pumpkins	Grass weeds	63	ALL	R3
Sethoxydim (Sertin)	A***	Pumpkins	Grass weeds	63	ALL	-

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

Appendix 4. Current permits for use in pumpkin

Permit No.	Description	Issued Date	Expiry Date	Permit Holder
PER81876 Version 4	Abamectin / Cucurbits (field & protected) / Leafminer including Vegetable & Serpentine Leafminer	24-Jun-16	30-Apr-24	Hort Innovation
PER80138 Version 3	Alpha-cypermethrin / Cucurbit vegetables (field) / Cucumber fruit fly	26-Feb-15	31-Mar-25	Hort Innovation
PER82374	Bifenthrin / Cucurbits (field only) / Stink bugs	14-Feb-18	28-Feb-23	Dept. of Ag. & Water resources
PER89259	Chlorantraniliprole (Coragen) / Various Crops, including Cucurbits (field) / Fall Armyworm	06-Mar-20	31-Mar-23	Hort Innovation
PER11768 Version 4	Chlorpyrifos (Lorsban) / Pumpkin / African Black Beetle	28-Jun-13	28-Feb-23	Hort Innovation
PER80101 Version 3	Clothianidin (Samurai) / Cucurbit vegetables (field & protected) / Cucumber fruit fly	10-Nov-15	30-Sep-23	Hort Innovation
PER81867 Version 2	Cyromazine (Diptex 150 WP) / Fruiting vegetables including cucurbits (field & protected) / <i>Liriomyza</i> species, including: Vegetable Leafminer (<i>Liriomyza sativae</i>) & Serpentine Leafminer (<i>Liriomyza huidobrensis</i>)	2-Dec-19	30-Nov-23	Hort Innovation
PER89263	Emamectin (Proclaim Opti) / Various crops including cucurbits (field & protected) / Fall Armyworm	10-Mar-20	31-Mar-23	Hort Innovation
PER82460 Version 2	Etoxazole (Paramite) / Cucurbits (field & protected) / Two-spotted mites and Tomato red spider mite	26-Jul-17	31-Jul-23	Hort Innovation
PER14765 Version 4	Hexythiazox (Calibre) / Cucurbit vegetables including pumpkins (field & protected) / Tomato spider mite, Two spotted mite, Broad mite, Tomato russet mite	21-Feb-15	30-Sep-23	Hort Innovation
PER82428 Version 4	Methomyl (Lannate) / Pumpkins (field) / <i>Helicoverpa</i> spp., Cucumber moth, Cluster caterpillar, Loopers, webworm, Rutherglen bug, Thrips including Western flower thrips	22-Apr-16	31-Mar-24	Hort Innovation

Permit No.	Description	Issued Date	Expiry Date	Permit Holder
PER89293	Methomyl (Lannate) / Cucurbits (field) / Fall Armyworm	10-Apr-20	30-Apr-23	Hort Innovation
PER12221 Version 4	Petroleum oil / Cucurbits (field & protected) / Greenhouse whitefly & Silverleaf whitefly	29-Jun-12	30-Nov-22	Hort Innovation
PER89241	Spinetoram (Success Neo) / Various Crops including cucurbits (field) / Fall Armyworm	06-Mar-20	31-Mar-23	Hort Innovation
PER91155	Spinetoram (Success Neo) / Cucurbits / Leafminers	09-Jun-21	30-Jun-24	Hort Innovation
PER89870	Spinosad (Entrust Organic) / Various crops including cucurbits (field & protected) / Fall Armyworm	21-Jul-20	31-Jul-23	Hort Innovation
PER90928	Spinosad (Entrust Organic) / Cucurbits including cucumber, melon, squash, zucchini (field & protected) / Leafminers	23-Apr-2021	30-Apr-24	Hort Innovation

Appendix 5. Pumpkin Maximum Residue Limits (MRLs)

CODEX commodity groupings of fruiting vegetables and subgroups:

VC0045	Fruiting vegetables, cucurbits
VC0429	Pumpkins
-	Vegetables

Note: Major export markets for Pumpkins include Singapore, Malaysia, Hong Kong, UAE & Indonesia. 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
1,3 -dichloropropene		Soil fumigant / MRLs not required	NR	
2,4-D			NA	NA
Abamectin	VC0045	Fruiting vegetables, cucurbits	0.02	-
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
Azoxystrobin	VC0045	Fruiting vegetables, cucurbits	2	1
Benalaxyl	VC0045	Fruiting vegetables, cucurbits	0.2	-
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
Bupirimate	VC0045	Fruiting vegetables, cucurbits	1	-
Buprofezin	VC0045	Fruiting vegetables, cucurbits	T2	0.7
Carbaryl	VC0045	Fruiting vegetables, cucurbits	*0.01	-
Chlorantraniliprole	VC0045	Fruiting vegetables, cucurbits	0.2	0.3
Chlordane	VC0045	Fruiting vegetables, cucurbits	E0.05	-
Chloropicrin		Soil fumigant / MRLs not required	NR	
Chlorothalonil	VC0045	Fruiting vegetables, cucurbits	5	-
Chlorpyrifos		Vegetables	T*0.01	-
Chlorthal-dimethyl		Vegetables	5	-
Clomazone	VC0045	Fruiting vegetables, cucurbits	*0.05	-
Clothianidin	VC0045	Fruiting vegetables, cucurbits	T0.5	*0.02
Cyantraniliprole	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
Cypermethrin	VC0045	Fruiting vegetables, cucurbits	T0.3	0.07
Cyprodinil	VC0045	Fruiting vegetables, cucurbits	-	0.5

Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Cyromazine	VC0045	Fruiting vegetables, cucurbits	T0.7	-
Dazomet		Soil fumigant / MRLs not required	NR	
DDT		Vegetables	E1	-
Deltamethrin	VC0045	Fruiting vegetables, cucurbits	-	0.2
Diafenthiuron	VC0045	Fruiting vegetables, cucurbits	0.5	
Diazinon		Vegetables	0.7	-
Dichlobenil	VC0045	Fruiting vegetables, cucurbits	-	*0.01
Dicofol		Vegetables	5	-
Dimethenamid-p	VC0429	Pumpkins	*0.02	
Dimethomorph	VC0045	Fruiting vegetables, cucurbits	0.5	0.5
Dinocap	VC0045	Fruiting vegetables, cucurbits	-	*0.05
Dinotefuran	VC0045	Fruiting vegetables, cucurbits	-	0.5
Diquat		Vegetables	*0.05	-
Dithiocarbamates	VC0045	Fruiting vegetables, cucurbits	2	-
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
EPTC		Vegetables	*0.04	-
Etoxazole	VC0045	Fruiting vegetables, cucurbits	T0.1	-
Etridiazole		Vegetables	0.2	-
Fenamidone	VC0045	Fruiting vegetables, cucurbits	-	0.2
Fonicamid	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
Fludioxonil	VC0045	Fruiting vegetables, cucurbits	-	0.5
Fluensulfone	VC0045	Fruiting vegetables, cucurbits	0.5	-
Flumioxazin	VC0045	Fruiting vegetables, cucurbits	-	*0.02
Fluopicolide	VC0045	Fruiting vegetables, cucurbits	0.5	0.5
Flutriafol	VC0045	Fruiting vegetables, cucurbits	-	0.3
Fluxapyroxad	VC0045	Fruiting vegetables, cucurbits	-	0.2
Glyphosate	VC0045	Fruiting vegetables, cucurbits	*0.1	-
Heptachlor		Vegetables	E0.05	-
Hexythiazox	VC0045	Fruiting vegetables, cucurbits: (except watermelon)	-	0.05
	VC0045	Fruiting vegetables, cucurbits	T0.05	-
Hydrogen peroxide		MRLs not required	NR	
Imidacloprid	VC0045	Fruiting vegetables, cucurbits	0.2	-
Indoxacarb	VC0045	Fruiting vegetables, cucurbits	0.2	0.5
Inorganic bromide		Vegetables	20	-
Kresoxim-methyl	VC0045	Fruiting vegetables, cucurbits	0.05	0.5
Lindane		Vegetables	E2	-
Linuron		Vegetables	*0.05	-
Maldison	VC0045	Fruiting vegetables, cucurbits	2	-
Mancozeb	VC0045	Fruiting vegetables, cucurbits	2	-
Metalaxyl	VC0045	Fruiting vegetables, cucurbits	0.2	-
Metaldehyde		Vegetables	1	-
Metham sodium	VC0045	Fruiting vegetables, cucurbits	2	

Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Methiocarb		Vegetables	0.1	-
Methomyl	VC0045	Fruiting vegetables, cucurbits	0.1	0.1
Methoxyfenozide	VC0045	Fruiting vegetables, cucurbits	-	0.3
Methyl bromide		Vegetables	T*0.05	-
Metiram	VC0045	Fruiting vegetables, cucurbits	2	-
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	-
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	-
Paraffinic oil		MRLs not required	NR	
Penthiopyrad	VC0045	Fruiting vegetables, cucurbits	1	0.5
Peroxy acetic acid		MRLs not required	NR	
Petroleum oil		MRLs not required	NR	
Phosphorous acid	VC0045	Fruiting vegetables, cucurbits	T100	-
Piperonyl Butoxide	VC0045	Fruiting vegetables, cucurbits	-	1
		Vegetables	8	-
Pirimicarb		Vegetables	1	1
Potassium salts of fatty acids		MRLs not required	NR	
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	VC0045	Fruiting vegetables, cucurbits	-	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	0.2
Pyriproxyfen	VC0045	Fruiting vegetables, cucurbits	0.2	-
Quizalofop-ethyl	VC0429	Pumpkins	*0.02	-
Quizalofop-P-tefuryl	VC0429	Pumpkins	*0.02	-
Rotenone		MRLs not required	NR	
Sethoxydim	VC0045	Fruiting vegetables, cucurbits	*0.1	-
Spinetoram	VC0045	Fruiting vegetables, cucurbits	0.05	-
Spinosad	VC0045	Fruiting vegetables, cucurbits	0.2	0.2
Spiromesifen	VC0045	Fruiting vegetables, cucurbits		0.09

Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Spirotetramat	VC0045	Fruiting vegetables, cucurbits	-	0.2
	VC0045	Fruiting vegetables, cucurbits (except Melons)	2	
Sulfoxaflor	VC0045	Fruiting vegetables, cucurbits	0.5	0.5
Sulphur		MRLs not required	NR	
Thiamethoxam	VC0045	Fruiting vegetables, cucurbits	T1	0.5
Triadimefon	VC0045	Fruiting vegetables, cucurbits:(based on triadimenol use only)	-	0.2
	VC0045	Fruiting vegetables, cucurbits	0.2	-
Triadimenol	VC0045	Fruiting vegetables, cucurbits	0.5	0.2
Trichlorfon		Vegetables	0.1	-
Trifloxystrobin	VC0045	Fruiting vegetables, cucurbits	-	0.3
Trifluralin		Vegetables	0.05	-
Zineb	VC0045	Fruiting vegetables, cucurbits	2	-
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.

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

NR - Uses of substances where MRLs are not necessary / required.

NA – MRLs are not in place.

T = Temporary MRL

E = The MRL is based on extraneous residues

Sources: APVMA MRLs: Agricultural and Veterinary Chemicals Code (MRL Standard) Instrument 2019. Compilation 4. Prepared 26 April 2021. CODEX MRLs: CODEX Alimentarius International Food Standards database (February 2020), <http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/>

Appendix 6: Pumpkin Agrichemical Regulatory Risk Assessment

Pumpkin Agrichemical Regulatory Risk Assessment

October 2020

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

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

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

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

Pumpkin Agrichemical Regulatory Risk Assessment

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

Problem	Active Constituents	Chemical Group	Comment	Activities
INSECT AND MITE PESTS				
Ants	Pyrethrins	3A		
	Chlorpyrifos	1B	APVMA: Currently under review, Potential issues w.r.t. environmental loading and worker exposure EU: Proposed cancellation of use Canada: proposed cancellation of most uses. USA: EPA decision to allow continued use	
Aphids				
Aphids	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
	Petroleum oil	UN		
	Pirimicarb	1A	Codex : JMPR Periodic re-evaluation 2022/23	
	Pyrethrins	3A		
Cabbage aphid	Afidopyropen	9D		
Cotton / melon aphid	Afidopyropen	9D		
	Cyantraniliprole	28		
	Diafenthiuron + cyantraniliprole	12A + 28	Diafenthiuron Codex: No MRLs EU: No authorisation in place	
	Flonicamid	29		
	Pymetrozine	9B	EU: Being phased out Codex: No registrant support	
	Spirotetramat	23		
	Sulfoxaflor	4C	USA: Pollinator concerns	

Problem	Active Constituents	Chemical Group	Comment	Activities
Cowpea aphid	Pymetrozine	9B	EU: Being phased out Codex: No registrant support	
Currant lettuce aphid	Afidopyropen	9D		
Green peach aphid	Afidopyropen	9D		
	Diafenthiuron + cyantraniliprole	12A + 28	Diafenthiuron Codex: No MRLs EU: No authorisation in place	
	Flonicamid	29		
	Imidacloprid	4A	APVMA: Under review Canada: Under review EU: Removal of all field uses USA: Re-registration with new risk mitigation measures	
	Pymetrozine	9B	EU: Being phased out Codex: No registrant support	
	Spirotetramat	23		
	Sulfoxaflor	4C	USA: Pollinator concerns	
Potato aphid	Pymetrozine	9B	EU: Being phased out Codex: No registrant support	
Beetles				
African black beetle	Chlorpyrifos (PER11768)	1B	APVMA: Under review. Potential issues w.r.t. environmental loading and worker exposure. EU: Proposed cancellation of use Canada: proposed cancellation of most uses. USA: EPA decision to allow continued use	
Leaf eating ladybirds	Carbaryl	1A	Canada: Review recently completed, retained but with a large number of uses deleted	
Pumpkin beetle	Carbaryl	1A	Codex: Toxicology review scheduled 2020 EU: deregistered	
	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	

Problem	Active Constituents	Chemical Group	Comment	Activities
28-spotted potato ladybird	Carbaryl	1A	Canada: Review recently completed, retained but with a large number of uses deleted Codex: Toxicology review scheduled 2020 EU: deregistered	
	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
Caterpillars/Lepidoptera				
Armyworms	Carbaryl	1A	Canada: Review recently completed, retained but with a large number of uses deleted Codex: Toxicology review scheduled 2020 EU: deregistered	
Cabbage white butterfly	Pyrethrins	3A		
	Spinetoram	5		
Caterpillars	Bifenthrin	3A	Canada: Subject to phase-out until 31/12/2020 EU: No authorisation in place	
	Pyrethrins	3A		
	Diazinon	1B	EU: Deregistered Codex : To be reviewed by 2020/21.	
	Spinetoram	5		
Cluster caterpillar	Diafenthiuron + cyantraniliprole	12A + 28	Diafenthiuron Codex: No MRLs EU: No authorisation in place	
	Emamectin benzoate	6		
	Flubendiamide	28		
	Methomyl (PER82428)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	

Problem	Active Constituents	Chemical Group	Comment	Activities
Cucumber moth	Beta-cyfluthrin	3A	EU: No authorisation in place	
	Bifenthrin	3A	Canada: Subject to phase-out until 31/12/2020 EU: No authorisation in place	
	Chlorantraniliprole	28		
	Cyantraniliprole	28		
	Diafenthiuron + cyantraniliprole	12A + 28	Diafenthiuron Codex: No MRLs EU: No authorisation in place	
	Emamectin benzoate	6		
	Methomyl (PER82428)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
	Spinetoram	5		
	Spinosad	5		
Cucurbit stem borer	Carbaryl	1A	Canada: Review recently completed, retained but with a large number of uses deleted Codex: Toxicology review scheduled 2020 EU: deregistered	
Cutworms	Carbaryl	1A	Canada: Review recently completed, retained but with a large number of uses deleted Codex: Toxicology review scheduled 2020 EU: deregistered	
	Diazinon	1B	EU: Deregistered Codex : To be reviewed by 2020/21.	
	Trichlorfon	1B	APVMA: nominated for review Codex: No MRLs EU: deregistered US: No MRLs	
Diamondback (Cabbage) moth	Pyrethrins	3A		

Problem	Active Constituents	Chemical Group	Comment	Activities
Fall armyworm	Chlorantraniliprole (PER89259)	28		
	Emamectin benzoate (PER89263)	6		
	Methomyl (PER89293)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
	Spinosad (PER89870)	5		
	Spinetoram (PER89241)	5		
Helicoverpa species Native Budworm (<i>H. punctigera</i>) Corn earworm/Cotton bollworm (<i>H. armigera</i>)	Beta-cyfluthrin	3A	EU: No authorisation in place	
	<i>B thuringiensis</i>	11A		
	Bifenthrin	3A	Canada: Subject to phase-out until 31/12/2020 EU: No authorisation in place	
	Carbaryl	1A	Canada: Review recently completed, retained but with a large number of uses deleted Codex: Toxicology review scheduled 2020 EU: deregistered	
	Chlorantraniliprole	28		
	Cyantraniliprole	28		
	Diafenthiuron + cyantraniliprole	12A + 28	Diafenthiuron Codex: No MRLs EU: No authorisation in place	
	Emamectin benzoate	6		
	Flubendiamide	28		
	Helicoverpa NPV	31		
	Methomyl (PER82428)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
	Spinetoram	5		
	Spinosad	5		

Problem	Active Constituents	Chemical Group	Comment	Activities
Loopers	Methomyl (PER82428)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
Moths	Bifenthrin	3A	Canada: Subject to phase-out until 31/12/2020 EU: No authorisation in place	
Potato moth (Leafminer)	Carbaryl	1A	Canada: Review recently completed, retained but with a large number of uses deleted Codex: Toxicology review scheduled 2020 EU: deregistered	
Tomato grub	Emamectin benzoate	6		
Webworms	Methomyl (PER82428)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
Fruit fly				
Cucumber fly	Alpha-cypermethrin	3A	EU: Proposed restricted authorisation & Candidate for substitution	
	Clothianidin (PER80101)	4A	APVMA: Under review Canada: Proposal to cancel foliar use in orchards strawberries and turf EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures ⁱ	
Flies	Pyrethrins	3A		

Problem	Active Constituents	Chemical Group	Comment	Activities
Grasshoppers/Locusts				
Australian plague locust	Chlorpyrifos	1B	APVMA: Currently under review. Potential issues w.r.t. environmental loading and worker exposure. EU: Proposed cancellation of use Canada: proposed cancellation of most uses. USA: EPA decision to allow continued use	
	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
Field crickets	Chlorpyrifos	1B	APVMA: Currently under review. Potential issues w.r.t. environmental loading and worker exposure.	
Migratory locust	Chlorpyrifos	1B	EU: Proposed cancellation of use Canada: proposed cancellation of most uses. USA: EPA decision to allow continued use	
	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
Mole crickets	Chlorpyrifos	1B	APVMA: Currently under review. Potential issues w.r.t. environmental loading and worker exposure.	
Spur-throated locust	Chlorpyrifos	1B	EU: Proposed cancellation of use Canada: proposed cancellation of most uses. USA: EPA decision to allow continued use	
	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
Wingless grasshopper	Carbaryl	1A	Canada: Review recently completed, retained but with a large number of uses deleted Codex: Toxicology review scheduled 2020 EU: deregistered	

Problem	Active Constituents	Chemical Group	Comment	Activities
Jassids/Plant bugs				
Brown marmorated stink bug	Bifenthrin (PER82374)	3A	Canada: Subject to phase-out until 31/12/2020 EU: No authorisation in place	
Green vegetable bug	Carbaryl	1A	Canada: Review recently completed, retained but with a large number of uses deleted Codex: Toxicology review scheduled 2020 EU: deregistered	
	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
Jassids	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
Leafhoppers	Pyrethrins	3A		
	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
	Petroleum oil	UN		
Rutherglen bug	Carbaryl	1A	Canada: Review recently completed, retained but with a large number of uses deleted Codex: Toxicology review scheduled 2020 EU: Deregistered	
	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
	Methomyl (PER82428)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
Yellow spotted stink bug	Bifenthrin (PER82374)	3A	Canada: Subject to phase-out until 31/12/2020 EU: No authorisation in place	

Problem	Active Constituents	Chemical Group	Comment	Activities
Mealybug/Scale				
Mealybugs	Chlorpyrifos	1B	APVMA: Under review. Potential issues w.r.t. environmental loading and worker exposure. EU: Proposed cancellation of use Canada: proposed cancellation of most uses. USA: EPA decision to allow continued use	
	Pyrethrins	3A		
Scale insects	Pyrethrins	3A		
Mites				
Broad mite	Hexythiazox (PER14765)	10A	Codex: No MRLs	
Bryobia mite	Bifenazate	20	EU: Proposed non-renewal	
Mites	Bifenthrin	3A	Canada: Subject to phase-out until 31/12/2020 EU: No authorisation in place	
	Petroleum oil	UN		
Redlegged earth mite	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
Tomato red spider mite	Etoxazole (PER82460)	10B	EU: Uses restricted to greenhouse ornamentals only & Candidate for substitution	
	Hexythiazox (PER14765)	10A	Codex: No MRLs	
Tomato russet mite	Hexythiazox (PER14765)	10A	Codex: No MRLs	
Two-spotted (Red spider) mite	Bifenazate	20	EU: Proposed non-renewal	
	Diafenthiuron + cyantraniliprole	12A + 28	Diafenthiuron Codex: No MRLs EU: No authorisation in place	
	Etoxazole (PER82460)	10B	EU: Uses restricted to greenhouse ornamentals only & Candidate for substitution	
	Hexythiazox (PER14765)	10A	Codex: No MRLs	
	Pyrethrins	3A		

Problem	Active Constituents	Chemical Group	Comment	Activities
Thrips				
Thrips	Diazinon	1B	EU: Deregistered Codex : To be reviewed by 2020/21.	
	Methomyl (PER82428)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
	Petroleum oil	UN		
	Pyrethrins	3A		
Melon thrips	Spinetoram	5		
Plague thrips	Diafenthiuron + cyantraniliprole	12A + 28	Diafenthiuron Codex: No MRLs	
Tomato thrips	Diafenthiuron + cyantraniliprole	12A + 28	EU: No authorisation in place	
Western flower thrips	Cyantraniliprole	28		
	Diafenthiuron + cyantraniliprole	12A + 28	Diafenthiuron Codex: No MRLs EU: No authorisation in place	
	Methomyl (PER82428)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
	Spinetoram	5		
	Spinosad	5		

Problem	Active Constituents	Chemical Group	Comment	Activities
White fly				
Cotton (Sweet Potato) whitefly	Buprofezin	16	EU: In the process of deleting MRLs	
Greenhouse whitefly	Buprofezin	16	EU: In the process of deleting MRLs	
	Petroleum oil	UN		
	Pymetrozine	9B	EU: Being phased out Codex: No registrant support	
	Pyriproxyfen	7C	EU: Authorisation renewal process underway	
	Sulfoxaflor	4C	USA: Pollinator concerns	
Silverleaf (Poinsettia) whitefly	Afidopyropen	9D		
	Bifenthrin	3A	Canada: Subject to phase-out until 31/12/2020 EU: No authorisation in place	
	Buprofezin	16	EU: In the process of deleting MRLs	
	Cyantraniliprole	28		
	Diafenthiuron + cyantraniliprole	12A + 28	Diafenthiuron Codex: No MRLs EU: No authorisation in place	
	Flonicamid	29		
	Imidacloprid	4A	APVMA: Under review Canada: Under review EU: Removal of all field uses USA: Re-registration with new risk mitigation measures	
	Petroleum oil	UN		
	Pymetrozine	9B	EU: Being phased out Codex: No registrant support	
	Pyriproxyfen	7C	EU: Authorisation renewal process underway	
Spirotetramat	23			

Problem	Active Constituents	Chemical Group	Comment	Activities
Whiteflies	Bifenthrin	3A	Canada: Subject to phase-out until 31/12/2020 EU: No authorisation in place	
	Chlorpyrifos	1B	APVMA: Currently under review. Potential issues w.r.t. environmental loading and worker exposure. EU: Proposed cancellation of use Canada: proposed cancellation of most uses. USA: EPA decision to allow continued use	
Whitefly	Pyrethrins	3A		
Other				
Earwigs	Pyrethrins	3A		
European earwig	Carbaryl	1A	Canada: Review recently completed, retained but with a large number of uses deleted Codex: Toxicology review scheduled 2020 EU: deregistered	
Vegetable leafminer	Abamectin (PER81876)	6		
	Cyromazine (PER81867)	17		
Nematodes				
Root-knot nematodes	Abamectin	6		
	Fluensulfone			

Problem	Active Constituents	Chemical Group	Comment	Activities
DISEASES				
Alternaria leaf blight	Benalaxyl	4	EU: Proposed non-renewal of authorisation	
	Chlorothalonil	M5	APVMA : Nominated for review Canada: Review recently completed; continued use considered acceptable EU: Authorisation not renewed ⁱⁱ .	
	Dimethomorph	40		
	Mancozeb	M3	APVMA: Nominated for review Canada: Many uses cancelled Codex: To be reviewed 2022/23 EU: Authorisation not renewed	
	Metalaxyl/Metalaxyl-M	4	EU: Metalaxyl candidate for substitution Metalaxyl-M restricted use approval	
Angular leaf spot	Copper	M1	EU: Candidate for substitution	

Problem	Active Constituents	Chemical Group	Comment	Activities
Anthracnose	Benalaxyl	4	EU: Proposed non-renewal of authorisation	
	Chlorothalonil	M5	APVMA : Nominated for review Canada: Review recently completed; continued use considered acceptable EU: Authorisation not renewed.	
	Copper	M1	EU: Candidate for substitution	
	Dimethomorph	40		
	Mancozeb	M3	APVMA: Nominated for review Canada: Many uses cancelled Codex: To be reviewed 2022/23 EU: Authorisation not renewed	
	Metalaxyl/Metalaxyl-M	4	EU: Metalaxyl candidate for substitution Metalaxyl-M restricted use approval	
	Oxadixyl	4	EU: No authorisation in place	
	Propineb	M3	APVMA : Nominated for review EU: No authorisation in place Codex : To be reviewed 2022/23	
	Sulfur	M2		
	Zineb	M3	APVMA : Nominated for review Codex : To be reviewed 2022/23 EU: No authorisation in place	
Bacterial spot	Copper	M1	EU: Candidate for substitution	
Bactericide	Iodine	M		
Damping off	Metalaxyl/Metalaxyl-M	4	EU: Metalaxyl candidate for substitution Metalaxyl-M restricted use approval	

Problem	Active Constituents	Chemical Group	Comment	Activities
Downy mildew	Azoxystrobin	11		
	Benalaxyl	4	EU: Proposed non-renewal of authorisation	
	Chlorothalonil	M5	APVMA : Nominated for review Canada: Review recently completed; continued use considered acceptable EU: Authorisation not renewed.	
	Copper	M1	EU: Candidate for substitution	
	Dimethomorph	40		
	Fluopicolide	43		
	Mancozeb	M3	APVMA: Nominated for review Canada: Many uses cancelled Codex: To be reviewed 2022/23 EU: Authorisation not renewed	
	Metalaxyl/Metalaxyl-M	4	EU: Metalaxyl candidate for substitution Metalaxyl-M restricted use approval	
	Metiram	M3	APVMA : Nominated for review Canada: Proposed cancelling of foliar uses Codex : To be reviewed 2022/23	
	Oxadixyl	4	EU: No authorisation in place	
	Oxathiapiprolin	49		
	Phosphorous acid	33		
	Propamocarb HCl	28		
	Propineb	M3	APVMA : Nominated for review EU: No authorisation in place Codex : To be reviewed 2022/23	
Sulfur	M2			
Zineb	M3	APVMA : Nominated for review Codex : To be reviewed 2022/23 EU: No authorisation in place		
Fungal diseases : Rhizoctonia	Cyanogen (ethanedinitrile)	-		
Fungi	Iodine	M		
Fungal diseases : Fusarium	Cyanogen (ethanedinitrile)	-		

Problem	Active Constituents	Chemical Group	Comment	Activities
Fusarium fruit rot	Guazatine acetate	M7	Codex: No MRLs EU: Deregistered	
	Imazalil	3	EU: Under review -data gaps identified. Withdrawal of many EU MRLs proposed.	
Fusarium wilt	Cyanogen (ethanedinitrile)	-		
Grey mould	Penthiopyrad	7		
Gummy stem blight	Azoxystrobin	11		
	Benalaxyl	4	EU: Proposed non-renewal of authorisation	
	Chlorothalonil	M5	APVMA : Nominated for review Canada: Review recently completed; continued use considered acceptable EU: Authorisation not renewed.	
	Copper	M1	EU: Candidate for substitution	
	Dimethomorph	40		
	Mancozeb	M3	APVMA: Nominated for review Canada: Many uses cancelled Codex: To be reviewed 2022/23 EU: Authorisation not renewed	
	Metalaxyl/Metalaxyl-M	4	EU: Metalaxyl candidate for substitution Metalaxyl-M restricted use approval	
	Metiram	M3	APVMA : Nominated for review Canada: Proposed cancelling of foliar uses Codex : To be reviewed 2022/23	
	Oxadixyl	4	EU: No authorisation in place	
	Penthiopyrad	7		
	Propineb	M3	APVMA : Nominated for review EU: No authorisation in place Codex : To be reviewed 2022/23	
	Sulfur	M2		
Late (Irish) blight	Copper	M1	EU: Candidate for substitution	
Leaf diseases/spots	Copper	M1	EU: Candidate for substitution	
Phytophthora soil fungus (Dieback)	Metalaxyl/Metalaxyl-M	4	EU: Metalaxyl candidate for substitution Metalaxyl-M restricted use approval	

Problem	Active Constituents	Chemical Group	Comment	Activities
Phytophthora trunk/collar rot	Cyanogen (ethanedinitrile)	-		
Pink mould rot	Guazatine acetate	M7	Codex: No MRLs EU: Deregistered	
	Imazalil	3	EU: Under review -data gaps identified. Withdrawal of many EU MRLs proposed.	
Powdery mildew	Azoxystrobin	11		
	Boscalid	7		
	Bupirimate	8		
	Chlorothalonil	M5	APVMA : Nominated for review Canada: Review recently completed; continued use considered acceptable EU: Authorisation not renewed.	
	Copper	M1	EU: Candidate for substitution	
	Cyflufenamid	U6		
	Hydrogen peroxide +peroxyacetic acid	M		
	Kresoxim-methyl	7		
	Mancozeb	M3	APVMA: Nominated for review Canada: Many uses cancelled Codex: To be reviewed 2022/23 EU: Authorisation not renewed	
	Metrafenone	U8		
	Penthiopyrad	7		
	Proquinazid	13		
	Pyriofenone	U8		
<i>Streptomyces lydicus</i>	BM02			
Sulphur	M2			

Problem	Active Constituents	Chemical Group	Comment	Activities
Powdery mildew	Triadimefon	3	APVMA : Nominated for review EU: No authorisation in place	
	Triadimenol	3	APVMA : Nominated for review EU: No authorisation in place	
Pythium diseases : soil borne	Cyanogen (ethanedinitrile)	-		
Rhizoctonia ground rot	Chlorothalonil	M5	APVMA : Nominated for review Canada: Review recently completed; continued use considered acceptable EU: Authorisation not renewed.	
Rhizoctonia rot	Cyanogen (ethanedinitrile)	-		
Rhizopus rot	Guazatine acetate	M7	Codex: No MRLs EU: Deregistered	
Root and collar rot	Cyanogen (ethanedinitrile)	-		
Rust	Copper	M1	EU: Candidate for substitution	
	Sulfur	M2		
Sclerotium crown rot	Cyanogen (ethanedinitrile)	-		
Septoria leaf spot	Copper	M1	EU: Candidate for substitution	
Septoria spot	Dimethomorph	40		
	Mancozeb	M3	APVMA: Nominated for review Canada: Many uses cancelled Codex: To be reviewed 2022/23 EU: Authorisation not renewed	
	Sulfur	M2		
Spot blotch	Cyanogen (ethanedinitrile)	-		
Target leafspot	Chlorothalonil	M5	APVMA : Nominated for review Canada: Review recently completed; continued use considered acceptable EU: Authorisation not renewed.	
Target spot (Early blight)	Copper	M1	EU: Candidate for substitution	
	Sulphur	M2		

Problem	Active Constituents	Chemical Group	Comment	Activities
WEEDS				
Broadleaf weeds and grasses	Clomazone	Q		
	Dimethenamid-P	K		
	Fluazifop-P	A		
	Quizalofop-P	A	Canada: Under re-evaluation : proposed completion June 2019. EU: Candidate for substitution	
	Sethoxydim	A	EU: No authorisation in place	

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ⁱ Clothianidin: Berry fruit, fruiting vegetables, ornamentals, pome fruit, turf Reduction in yearly total rate

ⁱⁱ Chlorothalonil - Withdrawal authorisations by 20 November 2019. Max period of grace: 20 May 2020. Commission Implementing Regulation (EU) 2019/677 <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32019R0677&from=EN>