



# **Leafy Lettuce**

Strategic Agrichemical Review Process  
(SARP)

July 2021

Hort Innovation  
Project - VG18004

**Hort Innovation Project Number:**

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 Leafy Lettuce industry across Australia. The information in this report will assist the industry with its agrichemical selection and usage into the future.

**Date of report:**

July 2021

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Strategic levy investment

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FUND**

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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 Leafy Lettuce industry with sound pesticide usage for the future that the industry can pursue for registration with the manufacturer, or minor-use permits with the Australian Pesticide and Veterinary Medicines Authority (APVMA).

## **1.1 Diseases**

The high priority diseases are:

<b>Common name</b>	<b>Scientific name</b>
Sclerotinia Rot / Lettuce Drop	<i>Sclerotinia minor, Sclerotinia sclerotiorum</i>
Anthracnose	<i>Microdochium panattonianum</i>
Bacterial Spot	<i>Xanthomonas campestris pv. Vesicatoria</i>
Septoria Spot / Late Blight	<i>Septoria apiicola</i>

## **1.2 Insects, mites and other pests**

The high priority insects, mites and other pests are:

<b>Common name</b>	<b>Scientific name</b>
Green Peach Aphid	<i>Myzus persicae</i>
Cotton Bollworm / Corn Earworm	<i>Helicoverpa armigera</i>
Native Budworm	<i>Helicoverpa punctigera</i>

## **1.3 Weeds**

The high priority weeds are:

<b>Common Name</b>	<b>Scientific Name</b>
Groundsel	<i>Senecio spp.</i>
Wild Turnip	<i>Brassica spp.</i>
Fumitory	<i>Fumaria spp.</i>
Marshmallow	<i>Malva parviflora</i>
Potato Weed	<i>Galinsoga spp.</i>
Shepherd's Purse	<i>Capsella bursa-pastoris</i>

## **2. The Australian Leafy Lettuce Industry**

As a type of lettuce, the Australian Leafy Lettuce industry is a part of a major horticultural industry.

Leafy Lettuce refers to varieties of lettuce which do not form a head. They are usually sold in a loose form as leaves, which are bagged or measured by weight. This can include red leaf, green leaf, coral, or curly endive lettuces. Head lettuces are discussed in a separate SARP.

Leafy Lettuce is predominately grown near the major capitals to ensure fresh supply to demand. Major production regions include Gatton in Queensland, Perth and Gin Gin in WA and Bacchus Marsh and the Gippsland region in Victoria.

Leafy Lettuce is grouped with other leafy salad vegetables (including rocket and baby spinach) for production and trade data purposes. Production for the year ending June 2020<sup>1</sup> was 69,321 tonnes of leafy salad vegetables. Of this production:

- 81% was for fresh supply.
- 17% was sent for processing.
- 2% went for export.

Australia is a net exporter of leafy salad vegetables. For the year ending June 2020, Australia exported 1,345 tonnes of fresh leafy salad vegetables, the majority of which was sent to Singapore (44%) and Hong Kong (26%) followed by Malaysia (10%), Thailand (5%) and Indonesia (4%).

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

Fresh Leafy Salad Vegetables Seasonality by State

State	19/20 t	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
New South Wales (7%)	5,163												
Victoria (45%)	30,979												
Queensland (28%)	19,178												
Western Australia (3%)	2,199												
South Australia (7%)	5,163												
Tasmania (10%)	6,638												
Availability legend			High		Medium		Low					None	

<sup>1</sup> 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 Leafy Lettuce 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 Leafy Lettuce 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 Leafy Lettuce 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 Leafy Lettuce 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 Leafy Lettuces 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 Plan<sup>2</sup> for the Vegetable Industry which covers Leafy Lettuce 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

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

their potential to enter, establish, and spread in Australia (e.g., environmental factors, host range, vectors) and the cost to industry of control measures.

### **3.2 Minor use permits and registration**

From a pesticide access perspective, the APVMA classifies lettuce as a major crop. The crop fits within the APVMA crop group 013A: Leafy greens.

Therefore, access to minor use permits can be difficult and permit requests need to be in accordance with the APVMA's minor use guidance<sup>3</sup>.

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

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<sup>3</sup> <https://apvma.gov.au/node/10931>



### 3.3 Methods

The current update of the Leafy Lettuce 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><b>Leafy Lettuce Agrichemical Regulatory Risk Assessment Document</b> 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 Leafy Lettuce as well as current initiatives aimed at addressing identified pest management deficiencies.</p>
VG18004 – Vegetable Strategic Agrichemical Review Process (SARP) Report Updates	<p><b>SARP updated via a desktop audit:</b> Review list of priorities ranked as high, moderate and low for each plant pest groups (disease, insects and weeds) – provided by VG16060 Identify industries pest priority gaps in order of importance Update current pesticides available via label registrations or minor use permits Update available pesticide use patterns, IPM ranking/compatibility, mode of action and chemical group. Identify pesticides at risk (under review and/or limited uses) via MT17019 Regulatory Support &amp; Co-ordination – AKC consulting. 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&amp;S, environmental safety and sustainability). Include known pesticide solutions that are currently under development with registrants for new uses in the nominated crops or in current Hort Innovation projects. 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 leafy lettuce

Appendix 2. Products available for control of insects, mites and other pests in leafy lettuce

Appendix 3. Products available for weed control in leafy lettuce

Appendix 4. Current permits for use in leafy lettuce

Appendix 5. Leafy Lettuce Maximum Residue Limits (MRLs)

Appendix 6. Leafy Lettuce Agrichemical Regulatory Risk Assessment

## **4. Disease, Pests and Weeds of Leafy Lettuce**

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

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

Some of the suggested options have no overseas MRLs (see Appendix 5).

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.

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<sup>4</sup> <https://www.croplife.org.au/resources/programs/resistance-management/>

## **4.1 Diseases of leafy lettuce**

### **4.1.1 Disease priorities**

<b>Common name</b>	<b>Scientific name</b>
<b>High</b>	
Sclerotinia Rot / Lettuce Drop	<i>Sclerotinia minor, Sclerotinia sclerotiorum</i>
Anthrachnose	<i>Microdochium panattonianum</i>
Bacterial Spot	<i>Xanthomonas campestris pv. Vesicatoria</i>
Septoria Spot / Late Blight	<i>Septoria apiicola</i>
<b>Moderate</b>	
Downy Mildew	<i>Bremia lactucae</i>
Botrytis Rot	<i>Botrytis cinerea</i>
Pythium	<i>Pythium</i> spp.
Dry Leaf Spot	<i>Xanthomonas campestris pv. Vitians</i> spp.
Varnish Spot	<i>Pseudomonas</i> spp.
Corky Root	<i>Rhizomonas suberifaciens</i>
Lettuce Necrotic Yellow Virus	LNyV
Tomato Spotted Wilt Virus	TSWV
Lettuce Big-Vein Virus	LBV
Mirafiori Lettuce Virus	MiLV
Lettuce Mosaic Virus	LMV
Cucumber Mosaic Virus	CMV
Turnip Mosaic Virus	TuMV
<b>Low</b>	
Damping Off	<i>Pythium</i> spp., <i>Phytophthora</i> spp., <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp.
Powdery Mildew	<i>Erysiphe cichoracearum</i>
Rhizoctonia Base Rot	<i>Rhizoctonia</i> spp.
Bacterial Soft Rot	<i>Erwinia</i> spp.

Viruses are usually transmitted by insects, with aphids a key vector for many viral infections. A key aspect of virus disease management is to accurately identify the virus causing the disease and then implement appropriate management strategies.

Insecticides are more effective against persistently transmitted viruses because insects are killed before they have time to acquire and transmit the virus. Vectors of non-persistent viruses will eventually be killed after feeding on plants sprayed with systemic insecticide. However, because these viruses can be transmitted within seconds, many plants become infected before the insect dies or moves out of the crop.

Management methods that ensure the use of virus-free seeds and seedling transplants along with early detection and disposal of infected seedlings will keep most of these diseases in check whilst eliminating alternative hosts, crop rotation, cover crops and farm hygiene are also important to prevent spread of these between sites.

### **Resistance Management**

Resistance Management Strategies for Downy Mildew<sup>5</sup>, Botrytis<sup>6</sup> and Sclerotinia<sup>6</sup> in lettuce are available on the Croplife website.

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

<sup>6</sup> <https://www.croplife.org.au/resources/programs/resistance-management/lettuce-botrytis-sclerotinia-draft/>

#### 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
<b>Sclerotinia Rot / Lettuce Drop</b> ( <i>Sclerotinia minor</i> , <i>Sclerotinia sclerotiorum</i> )							
<b>Priority: High</b>							
Sclerotinia Rot was ranked as a high priority in VIC, QLD, NSW, WA & TAS and as a moderate priority in SA. The fungus can survive in the soil for many years. Correct timing and effective application of fungicides are essential for control. CropLife fungicide resistance management strategy recommends maintaining a cover with protectant fungicide sprays at 7-10 day intervals from planting.							
Azoxystrobin (Amistar)	11	Protectant & Curative	14	A	ALL	Registered in lettuce (field) as a foliar application for suppression of <b>Sclerotinia Rot</b> . [Max. 3 applications per crop; re-treatment interval 7-14 d]	-
Azoxystrobin + Oxathiapiprolin (Orondis Flexi) Syngenta	11+49	Protectant & Curative	42 NG	A	ALL	Registered in lettuce (field) for control of Downy Mildew and suppression of Alternaria and <b>Sclerotinia</b> . [Max 3 applications per year; re-treatment interval 7-14 d]	-
Boscalid (Filan) BASF	7	Protectant & Curative	7	A	ALL	Registered in leafy vegetables (field and protected) for control of <b>Sclerotinia Rot</b> . Apply only on transplanted crops. [Max. no. of applications not specified; re-treatment interval 7-14 d]	-
Cyprodinil + Fludioxonil (Switch) Syngenta	9+12	Protectant	7	A	ALL	Registered in lettuce (field and protected) for control of Anthracnose, <b>Sclerotinia Rot</b> (Lettuce Drop) and Botrytis Grey Mould. [Max. 2 applications per crop; re-treatment interval 7 d]	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Dazomet (Basamid)	8F	Fumigant	NR	A	ALL	Registered as a pre-plant fumigant in seed beds for control of soil fungi including <i>Pythium</i> , <i>Phytophthora</i> , <b><i>Sclerotinia</i></b> , <i>Sclerotium</i> , <i>Rhizoctonia</i> , <i>Verticillium</i> , <i>Plasmodiophora</i> , <i>Armillaria</i> and <i>Fusarium</i> spp. Apply granules to the soil surface and incorporate and seal the soil surface immediately. Do not plant into soil until a positive germination test has been conducted.	-
Fludioxonil + Pydiflumetofen (Miravis Prime) Syngenta	12+7	Protectant & Curative	3 NG	A	ALL	Registered in lettuce (field and protected) for control of Grey Mould and <b>White Mould</b> . [Max. 2 applications per crop per year; re-treatment interval 7-14 d]	R3
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative	7	A	ALL	Registered in lettuce for control of <b>Lettuce Drop</b> . [Max. 2 applications per crop; re-treatment interval 7-14 d]	-
Iprodione (Rovral)	2	Protectant & Curative	7	A	ALL	Registered in lettuce (field) for control of <b>Sclerotinia Rot</b> . [Max. 4 applications per crop; re-treatment interval 7-10 d]	R2
Mandestrobin (Intuity) Sumitomo	11	Protectant & Curative	7	A	ALL	Registered in head and leafy lettuce (field only) for control of <b>Sclerotinia Rot</b> . [Max. 3 applications per crop; 2 consecutive; re-treatment interval 7-14 d]	-
Metham Sodium	-	Fumigant	NR	A	ALL	Registered in food crops as a pre-plant fumigant for control of fungus diseases including <i>Rhizoctonia</i> , <i>Pythium</i> , <i>Fusarium</i> , <i>Phytophthora</i> , <i>Verticillium</i> , <b><i>Sclerotinia</i></b> 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.	-
Penthiopyrad (Fontelis) Corteva	7	Protectant	3	A	ALL	Registered in leafy vegetable including lettuce for control of <b>Sclerotinia Rot</b> , Botrytis Grey Mould and Powdery Mildew. [Max. 2 sequential applications per crop; re-treatment interval 7-10 d]	-
Tebuconazole	3	Protectant & Curative	35	A	ALL	Registered in lettuce (field) for control of <b>Sclerotinia Rot</b> . [Max. 2 applications per crop; re-treatment interval 7-10 d]	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
<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.	-
<i>Aureobasidium pullulans</i> (Botector) Nufarm	BM 02	Biological		P		Registered for suppression of <b>Sclerotinia</b> in fruiting vegetables.	-
Fuopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of <b>Sclerotinia</b> in brassica leafy greens and sunflowers. Hort Innovation project ST17000 is generating data to support a label extension for control of <b>Sclerotinia</b> in leafy vegetables.	R3
NUL3446	TBC			P		Fungicide in development from Nufarm with activity on <b>Sclerotinia</b> spp.	-

#### **Anthracnose** (*Microdochium panattonianum*)

##### **Priority: High**

Anthracnose was ranked as a high priority in VIC and as a moderate priority in QLD, NSW, WA, SA & TAS. This fungus can be seed-borne and carry over on crop residue in the soil. It is spread in water droplets and worse in warm, humid weather.

Chlorothalonil (Bravo) PER14964	M5	Protectant	21	A	ALL (excl. VIC)	Permitted for use in lettuce seedlings prior to planting in the field (head & leafy varieties) for control of <b>Anthracnose</b> . [Max. 4 applications per crop; re-treatment interval 7 d]	R3
Copper	M1	Protectant	1	A	ALL	Registered in lettuce for control of Downy Mildew, Bacterial Leaf Spot, and <b>Anthracnose</b> . [Max. no. of applications not specified; re-treatment interval 7-10 d]	-
Cyprodinil + Fludioxonil (Switch) Syngenta	9+12	Protectant	7	A	ALL	Registered in lettuce (field and protected) for control of <b>Anthracnose</b> , Sclerotinia Rot (Lettuce Drop) and Botrytis Grey Mould. [Max. 2 applications per crop; re-treatment interval 7 d]	R3



Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Mancozeb	M3	Protectant	14	A	ALL	Registered in lettuce (field) for control of Downy Mildew, <b>Anthracnose</b> and Septoria Leaf 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	14	A	ALL	Registered in lettuce (field and protected) for control of Downy Mildew, <b>Anthracnose</b> and Septoria Leaf Spot. [Max. 2 consecutive applications per crop; re-treatment interval 7-10 d]	R2
Prochloraz (Octave) PER81131	3	Protectant & Curative	7 NG	A	ALL	Permitted for use in in leafy/open head lettuce (field) for control of <b>Anthracnose</b> . [Max. 4 applications per crop; 2 consecutive; re-treatment interval 7-14 d]	-
Thiram	M3	Protectant	7	A	QLD, WA, SA, VIC, TAS & NT	Registered in lettuce (field) for control of <b>Anthracnose</b> & Botrytis. [Max. no. of applications not specified; re-treatment interval 7-10 d].	R2
<i>Bacillus amyloliquefaciens</i> (Serenade Opti) Bayer PER87630	BM 02	Biological	NR	P-A	ALL	Permitted for use in lettuce (field & protected) for suppression of Bacterial Blight. Registered for control of <b>Anthracnose</b> in avocado and mango.	-
Captan PER14326	M4	Protectant & Curative	7	P-A	ALL (excl. VIC)	Permitted for use in leafy lettuce (protected) for control of Grey Mould. Registered for control of <b>Anthracnose</b> in strawberries.	-
Fludioxonil + Pydiflumetofen (Miravis Prime) Syngenta	12+7	Protectant & Curative	3 NG	P-A	ALL	Registered in lettuce (field and protected) for control of Grey Mould and White Mould. US registration for control of <b>Anthracnose</b> in berries and tuberous and corm vegetables, suppression of <b>Anthracnose</b> in lemons and limes.	R3
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative	7	P-A	ALL	Registered in Leafy lettuce for control of Lettuce Drop. Registered for control of <b>Anthracnose</b> in tropical and sub-tropical fruit.	-
<i>Aureobasidium pullulans</i> (Botector) Nufarm	BM 02	Biological	NR	P		Registered for control of <b>Anthracnose</b> in berries.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
<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 <b>Anthracnose</b> in artichoke, asparagus, berries, citrus, cucurbits, fruiting vegetables, pome fruit, stone fruit, tobacco, root and tuber vegetables (except sugar beet) and tree nuts.	-
Benzovindiflupyr + Propiconazole (Elatus) Syngenta	7+3	Protectant & Curative		P		Registered for control of various disease in wheat and barley. US registration for control of <b>Anthracnose</b> in sweet corn.	R3
BLAD (Problad Plus)	BM 01	Biological	NR	P		Registered in stone fruit for suppression of Brown Rot. US registration for control of <b>Anthracnose</b> in grapes and strawberries.	-
Dimethomorph (Acrobat) BASF	40	Protectant & Curative	14	P	ALL	Registered for the control of <b>Anthracnose</b> in head varieties of lettuce.	-
Florylpicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New active in development from Corteva with activity on Septoria, Powdery Mildew, Botrytis, <b>Anthracnose</b> , Alternaria, Scab, Monilinia, Rust and <i>Mycosphaerella</i> spp. Scheduled for JMPR evaluation in 2023.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of <b>Anthracnose</b> in almonds, cucurbits and tree nuts.	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 of <b>Anthracnose</b> in cucurbits, leafy vegetables, stone fruit, strawberries and tree nuts.	-
Isofetamid (Kenja) ISK / AgNova	7	Protectant & Curative		P		Registered in berries for control of Botrytis Grey Mould. US registration for control of <b>Anthracnose</b> in almonds, grapes and low-growing berries.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
<b>Bacterial Spot</b> ( <i>Xanthomonas campestris pv. vesicatoria</i> )							
<b>Priority: High</b>							
Bacterial Spot was ranked as a high priority in QLD and as a moderate priority in VIC, NSW, WA, SA & TAS. It 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 by insects, people or equipment moving through the crop.							
<i>Bacillus amyloliquefaciens</i> (Serenade Opti) Bayer PER87630	BM 02	Biological	NR	A	ALL	Permitted for use in lettuce (field & protected) for suppression of <b>Bacterial Blight</b> ( <i>Xanthomonas</i> spp.) [Max. no. of applications not specified; re-treatment interval 3-7 d]	-
Copper	M1	Protectant	1	A	ALL	Registered in lettuce for control of Downy Mildew, <b>Bacterial Leaf Spot</b> & Anthracnose. [Max. no. of applications not specified; re-treatment interval 7-10 d]	-
Acibenzolar-S-methyl (Actigard Plant Activator) Syngenta	P01	Protectant		P		Registered for the suppression of Bacterial Speck, Bacterial Spot ( <i>Xanthomonas</i> spp.), Bacterial Canker and Powdery Mildew in tomatoes. US registration for suppression of <i>Xanthomonas</i> spp. in Brassica leafy vegetables, cucurbits, low growing berry, bulb onion, pepper and tomato.	-
<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 <i>Xanthomonas</i> spp. in brassica leafy vegetables, citrus, fruiting vegetables, leafy vegetables, stone fruit, strawberries, root and tuber vegetables and tree nuts.	-
<b>Septoria Spot / Late Blight</b> ( <i>Septoria apiicola</i> )							
<b>Priority: High</b>							
Septoria Spot was ranked as a high priority in QLD, as a moderate priority in VIC, WA & SA and as a low priority in NSW & TAS. Septoria Spot is weather dependent, and it is an issue when cool and wet conditions set in. It is considered more of an autumn and winter issue. The fungus survives in several ways: it 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.							
Mancozeb	M3	Protectant	14	A	ALL	Registered in lettuce (field) for control of Downy Mildew, Anthracnose and <b>Septoria Leaf Spot</b> . [Max. no. of applications not specified; re-treatment interval 7-10 d]	R2

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Mancozeb + Metalaxyl-M (Ridomil Gold MZ) Syngenta	M3+4	Protectant & Curative	14	A	ALL	Registered in lettuce (field and protected) for control of Downy Mildew, Anthracnose and <b>Septoria Leaf Spot</b> . [Max. 2 consecutive applications per crop; re-treatment interval 7-10 d]	R2
Metiram (Polyram)	M3	Protectant	7	A	ALL (excl. QLD)	Registered in lettuce (field and protected) for control of Downy Mildew and <b>Septoria Leaf Spot</b> . [Max. no. of applications not specified; re-treatment interval 7-10 d]	R2
Copper	M1	Protectant	1	P-A	ALL	Registered in lettuce for control of Downy Mildew, Bacterial Leaf Spot, and Anthracnose. Registered for control of <b>Septoria Spot</b> in citrus, passionfruit, blackcurrent, carnation, celery, parsnips and tomatoes.	-
Fludioxonil + Pydiflumetofen (Miravis Prime) Syngenta	12+7	Protectant & Curative	3 NG	P-A	ALL	Registered in lettuce (field and protected) for control of Grey Mould and White Mould. US registration for control of <b>Septoria spp.</b> in cucurbits, fruiting vegetables, grapes and small fruit vine climbing (except fuzzy kiwifruit), specific leaf petioles, specific leafy greens, potatoes and tuberous and corm vegetables.	R3
Dimethomorph (Acrobat) BASF	40	Protectant & Curative		P		Registered for the control of <b>Septoria Leaf Spot</b> in head varieties of lettuce.	-
Dimethomorph + Mancozeb (Acrobat WDG) BASF	40+M3	Protectant		P		Registered for the control of <b>Septoria Leaf Spot</b> in head varieties of lettuce.	R2
Florylpicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New active in development from Corteva with activity on <b>Septoria</b> , 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		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of <b>Septoria</b> in dry and succulent beans and pistachios.	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 <b>Septoria Spot</b> in leafy vegetables.	-
<b>Downy Mildew (<i>Bremia lactucae</i>)</b>							
<b>Priority: Moderate</b>							
Downy Mildew was ranked as a high priority in NSW & WA and as a moderate priority in VIC, QLD, SA & TAS. Characterised by a white downy fungal growth that develops on the underside of the leaf, Downy Mildew comes up every season. Warm, moist weather favours the spread of the disease. Managing this issue would include general farm hygiene, crop rotation, planting space (to allow air movement) and the implementation of protectant and curative fungicide treatment program. CropLife resistance management strategy recommends that disease control is started early when conditions favour disease development and maintain a regular program and continue alternation of fungicide modes of action between successive crops.							
Azoxystrobin + Oxathiapiprolin (Orondis Flexi) Syngenta	11+49	Protectant & Curative	42 NG	A	ALL	Registered in lettuce (field) for control of <b>Downy Mildew</b> and suppression of Alternaria and Sclerotinia. [Max 3 applications per year; re-treatment interval 7-14 d]	-
Copper	M1	Protectant	1	A	ALL	Registered in lettuce for control of <b>Downy Mildew</b> , Bacterial Leaf Spot, and Anthracnose. [Max. no. of applications not specified; re-treatment interval 7-10 d]	-
Dimethomorph + Mancozeb (Acrobat+ Mancozeb) PER14958	40+M3	Protectant & Curative	14 NG	A	ALL	Permitted for use in leafy lettuce (field & protected) for control of <b>Downy Mildew</b> . [Max. 4 applications per crop; 2 sequential; re-treatment interval 7-10 d]	R2
Mancozeb	M3	Protectant	14	A	ALL	Registered in lettuce (field) for control of <b>Downy Mildew</b> , Anthracnose and Septoria Leaf 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	14	A	ALL	Registered in lettuce (field and protected) for control of <b>Downy Mildew</b> , Anthracnose and Septoria Leaf Spot. [Max. 2 consecutive 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
Mandipropamid (Revus) Syngenta	40	Protectant & Curative	1	A	ALL	Registered in lettuce (all types, field and protected) for control of <b>Downy Mildew</b> . [Max. 4 consecutive applications per crop; re-treatment interval 7-10 d]	-
Metiram (Polyram)	M3	Protectant	7	A	ALL	Registered in lettuce (field and protected) for control of <b>Downy Mildew</b> . [Max. no. of applications not specified; re-treatment interval 7-10 d]	R2
Oxathiapiprolin (Zorvec Enicade) Corteva	49	Protectant	3	A	ALL	Registered in lettuce (field and protected) for control of <b>Downy Mildew</b> . [Max. 3 applications per crop; 2 consecutive; re-treatment interval 7-10 d]	-
Phosphorous Acid PER13698	33	Curative	1	A	ALL (excl. VIC)	Permitted for use in leafy lettuce (field & protected) for control of <b>Downy Mildew</b> . Apply as a foliar spray only. [Max. no. of applications and re-treatment interval not specified]	-
Propamocarb Hydrochloride + Fluopicolide (Infinito) Bayer	28+43	Protectant	7	A	ALL	Registered in lettuce (field and protected) for control of <b>Downy Mildew</b> . [Max. 3 applications per crop; re-treatment interval 7-10 d]	-
Propineb (Antracol) Bayer	M3	Protectant	3	A	VIC, TAS & WA	Registered in lettuce (field) for control of <b>Downy Mildew</b> . [Max. no. of applications not specified; re-treatment interval 7-10 d]	R2
Propineb + Oxadixyl (Rebound) Kiwi Rural Trading	M3+4	Protectant & Curative	3	A	ALL	Registered in lettuce (field) for control of <b>Downy Mildew</b> . [Max. 2 applications per crop; re-treatment interval 7-10 d]	R2
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 <b>Downy Mildew</b> in Brassica leafy vegetables, cucurbits, leafy vegetables, spinach, and suppression of <b>Downy Mildew</b> in bulb onion.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Cyazofamid (Ranman) UPL	21	Protectant		P		Registered for control of Late Blight and White Blister in potatoes and broccoli. US registration for control of <b>Downy Mildew</b> in herbs, brassica leafy vegetables, cucurbits, grapes, hops, leafy greens, succulent-podded and succulent-shelled beans and bulb vegetables.	-
Dimethomorph (Acrobat) BASF	40	Protectant & Curative		P		Registered for the control of <b>Downy Mildew</b> in cucurbits, grapevines, head varieties of lettuce, onion and poppy oilseed.	-
Dimethomorph + Amitoctradin (Zampro) AgNova	40+45	Protectant		P		Registered for control of <b>Downy Mildew</b> in grape vines.	-
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 suppression of <b>Downy Mildew</b> in bulb vegetables, cucurbits and leafy vegetables.	-
Hydrogen Peroxide + Peroxyacetic Acid (Peratec Plus)	M	Protectant		P		Registered for control of <b>Downy Mildew</b> in brassica vegetables, bulb vegetables and grapes.	-
<b>Botrytis Rot (<i>Botrytis cinerea</i>)</b>							
<b>Priority: Moderate</b>							
Botrytis Rot was ranked as in moderate priority in VIC, QLD, NSW, WA, SA & TAS. <i>Botrytis</i> spp., which causes Grey Mould, can affect plants at most stages of production. Affected parts get rapidly covered with a thick grey mould. <i>Botrytis</i> also causes secondary rots on fruit and vegetables in storage or transit and in the marketplace. CropLife fungicide resistance management strategy recommends maintaining a cover with protectant fungicide sprays at 7-10 day intervals from planting.							
Captan PER14326	M4	Protectant	7	A	ALL (excl. VIC)	Permitted for use in leafy lettuce (protected) for control of <b>Grey Mould</b> . [Max. 3 applications per crop; re-treatment interval 7-14 d]	-
Cyprodinil + Fludioxonil (Switch) Syngenta	9+12	Protectant	7	A	ALL	Registered in lettuce (field and protected) for control of Anthracnose, Sclerotinia Rot (Lettuce Drop) and <b>Botrytis Grey Mould</b> . [Max. 2 applications per crop; re-treatment interval 7 d]	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Fenhexamid Imtrade	17	Protectant	3	A	ALL	Registered in lettuce (field and protected) for control of <b>Botrytis Grey Mould</b> . [Max. 2 applications per crop; re-treatment interval 7-10 d]	-
Fludioxonil + Pydiflumetofen (Miravis Prime) Syngenta	12+7	Protectant & Curative	3 NG	A	ALL	Registered in lettuce (field and protected) for control of <b>Grey Mould</b> and White Mould. [Max. 2 applications per crop per year; re-treatment interval 7-14 d]	R3
Iprodione (Rovral)	2	Protectant & Curative	7	A	TAS & WA	Registered in lettuces for control of Sclerotinia Rot (Lettuce Drop) and <b>Botrytis Grey Mould</b> . [Max. 4 applications per crop; re-treatment interval 7-10 d]	R2
Penthiopyrad (Fontelis) Corteva	7	Protectant	3	A	ALL	Registered in leafy vegetable including lettuce for control of Sclerotinia Rot, <b>Botrytis Grey Mould</b> and Powdery Mildew. [Max. 2 sequential applications per crop; re-treatment interval 7-10 d]	-
Pyrimethanil (Scala) Bayer PER12565	9	Protectant	3	A	ALL (excl. VIC)	Permitted for use in lettuce (protected) for control of <b>Botrytis Grey Mould</b> . [Max. 2 applications per crop; re-treatment interval 7-10 d]	-
Thiram	M3	Protectant	7	A	QLD, WA, SA, VIC, TAS & NT	Registered in lettuce (field) for control of Anthracnose & <b>Botrytis</b> . [Max. no. of applications not specified; re-treatment interval 7-10 d].	R2
<i>Bacillus amyloliquefaciens</i> (Serenade Opti) Bayer PER87630	BM 02	Biological	NR	P-A	ALL	Permitted for use in lettuce (field & protected) for suppression of Bacterial Blight. US registration for control of <b>Botrytis</b> in artichoke, asparagus, berries, bulb vegetables, fruiting vegetables, grapes, cucurbits, grapes, herbs/spices, legume vegetables, root/tuber and corm vegetables, stone fruit and kiwi.	-
Boscalid (Filan) BASF	7	Protectant	7	P-A	ALL	Registered in leafy vegetables for control of Sclerotinia Rot. Registered for control of <b>Botrytis</b> in grapevines and onions.	-



Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative	7	P-A	ALL	Registered in Leafy lettuce for control of Lettuce Drop. US registration for control of <b>Botrytis</b> in almond, artichoke, berries, brassica vegetables, brassica leafy greens, cherries, dill seed, pome fruit, small vine climbing fruit (except fuzzy kiwifruit), ginseng, herbs, hops. Leafy greens, melons, pistachio, tomato, pepper and root vegetables.	-
<i>Aureobasidium pullulans</i> (Botector) Nufarm	BM 02	Biological		P		Registered for control of <b>Botrytis</b> in berries, fruiting vegetables and grapes.	-
<i>Bacillus amyloliquefaciens</i> strain MBI 600 (Serifel) BASF	BM 02	Biological	NR	P		Registered for control of <b>Botrytis</b> in grapevines and strawberries. US registration for control of <b>Botrytis</b> 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 <b>Botrytis</b> in fruiting vegetables, grapes, strawberries and ornamentals.	-
Fenpyrazamine (Prolectus) Sumitomo	17	Protectant & Curative		P		Registered for <b>Botrytis</b> control in grapes. US registration for control of <b>Botrytis</b> in berries, ginseng, lettuce, pistachio, small fruit vine climbing (except fuzzy kiwifruit) and ornamentals.	-
Florylpicoxamid (Adavelt) Corteva	21	Protective & Curative		P		New active in development from Corteva with activity on Septoria, Powdery Mildew, <b>Botrytis</b> , 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 <b>Botrytis</b> 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

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 <b>Botrytis spp.</b> 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 <b>Botrytis</b> in berries.	-
NUL3195 Nufarm	TBC			P		New product from Nufarm with <b>Botrytis</b> activity.	-
<b>Pythium</b> ( <i>Pythium</i> spp.)							
<b>Priority: Moderate</b>							
Pythium was ranked as a moderate priority in VIC, QLD, NSW, WA, SA & TAS. Pythium causes seedling damping off and root rot. Disease incidence tends to be greater in reduced tillage systems in higher organic matter soils with acidic-neutral rather than alkaline pH.							
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Fumigant	NR	A	ALL	Registered in vegetables for pre-planting control of Soil Borne Diseases including <i>Fusarium</i> , <i>Verticillium</i> Wilts, <i>Rhizoctonia</i> and <b>Pythium</b> . <b>For use by professional and registered fumigators only.</b>	-
Dazomet (Basamid)	8F	Fumigant	NR	A	ALL	Registered as a pre-plant fumigant in seed beds for control of soil fungi including <b>Pythium</b> , <i>Phytophthora</i> , <i>Sclerotinia</i> , <i>Sclerotium</i> , <i>Rhizoctonia</i> , <i>Verticillium</i> , <i>Plasmodiophora</i> , <i>Armillaria</i> and <i>Fusarium</i> spp. Apply granules to the soil surface and incorporate and seal the soil surface immediately. Do not plant into soil until a positive germination test has been conducted.	-
Metalaxyl-M (Ridomil Gold) Syngenta PER14318	4	Protectant	NR	A	ALL (excl. VIC)	Permitted in lettuce (field) as a pre-plant treatment for control of Damping Off ( <i>Pythium</i> & <i>Phytophthora</i> spp.) [Max. 1 application per crop]	-

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 fungus diseases including <i>Rhizoctonia</i> , <b><i>Pythium</i></b> , <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>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.	-
<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 <b><i>Pythium</i> spp.</b> in artichoke, asparagus, brassica leafy vegetables, bulb vegetables, citrus, cucurbits, corn, fruiting vegetables, legume vegetables, oilseeds, soybean, strawberry and root and tuber vegetables (except sugar beet).	-
Cyazofamid (Ranman) UPL	21	Protectant & curative		P		Registered in Brassica leafy vegetable seedlings for the control of Downy Mildew. US registration for control of <b><i>Pythium</i> spp.</b> in carrot, leafy greens, succulent-podded and succulent-shelled beans, tuberous and corm vegetables, tomato greenhouse transplants and greenhouse-grown bell peppers.	-
NUL3163 Nufarm	TBC			P		New active in development from Nufarm with activity on <i>Fusarium</i> , <b><i>Pythium</i></b> & <i>Rhizoctonia</i> .	-
<i>Streptomyces lydicus</i> (Actinovate) Novozymes Bioag	BM 02	Biological		P		Registered in strawberries and tomato for control of <i>Phytophthora</i> and as a seed treatment in vegetables for control of <b><i>Pythium</i></b> , <i>Fusarium</i> and <i>Rhizoctonia</i> . Apply prior to onset of disease season.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Thiophanate-Methyl + Etridiazole (Banrot)	1+14	Protective		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> , <i>Rhizoctonia</i> and <i>Thielaviopsis</i> .	-
<b>Dry Leaf Spot</b> ( <i>Xanthomonas campestris</i> pv. <i>vitians</i> spp.)							
<b>Priority: Moderate</b>							
Dry Leaf Spot was ranked as a moderate priority in VIC, QLD, WA, SA & TAS and as a low priority in NSW. It 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.							
<i>Bacillus amyloliquefaciens</i> (Serenade Opti) Bayer PER87630	BM 02	Biological	NR	P-A	ALL	Permitted for use in lettuce (field & protected) for suppression of Bacterial Blight ( <i>Xanthomonas</i> spp.)	-
Copper	M1	Protectant	1	P-A	ALL	Registered in lettuce for control of Downy Mildew, Bacterial Leaf Spot, and Anthracnose.	-
Acibenzolar-S-Methyl (Actigard Plant Activator) Syngenta	P01	Protectant		P		Registered for suppression of Bacterial Spot ( <i>Xanthomonas campestris</i> ), Bacterial Speck and Bacterial Canker in tomatoes.	-
<b>Varnish Spot</b> ( <i>Pseudomonas</i> spp.)							
<b>Priority: Moderate</b>							
Varnish Spot was ranked as a moderate priority in VIC & QLD. It affects only the inner leaves of head lettuce varieties. This disease occurs in places where <i>Pseudomonas cichorii</i> contaminates water in reservoirs. When such water is used to sprinkle irrigate head lettuce crops at the rosette stage, the bacteria are introduced into the developing head. Avoid using contaminated reservoir water when sprinkler irrigating head lettuce at susceptible stages. Rotate away from susceptible crops (e.g., chicory, endive, cabbage, cauliflower, and celery) for at least 1 year.							
<i>Bacillus amyloliquefaciens</i> (Serenade Opti) Bayer PER87630	BM 02	Biological	NR	P-A	ALL	Permitted for use in lettuce (field & protected) for suppression of Bacterial Blight ( <i>Xanthomonas</i> spp.)	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Copper	M1	Protectant	1	P-A	ALL	Registered in lettuce for control of Downy Mildew, Bacterial Leaf Spot, and Anthracnose. Registered for control of Bacterial Spot ( <i>Pseudomonas</i> spp.) in stone fruit, brassicas, cucurbits, peas and tomatoes.	-
Acibenzolar-S-Methyl (Actigard Plant Activator) Syngenta	P01	Protectant		P		Registered for control of Powdery Mildew and Bacterial Spot in tomatoes.	-
<b>Corky Root (<i>Rhizomonas suberifaciens</i>)</b>							
<b>Priority: Moderate</b>							
Corky Root was ranked as a moderate priority in VIC & QLD. It is a soilborne pathogen and is typically more severe when soil temperatures are warmer. High soil nitrate levels can increase disease severity and over fertilising with nitrogen fertiliser should be avoided.							
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Fumigant	NR	A	ALL	Registered in vegetables for pre-planting control of Soil Borne Diseases including <i>Fusarium</i> , <i>Verticillium</i> Wilts, <i>Rhizoctonia</i> and <i>Pythium</i> . <b>For use by professional and registered fumigators only.</b>	-
Dazomet (Basamid)	8F	Fumigant	NR	A	ALL	Registered as a pre-plant fumigant in seed beds for control of soil fungi including <i>Pythium</i> , <i>Phytophthora</i> , <i>Sclerotinia</i> , <i>Sclerotium</i> , <i>Rhizoctonia</i> , <i>Verticillium</i> , <i>Plasmodiophora</i> , <i>Armillaria</i> and <i>Fusarium</i> spp. Apply granules to the soil surface and incorporate and seal the soil surface immediately. Do not plant into soil until a positive germination test has been conducted.	-
Metham Sodium	-	Fumigant	NR	A	ALL	Registered in food crops as a pre-plant fumigant for control of fungus 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.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
<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.	-
<p><b>Lettuce Necrotic Yellow Virus (LNYV)</b>  <b>Priority: Moderate</b>  Lettuce Necrotic Yellows was ranked as a moderate priority in VIC, QLD &amp; NSW. It is a common disease that can cause serious sporadic losses in lettuce crops. The Sowthistle Aphid is the major vector (persistent) for this disease and Sowthistle weed is the major host. Growers should control Sowthistle in and around lettuce crops to avoid outbreaks of Necrotic Yellows and control of Aphids can reduce transmission and spread of the virus.</p>							
<p><b>Tomato Spotted Wilt Virus (TSWV)</b>  <b>Priority: Moderate</b>  Tomato Spotted Wilt Virus was ranked as a moderate priority in VIC, QLD &amp; NSW. Several weeds are hosts for the disease, including Sowthistle, Capeweed, Thornapples, Cobblers Pegs, Nightshades and Jamaican Snakeweed. Thrips are the most common vector (persistent) and their control along with controlling host weeds is an important control measure.</p>							
<p><b>Lettuce Big-Vein Virus (LBV)</b>  <b>Mirafiori Lettuce Virus (MiLV)</b>  <b>Priority: Moderate</b>  Lettuce Big-Vein was ranked as a moderate priority in VIC &amp; QLD. It is favoured by cool, wet soil conditions and is transmitted from plant to plant by the soilborne fungus <i>Ospidium brassicae</i>. Control measures are limited to reducing waterlogging if possible and crop rotation to break the disease cycle in lettuce fields.</p>							
<p><b>Lettuce Mosaic Virus (LMV)</b>  <b>Priority: Moderate</b>  Lettuce Mosaic Virus was ranked as a moderate priority in VIC &amp; QLD. Several weeds are hosts and infections can be spread by aphids (non-persistent) in crop. The disease can also be spread through infected seed, and a key management option is to use certified disease-free seed. Control of weeds will assist in and around crops, although control of aphids is ineffective at preventing transmission.</p>							

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
<b>Cucumber Mosaic Virus (CMV)</b> <b>Turnip Mosaic Virus (TuMV)</b> <b>Priority: Unknown</b> Other virus diseases can infect lettuce although their priority was not determined in the recent survey. Cucumber Mosaic Virus and Turnip Mosaic Virus are vectored by Aphids (non-persistent). Control of Aphids is ineffective at controlled infection and spread of these diseases and control measures are reliant on the removal of infected plants and general farm hygiene.							
<b>Damping Off (<i>Pythium</i> spp., <i>Phytophthora</i> spp., <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp.)</b> <b>Priority: Low</b> Damping Off was ranked as a moderate priority in NSW & SA and as a low priority in VIC, QLD, WA & TAS. The disease attacks seedlings at the 1-2 leaf stage, causing water-soaked lesions on the stem and roots. Severe infections can cause stunting and yellowing in older crops. Registered fungicide treatments are limited for control although it is expected that seed treatments will assist, and good on-farm sanitation is recommended.							
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Fumigant	NR	A	ALL	Registered in vegetables for pre-planting control of Soil Borne Diseases including <b><i>Fusarium</i></b> , <b><i>Verticillium</i></b> Wilts, <b><i>Rhizoctonia</i></b> and <b><i>Pythium</i></b> . <b><i>For use by professional and registered fumigators only.</i></b>	-
Dazomet (Basamid)	8F	Fumigant	NR	A	ALL	Registered as a pre-plant fumigant in seed beds for control of soil fungi including <b><i>Pythium</i></b> , <b><i>Phytophthora</i></b> , <b><i>Sclerotinia</i></b> , <b><i>Sclerotium</i></b> , <b><i>Rhizoctonia</i></b> , <b><i>Verticillium</i></b> , <b><i>Plasmodiophora</i></b> , <b><i>Armillaria</i></b> and <b><i>Fusarium</i></b> spp. Apply granules to the soil surface and incorporate and seal the soil surface immediately. Do not plant into soil until a positive germination test has been conducted.	-
Metalaxyl-M (Ridomil Gold) Syngenta PER14318	4	Protectant	NR	A	ALL (excl. VIC)	Permitted in lettuce (field) as a pre-plant treatment for control of <b>Damping Off (<i>Pythium</i> &amp; <i>Phytophthora</i> spp.)</b> [Max. 1 application per crop]	-
Metham Sodium	-	Fumigant	NR	A	ALL	Registered in food crops as a pre-plant fumigant for control of fungus diseases including <b><i>Rhizoctonia</i></b> , <b><i>Pythium</i></b> , <b><i>Fusarium</i></b> , <b><i>Phytophthora</i></b> , <b><i>Verticillium</i></b> , <b><i>Sclerotinia</i></b> 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.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Azoxystrobin (Amistar)	11	Protectant & Curative	NR NG	P-A	ALL	Registered in lettuce (field) as an in-furrow spray or plug hole drench for control of Bottom Rot ( <i>Rhizoctonia solani</i> ).	-
<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.	-
Tolcofos-Methyl (Rizolex) PER14431	14	Protectant & Curative	NR NG	P-A	ALL (excl. VIC)	Permitted for use in lettuce (field) as an in-furrow application or plug hole drench for control of Bottom Rot ( <i>Rhizoctonia solani</i> ).	-
Azoxystrobin + Difenoconazole (Amistar Top) Syngenta	11+3	Protectant & Curative		P		Registered for control of <b>Phytophthora</b> in potatoes.	R3
<i>Bacillus amyloliquefaciens</i> (Serifel) BASF	BM 02	Biological	NR	P		Registered for control of <i>Botrytis</i> in grapes. US registration for control of <b>Pythium Damping Off</b> in artichoke, asparagus, brassica leafy vegetables, bulb vegetables, citrus, cucurbits, corn, fruiting vegetables, legume vegetables, oilseeds, soybean, strawberry and root and tuber vegetables (except sugar beet).	-
Cyazofamid (Ranman) UPL	21	Protectant & curative		P		Registered in Brassica leafy vegetable seedlings for the control of Downy Mildew. US registration for control of <i>Pythium</i> spp. in carrot, leafy greens, succulent-podded and succulent-shelled beans, tuberous and corm vegetables, tomato greenhouse transplants and greenhouse-grown bell peppers.	-
Fludioxonil + Sedaxane (Vibrance Premium) Syngenta	12 +7	Protective Seed Treatment		P		Registered for control of Black Scurf ( <i>Rhizoctonia</i> ), Silver Surf, Black Rot, Gangrene and Fusarium Dry Rot and suppression of Scab in potatoes. Hort innovation is pursuing studies to control Rhizoctonia in beetroot.	R3



Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Fosetyl-Aluminium (Aliette)	33	Curative		P		Registered for control of <b>Phytophthora spp.</b> in apples, peaches, avocados & pineapples.	-
NUL3163 Nufarm	TBC			P		New active in development from Nufarm with activity on <b>Fusarium, Pythium &amp; Rhizoctonia.</b>	-
<i>Streptomyces lydicus</i> WYEC108 (Actinovate) Novozymes Bioag	BM 02	Biological	NR	P		Registered in strawberries and tomato for control of Phytophthora and as a seed treatment in vegetables for control of Pythium, <b>Fusarium</b> and <b>Rhizoctonia.</b>	-
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 <b>Pythium, Phytophthora, Rhizoctonia</b> and <i>Thielaviopsis</i> .	-
Thiram + Thiabendazole (Evershield) UPL	1+M3	Protectant		P		Registered in field & garden peas for control of Black Spot ( <i>Mycosphaerella pinodes</i> ) & Seedling Root Rots ( <b>Fusarium, Pythium</b> & <i>Macrophomina</i> spp.).	R2
<b>Powdery Mildew</b> ( <i>Erysiphe cichoracearum</i> )							
<b>Priority: Low</b>							
Powdery Mildew was ranked as a low priority in VIC, QLD, NSW, WA, SA & TAS. The characteristic white, powdery growth occurs on plants infected by this fungus. 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.							
Penthiopyrad (Fontelis) Corteva	7	Protectant	3	A	ALL	Registered in leafy vegetable including lettuce for control of Sclerotinia Rot, Botrytis Grey Mould and <b>Powdery Mildew.</b> [Max. 2 sequential applications per crop; re-treatment interval 7-10 d]	-
Potassium Bicarbonate (Eco-Carb) PER13695	M2	Protectant	NR	A	ALL (excl. VIC)	Permitted for use in lettuce (field & protected) for control of <b>Powdery Mildew</b> [Max. no. of applications not specified; re-treatment interval: 10-14 d]	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
<i>Bacillus amyloliquefaciens</i> (Serenade Opti) Bayer PER87630	BM 02	Biological	NR	P-A	ALL	Permitted for use in lettuce (field & protected) for suppression of Bacterial Blight. Permitted for control of <b>Powdery Mildew</b> in eggplant. US registration for control of <b>Powdery Mildew</b> in cucurbits, grapes, pome fruit, stone fruit and strawberries.	-
Fludioxonil + Pydiflumetofen (Miravis Prime) Syngenta	12+7	Protectant & Curative	3 NG	P-A	ALL	Registered in lettuce (field and protected) for control of Grey Mould and White Mould. US registration for control of <b>Powdery Mildew</b> 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
Fuopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative	7	P-A	ALL	Registered in Leafy lettuce for control of Lettuce Drop. Registered for control of <b>Powdery Mildew</b> in apples.	-
Acibenzolar-S-Methyl (Actigard Plant Activator) Syngenta ADM1700F Adama	P01	Protectant		P		Registered in tomatoes for the suppression of Bacterial Speck, Bacterial Spot, Bacterial Canker and Powdery Mildew. US registration for control of <b>Powdery Mildew</b> in cucurbits.	-
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 <b>Powdery Mildew</b> in cucurbits, fruiting vegetables, grapes, hops, pome fruit and strawberries.	-
Boscalid + Kresoxim-Methyl (Colliss) BASF	7+11	Protectant & Curative		P		Registered for control of <b>Powdery Mildew</b> in cucurbits.	-
Bupirimate (Nimrod) Adama	8	Protectant & Curative		P		Registered for control of <b>Powdery Mildew</b> in apples, cucurbits, cut flower, eggplant, melons, nursery stock, ornamentals, peppers and strawberries.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Cyflufenamid (Flute) AgNova	U6	Protectant & Curative		P		Registered for control of <b>Powdery Mildew</b> in cucurbits, grapevines and strawberries.	-
Florylpicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New active in development from Corteva with activity on Septoria, <b>Powdery Mildew</b> , 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		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of <b>Powdery Mildew</b> in almonds, brassica leafy greens, cucurbits, grapes, hops, dry and succulent beans, stone fruit and sunflowers.	R3
Hydrogen Peroxide + Peroxyacetic Acid (Peratec Plus)	M	Protectant		P		Registered for control of <b>Powdery Mildew</b> in grapes, fruiting vegetables, cucurbits and potatoes.	-
Isofetamid (Kenja) ISK / AgNova	7	Protective & Curative		P		Registered in berries for control of Botrytis Grey Mould. US registration for control of <b>Powdery Mildew</b> in grapes, low-growing berries and pome fruit.	-
Mefentrifluconazole (Belanty) BASF	3	Systemic		P		Registered for control of <b>Powdery Mildew</b> in grapes.	-
Metrafenone (Vivando) BASF	U8	Protectant		P		Registered for control of <b>Powdery Mildew</b> in cucurbits and grapes.	-
NUL3195 Nufarm	TBC			P		Fungicide in development from Nufarm with activity on <b>Powdery Mildew</b> and <i>Botrytis</i> .	-
Proquinazid (Talendo) Corteva	13	Protectant		P		Registered for control of <b>Powdery Mildew</b> in fruiting vegetables, cucurbits, grapes and pome fruit.	-
Pyriofenone (Kusabi) AgNova	50	Protectant & Curative		P		Registered for control of <b>Powdery Mildew</b> in cucurbits and grapes.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
<i>Streptomyces lydicus</i> (Actinovate)	BM 02	Biological	NR	P		Registered for control of <b>Powdery Mildew</b> in strawberries, carrots, cucurbits, fruiting vegetables and verbena.	-
Tea Tree Oil (Timorex)	46	Protectant				Registered for control of <b>Powdery Mildew</b> in fruiting vegetables, cucurbits and grapes.	-
<b>Rhizoctonia Base Rot</b> ( <i>Rhizoctonia</i> spp.)							
<b>Priority: Low</b>							
Rhizoctonia Base Rot was ranked as a low priority in VIC, QLD, NSW, WA, SA & TAS. It is a common soil-borne disease with a wide host range. Management options include soil fumigation, use of disease-free planting material, fungicides and removal of previous crop residues prior to planting.							
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Fumigant	NR	A	ALL	Registered in vegetables for pre-planting control of Soil Borne Diseases including <i>Fusarium</i> , <i>Verticillium</i> Wilts, <b><i>Rhizoctonia</i></b> and <i>Pythium</i> . <b>For use by professional and registered fumigators only.</b>	-
Azoxystrobin (Amistar)	11	Protectant & Curative	NR NG	A	ALL	Registered in lettuce (field) as an in-furrow application or plug hole drench for control of <b>Bottom Rot (<i>Rhizoctonia solani</i>)</b> . [Max. 1 application per crop]	-
Dazomet (Basamid)	8F	Fumigant	NR	A	ALL	Registered as a pre-plant fumigant in seed beds for control of soil fungi including <i>Pythium</i> , <i>Phytophthora</i> , <i>Sclerotinia</i> , <i>Sclerotium</i> , <b><i>Rhizoctonia</i></b> , <i>Verticillium</i> , <i>Plasmodiophora</i> , <i>Armillaria</i> and <i>Fusarium</i> spp. Apply granules to the soil surface and incorporate and seal the soil surface immediately. Do not plant into soil until a positive germination test has been conducted.	-
Metham Sodium	-	Fumigant	NR	A	ALL	Registered in food crops as a pre-plant fumigant for control of fungus diseases including <b><i>Rhizoctonia</i></b> , <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.	-
Tolcofos-Methyl (Rizolex) PER14431	14	Protectant & Curative	NR NG	A	ALL (excl. VIC)	Permitted for use in lettuce (field) as an in-furrow application or plug hole drench for control of <b>Bottom Rot (<i>Rhizoctonia solani</i>)</b> . [Max. 1 application per crop]	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
<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.	-
Copper	M1	Protectant	1	P-A	ALL	Registered in lettuce for control of Downy Mildew, Bacterial Leaf Spot, and Anthracnose. Registered for control of <b>Rhizoctonia</b> in turf.	-
<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 <b>Rhizoctonia spp.</b> 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 <b>Rhizoctonia Rot</b> 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 ( <b>Rhizoctonia</b> ), Silver Surf, Black Rot, Gangrene and Fusarium Dry Rot and suppression of Scab. Hort innovation is conducting research for use in beetroot to control <b>Rhizoctonia</b> .	R3
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of <b>Rhizoctonia</b> in cucurbits and for suppression of <b>Rhizoctonia</b> in Brassica leafy vegetables.	R3
NUL3163 Nufarm	TBC			P		New active in development from Nufarm with activity on <i>Fusarium</i> , <i>Pythium</i> & <b>Rhizoctonia</b> .	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Penflufen+ Trifloxystrobin (Evergol Extend) Bayer	7+11	Protectant		P		Registered for control of <b>Rhizoctonia spp.</b> in canola, forage brassicas, pastures and cotton.	-
<i>Streptomyces lydicus</i> (Actinovate)	BM 02	Biological	NR	P		Registered in strawberries and tomato for control of Phytophthora and as a seed treatment in vegetables for control of <i>Pythium</i> , <i>Fusarium</i> and <b>Rhizoctonia</b> .	-
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> , <b>Rhizoctonia</b> and <i>Thielaviopsis</i> .	-
<b>Bacterial Soft Rot (<i>Erwinia</i> spp.)</b>							
<b>Priority: Low</b>							
Bacterial Soft Rot was ranked as a low priority in VIC & QLD. It may be introduced in seed or in surviving undecomposed crop residue or other host plants. It can spread in water splash and so overhead irrigation should be avoided. Application of copper may reduce disease spread and infection.							
<i>Bacillus amyloliquefaciens</i> (Serenade Opti) Bayer PER87630	BM 02	Biological	NR	P-A	ALL	Permitted for use in lettuce (field & protected) for suppression of Bacterial Blight. US registration for control of <b>Erwinia spp.</b> in pome fruit and root/tuber and corm vegetables.	-
Copper	M1	Protectant	1	P-A	ALL	Registered in Lettuce for the control of Bacterial Leaf Spot, Anthracnose and Downy Mildew.	-
<i>Bacillus amyloliquefaciens</i> strain MBI 600 (Serifel) BASF	BM 02	Biological		P		Registered for control of <i>Botrytis</i> in grapes and strawberries. US registration for control of <b>Erwinia spp.</b> in pome fruit and root and tuber vegetables (except sugar beet).	-

## **4.2 Insects, mites and other pests of leafy lettuce**

### **4.2.1 Insect, mite and other pest priorities**

<b>Common name</b>	<b>Scientific name</b>
<b>High</b>	
Green Peach Aphid	<i>Myzus persicae</i>
Cotton Bollworm / Corn Earworm	<i>Helicoverpa armigera</i>
Native Budworm	<i>Helicoverpa punctigera</i>
<b>Moderate</b>	
Western Flower Thrips	<i>Frankliniella occidentalis</i>
Plague Thrips	<i>Thrips imaginis</i>
Currant Lettuce Aphid	<i>Nasonovia ribis-nigri</i>
Rutherglen Bug	<i>Nysius vinitor</i>
Silverleaf Whitefly	<i>Bemisia tabaci</i>
Soldier Beetle	<i>Chauliognathus pulchellus</i>
<b>Low</b>	
Leafminer Flies	<i>Scaptomyza flava</i>
Cutworm	<i>Agrotis</i> spp.
African Black Beetle	<i>Heteronychus arator</i>
Green Vegetable Bug	<i>Nezara viridula</i>
Jassids	Cicadellidae
Looper Caterpillars	<i>Chrysodeixis</i> spp.
Webworm	Lepidoptera
Redlegged Earth Mite	<i>Halotydeus destructor</i>
Two-Spotted Mite	<i>Tetranychus urticae</i>
Wireworm and False Wireworms	Elateridae - <i>Tenebrionidae</i> spp.
Earwigs	<i>Forficula</i> spp.
Slugs and Snails	Gastropoda

Other non-ranked pests and new incursions of an exotic pest which pose a potential threat.

<b>New Pest to Australia (unknown priority)</b>	
Fall Armyworm	<i>Spodoptera frugiperda</i>
Greenhouse Whitefly	<i>Trialeurodes vaporariorum</i>
Vegetable Leafminer	<i>Liriomyza sativae</i>
Pea Leafminer / Serpentine Leafminer	<i>Liriomyza huidobrensis</i>
American Serpentine Leafminer	<i>Liriomyza trifolii</i>

The highest priority insect pests identified by the survey are Green Peach Aphid and *Helicoverpa*. Available and potential products for control of these insect pests are detailed in Section 4.2.2.

### **Resistance Management**

There are several resistance management strategies applicable to lettuce, including for the management of Aphids, Fall Armyworm, Silverleaf Whitefly and Western Flower Thrips. Details of these strategies are listed on the Croplife Website<sup>7</sup>. In the case of Green Peach Aphid, there is known cross-resistance between groups 1A and 1B. Product rotation should be used between group 1 and groups 4, 9, 23 and 28.

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<sup>7</sup> <https://www.croplife.org.au/resources/programs/resistance-management/>



## 4.2.2 Available and potential products for priority insects, mites and other pests

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

Availability		Regulatory risk (refer to Appendix 6)	
A	Available via either registration or permit approval	R1	Short-term: Critical concern over retaining access
P	Potential - a possible candidate to pursue for registration or permit	R2	Medium-term: Maintaining access of significant concern
P-A	Potential, already approved in the crop for another use	R3	Long-term: Potential issues associated with use - Monitoring required
Withholding Period (WHP) – Number of days from last treatment to harvest (H) or Grazing (G)			
Harvest	H	Not Required when used as directed	NR
Grazing	G	No Grazing Permitted	NG
IPM – indicative overall impact on beneficials (based on the Cotton Pest Management Guide 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
<b>Green Peach Aphid</b> ( <i>Myzus persicae</i> )								
<b>Priority: High</b>								
Green Peach Aphid was ranked as a high priority in VIC, QLD, NSW, WA, SA & TAS. Nymphs and adults suck on sap, causing loss of vigour, and in some cases yellowing, stunting or distortion of plant parts. Honeydew (unused sap) secreted by the insects can cause sooty mould to develop on leaves. Aphids can also be vectors (carriers) for viruses.								
Afidopyropen (Versys) BASF	9D	Ingestion	1	A	ALL	Registered in leafy vegetables including lettuce (field) for control of <b>Green Peach Aphid</b> , Cabbage Aphid, Currant Lettuce Aphid, Cotton Aphid & suppression of Silverleaf Whitefly. [Max. 4 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, <b>Green Peach Aphid</b> & 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
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta	28+4A	Contact & Ingestion	42	A	ALL	Registered in leafy vegetables including lettuce as a seedling treatment for control of Helicoverpa, Cluster Caterpillar, Looper, Lettuce Aphid, <b>Green Peach Aphid</b> , Brown Sowthistle Aphid, Silverleaf Whitefly, Western Flower Thrips, Vegetable Leafhopper, and Lucerne Leafroller. [Max 1 application per crop; seedlings should be transplanted within 48 h of application]	L-H Bee:H	R2
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, <b>Aphids</b> , 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 (excl. QLD)	Registered in vegetables including lettuce (field) for control of <b>Aphids</b> , Green Vegetable Bug, Jassids, Leafhopper and Rutherglen Bug. [Apply at first sight of infestation: max no. of applications not specified]	H Bee:H	-
Petroleum Oil PER12221	-	Contact	1	A	ALL (excl. VIC)	Permitted for use in lettuce (field and protected) for control of Silverleaf Whitefly, Greenhouse Whitefly, <b>Aphids</b> , Green Mirid, Green Vegetable Bug, Grey Cluster Bug, Leafhoppers, Mites, Rutherglen Bug and Thrips. [Max. no. of applications and re-treatment interval not specified]	VL Bee:L	-
Pirimicarb (Aphidex) Adama	1A	Contact & Ingestion	2	A	ALL	Registered in lettuce (field) for control of <b>Aphids</b> . Spray when Aphids are detected. [Max. no. of applications & re-treatment interval not specified]	VL Bee:VL	R3
Potassium Salts of Fatty Acids (Natrasoap)	-	Contact	NR	A	ALL	Registered in vegetables for control of <b>Aphids</b> , 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	Contact	3	A	ALL	Registered in lettuce (field and protected) for control of Brown Sow Thistle Aphid, <b>Green Peach Aphid</b> , Currant Lettuce Aphid, Brown Sowthistle Aphids and suppression of Silverleaf Whitefly. [Max. 2 applications per crop; re-treatment interval: 7 d]	L Bee:VL	R3
Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in lettuce (field and protected) for control of <b>Aphids</b> , Cabbage White Butterfly, Pear and Cherry Slug, Rutherglen Bug, Greenhouse Whitefly, Light Brown Apple Moth, Plague Thrips, large-bodied caterpillars e.g. Grapevine Moth & Native Budworm. [Max no. of applications not specified; Re-treatment interval: 7 d]	VH Bee:H	-
Spirotetramat (Movento) Bayer	23	Ingestion	1	A	ALL	Registered in lettuce (protected and field) for control of Brown Sowthistle Aphid, Currant Lettuce Aphid, <b>Green Peach Aphid</b> and Western Flower Thrips. [Max 3 applications per crop; re-treatment interval 7 d]	M Bee:VL	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	3	A	ALL	Registered in leafy vegetables including lettuce (field and protected) for control of <b>Green Peach Aphid</b> , Brown Sowthistle Aphid, Rutherglen Bug and Greenhouse Whitefly. [Max no. of applications not specified; re-treatment interval 7-10 d;]	M Bee:VH	-
Emulsifiable Botanical Oil (Eco-Oil)	-	Contact	NR	P-A	ALL	Registered in vegetables for control of Greenhouse Whitefly. Registered for control of Aphids in tomatoes, cucumbers, capsicums, strawberries and ornamentals.	L Bee:L	-
Imidacloprid	4A	Contact & systemic	28	P-A	ALL	Registered in lettuce as a seedling treatment for control of Currant Lettuce Aphid. Registered for control of Green Peach Aphid in stone fruit, cucurbits, fruiting vegetables, duboisia and brassica vegetables.	M Bee:M	R2
Pyrethrins (Pyganic)	3A	Contact	1	P-A	ALL	Registered in lettuce (field) for control of Pea Aphids.	VH Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
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.	-	-
Fonicamid (Mainman) UPL	9C	Ingestion		P		Registered for control of Green Peach Aphid in canola, cucurbits and potato.	M 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 Green Peach Aphid in brassica leafy vegetables, cucurbits, fruiting vegetables, leafy vegetables, tuberous and corm vegetables and turnip greens.	L Bee:VL	-
Novaluron + Acetamiprid (Cormoran) Adama	15+4A	Contact & Ingestion		P		Registered for control of Green Peach Aphid in stone fruit.	M Bee:M	R2
<p><b>Cotton Bollworm / Corn Earworm (<i>Helicoverpa armigera</i>)</b>  <b>Native Budworm (<i>Helicoverpa punctigera</i>)</b>  <b>Priority: High</b></p> <p><i>Helicoverpa</i> was ranked as a high priority in VIC, QLD &amp; NSW and as a moderate priority in WA, SA &amp; TAS. <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.</p>								
Alpha-Cypermethrin	3A	Contact	3	A	ALL	Registered in lettuce (field) for control of <b><i>Helicoverpa</i> spp.</b> Do not apply to <i>H. armigera</i> larvae >5 mm in Northern NSW & QLD. [Max. no. of applications and re-treatment interval not specified]	VH Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
<i>Bacillus thuringiensis subsp. kurstaki</i> (DiPel)	11A	Biological	NR	A	ALL	Registered in vegetables (field and protected) for control of Armyworm, <b>Cotton Bollworm, Native Budworm</b> , Cabbage Moth, Cabbage White Butterfly, Green Looper, Light Brown Apple Moth, Pear Looper, Soybean Looper, Vine Moth and Tobacco Looper. Most effective on larvae < 8 mm. [Apply a minimum of 2 sprays, 3 d apart; re-treatment interval 3-5 d]	VL Bee:L	-
Chlorantraniliprole (Coragen) FMC	28	Ingestion	3	A	ALL	Registered in lettuce (field and protected) for control of <b>Cotton Bollworm</b> and <b>Native Budworm</b> . [Max of 3 sprays per crop; max 2 consecutive; re-treatment interval 7 d]	L Bee:VL	-
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta	28+4A	Contact & Ingestion	28	A	ALL	Registered in lettuce (field) as a seedling treatment for control of <b>Corn Earworm, Native Budworm</b> , Cluster Caterpillar, Looper, Lettuce Aphid, Green Peach Aphid, Brown Sowthistle Aphid, Silverleaf Whitefly, Western Flower Thrips, Vegetable Leafhopper and Lucerne Leafroller [Max 1 application per crop; seedlings should be transplanted within 48 h of application]	L-H Bee:H	R2
Diazinon	1B	Contact	14	A	ALL (excl. TAS)	Registered in lettuce (field) for control of Caterpillars and Cutworms. [Max no. of applications not specified]	H Bee:H	R3
Emamectin (Proclaim Opti) Syngenta	6	Ingestion	3	A	ALL	Registered in lettuce (field and protected) for control of <b>Helicoverpa</b> . [Max 4 applications per crop; re-treatment interval: 7 d]	M Bee:H	-
Flubendiamide (Belt) Bayer	28	Ingestion	1 NG	A	ALL	Registered in lettuce (field and protected) for control of <b>Helicoverpa spp.</b> [Max 3 applications per crop; re-treatment interval 7-14 d]	L-M Bee:L	-
Helicoverpa NPV (Vivus Max) AgBiTech	31	Biological	NR	A	ALL	Registered in lettuce (field and protected) for control of <b>Cotton Bollworm</b> and <b>Native Budworm</b> . [Max no. of applications not specified; re-treatment interval 2-3 d]	VL Bee:L	-
Indoxacarb (Avatar eVo) FMC	22A	Ingestion	3	A	ALL	Registered in lettuce (field) for control of <b>Cotton Bollworm</b> and <b>Native Budworm</b> . [Max. 3 applications per crop; re-treatment interval: 7 d]	L Bee:H	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Indoxacarb + Novaluron (Plemax) Adama	22A+15	Contact & Ingestion	3 NG	A	ALL	Registered in lettuce (field) for control of Cabbage White Butterfly, Cotton Bollworm, Native Budworm, Cabbage Cluster Caterpillar, Centre Grub, Cluster Caterpillar and Diamondback Moth. [Max. 3 applications per crop; re-treatment interval: 7 d]	M Bee:H	R3
Methomyl (Lannate)	1A	Contact	7	A	ALL	Registered in lettuce (field) for control of <b>Helicoverpa spp.</b> , Cluster Caterpillar and Western Flower Thrips. [Max. 4 applications per crop; re-treatment interval: 3 d]	H Bee:H	R2
Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in lettuce (field and protected) for control of Aphids, Cabbage White Butterfly, Pear and Cherry Slug, Rutherglen Bug, Greenhouse Whitefly, Light Brown Apple Moth, Plague Thrips, large-bodied caterpillars e.g. Grapevine Moth & <b>Native Budworm</b> . [Max no. of applications not specified; Re-treatment interval: 7 d]	VH Bee:H	-
Spinetoram (Success Neo) Corteva	5	Ingestion	3	A	ALL	Registered in leafy vegetables (field) for control of Loopers, Western Flower Thrips and <b>Helicoverpa spp.</b> [Max no. of applications not specified; re-treatment interval: 7-14 d]	M Bee:H	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	3 G:14	A	ALL	Registered in leafy vegetables (field and protected) for control of Loopers, <b>Helicoverpa</b> & 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	NR	P		Registered in cotton for control of <b>Helicoverpa spp.</b> , 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	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on <b>Lepidoptera</b> , 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 <b>Caterpillars</b> .	-	-
<b>Western Flower Thrips</b> ( <i>Frankliniella occidentalis</i> ) <b>Plague Thrips</b> ( <i>Thrips imaginis</i> ) <b>Priority: Moderate</b>								
Western Flower Thrips was ranked as a high priority in VIC, QLD & SA, and as a moderate priority in NSW, WA & TAS. Plague Thrips were ranked as a moderate priority in VIC, QLD WA & SA and as a low priority in NSW & TAS. 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.								
Abamectin	6	Contact & Ingestion	21	A	ALL	Registered in lettuce (field) for control of Two-Spotted Mite and <b>Western Flower Thrips</b> . [Max. 2 applications per crop; re-treatment interval: 28 d]	M Bee:H	-
<i>Beauveria bassiana</i> (Velifer) BASF	UNF	Biological	NR	A	ALL	Registered in protected vegetables and ornamentals for suppression of various pests including <b>Western Flower Thrips</b> , 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	-
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta	28+4A	Contact & Ingestion	28	A	ALL	Registered in lettuce (field) as a seedling treatment for control of Corn Earworm, Native Budworm, Cluster Caterpillar, Looper, Lettuce Aphid, Green Peach Aphid, Brown Sowthistle Aphid, Silverleaf Whitefly, <b>Western Flower Thrips</b> , Vegetable Leafhopper and Lucerne Leafroller [Max 1 application per crop; seedlings should be transplanted within 48 h of application]	L-H Bee:H	R2
Fipronil (Regent) PER83203	2B	Contact	10	A	ALL (excl. VIC)	Permitted for use in lettuce (field) for control of Onion Thrips & <b>Western Flower Thrips</b> . [Max. 3 applications per crop; re-treatment interval 14 d]	M Bee:VH	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, Caterpillars, Earwigs, Whitefly, <b>Thrips</b> 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)	1A	Contact	7	A	ALL	Registered in lettuce (field) for control of <i>Helicoverpa</i> spp., Cluster Caterpillar and <b>Western Flower Thrips</b> . [Max. 4 applications per crop; re-treatment interval: 3 d]	H Bee:H	R2
Petroleum Oil PER12221	-	Contact	1	A	ALL (excl. VIC)	Permitted for use in lettuce (field and protected) for control of Silverleaf Whitefly, Greenhouse Whitefly, Aphids, Green Mirid, Green Vegetable Bug, Grey Cluster Bug, Leafhoppers, Mites, Rutherglen Bug and <b>Thrips</b> . [Max. no. of applications and re-treatment interval not specified]	VL Bee:L	-
Potassium Salts of Fatty Acids (Natrasoap)	-	Contact	NR	A	ALL	Registered in vegetables for control of Aphids, <b>Thrips</b> , 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	-
Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in lettuce (field and protected) for control of Aphids, Cabbage White Butterfly, Pear and Cherry Slug, Rutherglen Bug, Greenhouse Whitefly, Light Brown Apple Moth, <b>Plague Thrips</b> , large-bodied caterpillars e.g. Grapevine Moth & Native Budworm. [Max no. of applications not specified; Re-treatment interval: 7 d]	VH Bee:H	-
Spinetoram (Success Neo) Corteva	5	Ingestion	3	A	ALL	Registered in leafy vegetables (field) for control of Loopers, <b>Western Flower Thrips</b> and <i>Helicoverpa</i> spp. [Max no. of applications not specified; re-treatment interval: 7-14 d]	M Bee:H	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	3 G:14	A	ALL	Registered in leafy vegetables (field and protected) for control of Loopers, <i>Helicoverpa</i> & <b>Western Flower Thrips</b> . [Max. 4 applications per season; re-treatment interval 7-14 d].	L Bee:L	-



Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spirotetramat (Movento) Bayer	23	Ingestion	1	A	ALL	Registered in lettuce (protected and field) for control of Brown Sowthistle Aphid, Currant Lettuce Aphid, Green Peach Aphid and <b>Western Flower Thrips</b> . [Max 3 applications per crop; re-treatment interval 7 d]	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 <b>Thrips</b> . 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 suppression of <b>Thrips</b> in berries, citrus, fruiting vegetables, tropical and subtropical fruit.	L Bee:VL	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and <b>Thrips</b> .	-	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2023 for <b>Thrips</b> , Bugs, Mites and Caterpillars. Hort Innovation project ST20003 is generating data to support a label registration for control of <b>Thrips</b> in brassica leafy vegetables.	-	-
<b>Currant Lettuce Aphid</b> ( <i>Nasonovia ribis-nigri</i> ) <b>Priority: Moderate</b>								
Currant Lettuce Aphid was ranked as a moderate priority in VIC, QLD, NSW, WA, SA & TAS. Nymphs and adults attack host plants at all stages of development and is primarily a problem because the colonisation of the inner leaves (and hearts of lettuce) renders the product unmarketable. It is also a vector for Cucumber Mosaic Virus and Lettuce Mosaic Virus.								
Afidopyropen (Versys) BASF	9D	Ingestion	1	A	ALL	Registered in leafy vegetables including lettuce (field) for control of <b>Green Peach Aphid</b> , Cabbage Aphid, Currant Lettuce Aphid, Cotton Aphid & suppression of Silverleaf Whitefly. [Max. 4 applications per crop; re-treatment interval 14 d]	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta	28+4A	Contact & Ingestion	28	A	ALL	Registered in lettuce (field) as a seedling treatment for control of Corn Earworm, Native Budworm, Cluster Caterpillar, Looper, <b>Lettuce Aphid</b> , Green Peach Aphid, Brown Sowthistle Aphid, Silverleaf Whitefly, Western Flower Thrips, Vegetable Leafhopper and Lucerne Leafroller [Max 1 application per crop; seedlings should be transplanted within 48 h of application]	L-H Bee:H	R2
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, <b>Aphids</b> , 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	4A	Contact	28	A	ALL	Registered in lettuce as a seedling treatment for control of <b>Currant Lettuce Aphid</b> . [Max. 1 application per transplant cell]	M Bee:M	R2
Maldison	1B	Contact	3	A	ALL (excl. QLD)	Registered in vegetables including lettuce (field) for control of <b>Aphids</b> , Green Vegetable Bug, Jassids, Leafhopper and Rutherglen Bug. [Apply at first sight of infestation: max no. of applications not specified]	H Bee:H	-
Petroleum Oil PER12221	-	Contact	1	A	ALL (excl. VIC)	Permitted for use in lettuce (field and protected) for control of Silverleaf Whitefly, Greenhouse Whitefly, <b>Aphids</b> , Green Mirid, Green Vegetable Bug, Grey Cluster Bug, Leafhoppers, Mites, Rutherglen Bug and Thrips. [Max. no. of applications and re-treatment interval not specified]	VL Bee:L	-
Pirimicarb (Aphidex) Adama	1A	Contact & Ingestion	2	A	ALL	Registered in lettuce (field) for control of <b>Aphids</b> . Spray when Aphids are detected. [Max. no. of applications & re-treatment interval not specified]	VL Bee:VL	R3
Potassium Salts of Fatty Acids (Natrasoap)	-	Contact	NR	A	ALL	Registered in vegetables for control of <b>Aphids</b> , 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	Contact	3	A	ALL	Registered in lettuce (field and protected) for control of Brown Sow Thistle Aphid, Green Peach Aphid, <b>Currant Lettuce Aphid</b> , Brown Sowthistle Aphids and suppression of Silverleaf Whitefly. [Max. 2 applications per crop; re-treatment interval: 7 d]	L Bee:VL	R3
Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in lettuce (field and protected) for control of <b>Aphids</b> , Cabbage White Butterfly, Pear and Cherry Slug, Rutherglen Bug, Greenhouse Whitefly, Light Brown Apple Moth, Plague Thrips, large-bodied caterpillars e.g. Grapevine Moth & Native Budworm. [Max no. of applications not specified; Re-treatment interval: 7 d]	VH Bee:H	-
Spirotetramat (Movento) Bayer	23	Ingestion	1	A	ALL	Registered in lettuce (protected and field) for control of Brown Sowthistle Aphid, <b>Currant Lettuce Aphid</b> , Green Peach Aphid and Western Flower Thrips. [Max 3 applications per crop; re-treatment interval 7 d]	M Bee:VL	-
<i>Beauveria bassiana</i> (Velifer) BASF	UNF	Biological	NR	P-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.	L Bee:L	-
Pyrethrins (Pyganic)	3A	Contact	NR	P-A	ALL	Registered in lettuce (field) for control of Pea Aphids.	VH Bee:H	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	3	P-A	ALL	Registered in leafy vegetables including lettuce (field and protected) for control of Green Peach Aphid, Brown Sowthistle Aphid, Rutherglen Bug and Greenhouse Whitefly.	M Bee:VH	-
Dimpropridaz (Axalion) BASF	TBC			P		BASF has applied for registration in leafy vegetables, brassica vegetables and fruiting vegetables, including cucurbits to control Whitefly, <b>Aphids</b> 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
Flonicamid (Mainman) UPL	9C	Ingestion		P		Registered for control of <b>Aphids</b> and Silverleaf Whitefly in cucurbits; <b>Aphids</b> in potatoes; <b>Aphids</b> and Mealybugs in apples and pears; Aphids and Mirids in cotton. US registration for control of <b>Aphids</b> , including <b>Red Lettuce Aphid (<i>Nasonovia ribis-nigri</i>)</b> in leafy greens.	M 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 <b>Aphids</b> in brassica leafy vegetables, berries, citrus, cucurbits, fruiting vegetables, hops, leafy vegetables, legume vegetables, peanuts, root vegetables, stone fruit, taro, tree nuts, tropical and sub-tropical fruit, tuberous and corm vegetables and turnip greens.	L Bee:VL	-
Novaluron + Acetamiprid (Cormoran) Adama	15+4A	Contact & Ingestion		P		Registered for control of Green Peach Aphid & Black Peach Aphid in stone fruit.	M Bee:M	R2
<b>Rutherglen Bug (<i>Nysius vinitor</i>)</b>								
<b>Priority: Moderate</b>								
Rutherglen Bug was ranked as a moderate priority in VIC, QLD, NSW, WA, SA & TAS. They breed up on weeds adjacent to cropping areas. It is important to monitor crops for eggs and nymphs by regular field scouting. Repeated influxes of migrating adults can make repeat insecticide applications necessary. Large numbers can cause significant feeding damage to foliage by sucking the sap and depleting the crop of nutrients.								
Maldison	1B	Contact	3	A	ALL (excl. QLD)	Registered in vegetables including lettuce (field) for control of Aphids, Green Vegetable Bug, Jassids, Leafhopper and <b>Rutherglen Bug</b> . [Apply at first sight of infestation: max no. of applications not specified]	H Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Petroleum Oil PER12221	-	Contact	1	A	ALL (excl. VIC)	Permitted for use in lettuce (field and protected) for control of Silverleaf Whitefly, Greenhouse Whitefly, Aphids, Green Mirid, Green Vegetable Bug, Grey Cluster Bug, Leafhoppers, Mites, <b>Rutherglen Bug</b> and Thrips. [Max. no. of applications and re-treatment interval not specified]	VL Bee:L	-
Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in lettuce (field and protected) for control of Aphids, Cabbage White Butterfly, Pear and Cherry Slug, <b>Rutherglen Bug</b> , Greenhouse Whitefly, Light Brown Apple Moth, Plague Thrips, large-bodied caterpillars e.g. Grapevine Moth & Native Budworm. [Max no. of applications not specified; Re-treatment interval: 7 d]	VH Bee:H	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	3	A	ALL	Registered in leafy vegetables including lettuce (field and protected) for control of Green Peach Aphid, Brown Sowthistle Aphid, <b>Rutherglen Bug</b> and Greenhouse Whitefly. [Max no. of applications not specified; re-treatment interval 7-10 d;]	M Bee:VH	-
Trichlorfon (Lepidex)	1B	Contact	2	A	ALL	Registered in vegetables (field) for control of Cabbage White Butterfly, Cabbage Moth, Green Vegetable Bug and <b>Rutherglen Bug</b> . [Max no. of applications not specified; re-treatment interval 7-10 d]	H Bee:H	R2
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 and Whiteflies in leafy vegetables.	L Bee:VL	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, <b>Bugs</b> , Beetles/Weevils, Fruit Fly and Thrips.	-	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for Thrips, <b>Bugs</b> and Caterpillars.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
<b>Silverleaf Whitefly</b> ( <i>Bemisia tabaci</i> )								
<b>Priority: Moderate</b>								
Silverleaf Whitefly was ranked as a moderate priority in QLD, NSW & TAS and as a low priority in VIC, WA & SA. High reproduction rate and short generation time results in large numbers that can retard plants simply through feeding. A significant problem is their ability to develop resistance very quickly when insecticides are used repeatedly.								
Afidopyropen (Versys) BASF	9D	Ingestion	1	A	ALL	Registered in leafy vegetables including lettuce (field) for control of Green Peach Aphid, Cabbage Aphid, Currant Lettuce Aphid, Cotton Aphid & suppression of <b>Silverleaf Whitefly</b> . [Max. 4 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, <b>Silverleaf Whitefly</b> , Sweet Potato Whitefly, Green Peach Aphid & Two-Spotted Spider Mites. [Max. 3 application per crop; re-treatment interval 3-14 d]	L Bee:L	-
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta	28+4A	Contact & Ingestion	28	A	ALL	Registered in lettuce (field) as a seedling treatment for control of Corn Earworm, Native Budworm, Cluster Caterpillar, Looper, Lettuce Aphid, Green Peach Aphid, Brown Sowthistle Aphid, <b>Silverleaf Whitefly</b> , Western Flower Thrips, Vegetable Leafhopper and Lucerne Leafroller [Max 1 application per crop; seedlings should be transplanted within 48 h of application]	L-H Bee:H	R2
Emulsifiable Botanical Oils (Eco-Oil) PER14077	-	Contact	NR	A	ALL (excl. VIC)	Permitted for use in lettuce (protected) for control of <b>Silverleaf Whitefly</b> (biotype B). [Max. 2 application per crop; re-treatment interval 2 d]	L Bee:L	-
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, Caterpillars, Earwigs, <b>Whitefly</b> , 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
Imidacloprid PER12351	4A	Contact & Ingestion	NR	A	ALL (excl. VIC)	Permitted for use in leafy lettuce (field) as a soil application for control of <b>Silverleaf Whitefly</b> . [Max. 2 application per crop; re-treatment interval 2 d]	M Bee:M	R2
Petroleum Oil PER12221	-	Contact	1	A	ALL (excl. VIC)	Permitted for use in lettuce (field and protected) for control of <b>Silverleaf Whitefly</b> , Greenhouse Whitefly, Aphids, Green Mirid, Green Vegetable Bug, Grey Cluster Bug, Leafhoppers, Mites, Rutherglen Bug and Thrips. [Max. no. of applications and re-treatment interval not specified]	VL Bee:L	-
Potassium Salts of Fatty Acids (Natrasoap)	-	Contact	NR	A	ALL	Registered in vegetables (field and protected) for control of Aphids, Thrips, Mealybug, Two Spotted Mites, Spider Mite and <b>Whitefly</b> . Apply when temperatures are cooler. [Max no. of applications not specified; re-treatment interval 5-7 d]	L Bee:L	-
Potassium Salts of Fatty Acids (Natrasoap) PER13920	-	Contact	NR	A	ALL (excl. VIC)	Permitted for use in lettuce (protected) for control of Greenhouse Whitefly and <b>Silverleaf Whitefly</b> . [Max no. of applications not specified; re-treatment interval 5-7 d].	L Bee:L	-
Pymetrozine (Chess) Syngenta	9B	Contact	3	A	ALL	Registered in lettuce (field and protected) for control of Brown Sow Thistle Aphid, Green Peach Aphid, Currant Lettuce Aphid, Brown Sowthistle Aphids and suppression of <b>Silverleaf Whitefly</b> . [Max. 2 applications per crop; re-treatment interval: 7 d]	L Bee:VL	R3
Pyriproxyfen (Admiral Advance) Sumitomo	7C	IGR	7	A	ALL	Registered in leafy lettuce (field and protected) for control of <b>Silverleaf Whitefly</b> . [Max. 2 applications per crop; re-treatment interval: 14 d]	VL Bee L	-
<i>Clitoria ternatea</i> Extract (Sero-X) Growth Agriculture	-	Biological	NR	P		Registered in cotton for control of <i>Helicoverpa</i> spp., Green Mirids and <b>Silverleaf Whitefly</b> and in brassica leafy vegetables for control of Diamondback Moth. Label extension has been submitted seeking to add new uses for control of <b>Silverleaf Whitefly</b> and Thrips in brassicas and cucurbits.	L Bee VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Dimpropridaz (Axalion) BASF	TBC			P		BASF has applied for registration in leafy vegetables, brassica vegetables and fruiting vegetables, including cucurbits to control <b>Whitefly</b> , Aphids and Thrips. Pending regulatory approvals, first market introduction in Australia is expected by late 2022 or early 2023.	-	-
Fonicamid (Mainman) UPL	29	Ingestion		P		Registered for control of Aphids and Silverleaf White Fly in cucurbits; Aphids in potatoes; Aphids and Mealybugs in apples and pears; Aphids and Mirids in Cotton. US registration for control of Aphids, Plant Bugs and Greenhouse Whitefly in leafy greens.	M 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 <b>Whitefly</b> in brassica leafy vegetables, berries, citrus, cucurbits, fruiting vegetables, leafy vegetables, legume vegetables, peanuts, root vegetables, taro leaves, tree nuts, tropical and sub-tropical fruit, tuberous and corm vegetables and turnip greens.	L Bee:VL	-
NUL3145 Nufarm	TBC			P		New product in development from Nufarm with activity on Scale, Nematodes, Mealybug and <b>Whitefly</b> .	-	-
<b>Soldier Beetle</b> ( <i>Chauliognathus pulchellus</i> )								
<b>Priority: Moderate</b>								
Soldier Beetle was ranked as a moderate priority in VIC & TAS and as a low priority in QLD, NSW, WA & SA. Larvae are soil dwelling and adults chew plants at or just beneath ground level. Soil fumigation helps.								
Dazomet (Basamid)	8F	Soil fumigant	NR	A	ALL	Registered as a pre-planting soil fumigation for control of <b>soil borne pests</b> , diseases & weeds. Soil moisture is essential for release of gas and plastic cover brings optimum results.	-	-
Spinetoram (Success Neo) Corteva	5	Ingestion	3	P-A	ALL	Registered in leafy vegetables (field) for control of Loopers, Western Flower Thrips and <i>Helicoverpa</i> spp. US registration for control of Colorado Potato Beetle in root and tuber vegetables	M Bee:H	-



Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spinosad (Entrust Organic) Corteva	5	Contact & ingestion	3 G:14	P-A	ALL	Registered in leafy vegetables including lettuce for control of Loopers, Helicoverpa & Western Flower Thrips. US registration for control of Colorado Potato Beetle in root and tuber vegetables, artichoke and fruiting vegetables, Asparagus Beetle in asparagus, Chrysomelid Leaf Feeding Beetles in ornamentals, and for control of Diamondback Moth, Cabbage Looper, Imported Cabbage Worm, Armyworms, Leafminers and Trips in leafy vegetables.	L Bee:L	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, <b>Beetles</b> /Weevils, Fruit Fly and Thrips.	-	-
Tetraniliprole (Vayego) Bayer	28	Ingestion		P		Registered in almonds, macadamias, pomefruit, and stonefruit for various insect pests such as Fruit Fly suppression, Carpophilus Beetles, Weevils & Lepidoptera. Hort Innovation has several projects underway towards assisting registration in vegetables including Root & Tuber and Stalk & Stem. Canadian registration for control of Cabbageworm, Diamondback Moth, Cutworms, Armyworms, Flea Beetles and suppression of Aphids and Cabbage Looper in leafy vegetables.	M Bee:VH	-
<b>Leafminer Flies (<i>Scaptomyza flava</i>)</b>								
<b>Priority: Low</b>								
Leafminer Flies were ranked as a moderate priority in SA & TAS and as a low priority in VIC, QLD, NSW & WA. They are a type of Dipteran Leafminer that can cause substantial damage to leaves, although they tend to be controlled incidentally in lettuce with insecticides targeted at Helicoverpa.								
Spinosad (Entrust Organic) Corteva PER90928	5	Ingestion	3 G:14	P-A	ALL (excl. VIC)	Permitted for use in lettuce (field and protected) for control of Liriomyza Leafminers.	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spirotetramat (Movento) Bayer PER88640	23	Ingestion	1	P-A	ALL (excl. VIC)	Permitted for use in lettuce (field and protected) for control of <i>Liriomyza</i> Leafminers.	M Bee:VL	-
Abamectin	6	Contact & Ingestion	21	P-A	ALL	Registered in lettuce (field) for control of Two-Spotted Mite and Western Flower Thrips. Permitted for suppression of Leafminers including Vegetable Leafminer and Serpentine Leafminer in cucurbits, fruiting vegetables, leafy vegetables (except lettuce), legume vegetables, root and tuber vegetables, bulb onions, cabbage (head), celery, rhubarb and bulb vegetables (except bulb onions).	M Bee:H	-
Chlorantraniliprole (Coragen) FMC	28	Ingestion	3	P-A	ALL	Registered in lettuce (field and protected) for control of Cotton Bollworm and Native Budworm. Permitted for control of <i>Liriomyza</i> Leafminers in spinach and silverbeet.	L Bee:VL	-
Emamectin (Proclaim Opti) Syngenta	6	Ingestion	3	P-A	ALL	Registered in lettuce (field and protected) for control of <i>Helicoverpa</i> . Permitted for control of <i>Liriomyza</i> species, including Vegetable Leafminer in Brassica vegetables.	M Bee:H	-
Spinetoram (Success Neo) Corteva	5	Ingestion	3	P-A	ALL	Registered in leafy vegetables (field) for control of Loopers, Western Flower Thrips and <i>Helicoverpa</i> spp. Permitted for control of <i>Liriomyza</i> Leafminers in snow peas, sugar snap peas and green beans.	M Bee:H	-
Cyantraniliprole (Benevia) FMC	28	Contact		P		Permitted for control of <i>Liriomyza</i> species, including Vegetable Leafminer ( <i>Liriomyza sativae</i> ), Pea Leafminer / Serpentine Leafminer ( <i>Liriomyza huidobrensis</i> ) and American Serpentine Leafminer ( <i>Liriomyza trifolii</i> ) in bulb vegetables, fruiting vegetables (all) and potatoes.	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Cyromazine (Diptex 150 WP)	17	Insect Growth Regulator		P		Permitted for control of Leafminers including Vegetable Leafminer and Serpentine Leafminer in broccoli, cucurbits, fruiting vegetables, head lettuce, legume vegetables, rot and tuber vegetables, and stalk and stem vegetables.	-	-
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	-
<p><b>Cutworms</b> (<i>Agrotis</i> spp.)  <b>Priority: Moderate</b></p> <p>Cutworm was ranked as a moderate priority in NSW, WA &amp; SA and as a low priority in VIC, QLD &amp; TAS. 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. MT16009 IPM Project Recommends: Predatory wasps, rotation, and early insecticide applications.</p>								
Dazomet (Basamid)	8F	Soil fumigant	NR	A	ALL	Registered as a pre-planting soil fumigation for control of <b>soil borne pests</b> , diseases & weeds. Soil moisture is essential for release of gas and plastic cover brings optimum results.	-	-
Diazinon	1B	Contact	14	A	ALL (excl. TAS)	Registered in lettuce (field) for control of Caterpillars and <b>Cutworms</b> . [Max no. of applications not specified]	H Bee:H	R3
Trichlorfon (Lepidex)	1B	Contact	2	A	ALL	Registered in lettuce (field) for control of <b>Cutworm</b> . Spray the base of plant and surrounding soil in late afternoon or night. [Max no. of applications and re-treatment interval not specified]	H Bee:H	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
<b>African Black Beetle</b> ( <i>Heteronychus arator</i> )								
<b>Priority: Low</b>								
African Black Beetle was ranked as a low priority in VIC, QLD, NSW, WA, SA & TAS. Larvae are soil dwelling and adults chew plants at or just beneath ground level. The larvae are less damaging than adults. There is a commercially available nematode ( <i>Heterorhabditis zealandica</i> ) for the biological control of African Black Beetle in turf and other high value crops. A new and promising biopesticide based on the naturally occurring bacteria <i>Yersinia entomophaga</i> , is being evaluated in New Zealand.								
Dazomet (Basamid)	8F	Soil fumigant	NR	A	ALL	Registered as a pre-planting soil fumigation for control of <b>soil borne pests</b> , diseases & weeds. Soil moisture is essential for release of gas and plastic cover brings optimum results.	-	-
Spinetoram (Success Neo) Corteva	5	Ingestion	3	P-A	ALL	Registered in leafy vegetables (field) for control of Loopers, Western Flower Thrips and <i>Helicoverpa</i> spp. US registration for control of Colorado Potato Beetle in root and tuber vegetables	M Bee:H	-
Spinosad (Entrust Organic) Corteva	5	Contact & ingestion	3 G:14	P-A	ALL	Registered in leafy vegetables including lettuce for control of Loopers, Helicoverpa & Western Flower Thrips. US registration for control of Colorado Potato Beetle in root and tuber vegetables, artichoke and fruiting vegetables, Asparagus Beetle in asparagus, Chrysomelid Leaf Feeding Beetles in ornamentals, and for control of Diamondback Moth, Cabbage Looper, Imported Cabbage Worm, Armyworms, Leafminers and Trips in leafy vegetables.	L Bee:L	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, <b>Beetles</b> /Weevils, Fruit Fly and Thrips.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Tetraniliprole (Vayego) Bayer	28	Ingestion		P		Registered in almonds, macadamias, pomefruit, and stonefruit for various insect pests such as Fruit Fly suppression, Carpophillus Beetles, Weevils & Lepidoptera. Hort Innovation has several projects underway towards assisting registration in vegetables including Root & Tuber and Stalk & Stem. Canadian registration for control of Cabbageworm, Diamondback Moth, Cutworms, Armyworms, Flea Beetles and suppression of Aphids and Cabbage Looper in leafy vegetables.	M Bee:VH	-
<b>Green Vegetable Bug (<i>Nezara viridula</i>)</b>								
<b>Priority: Low</b>								
Green Vegetable Bug was ranked as a low priority in VIC, QLD, NSW, WA, SA & TAS. These bugs use their long, thin mouthpart to suck nutrients from the aerial parts of the plant. It emits a foul smell when disturbed to deter predators. The nymphs are predated by ants, spiders & predatory bugs. It is important to monitor crops for eggs and nymphs of pest species by regular field scouting. Target sprays against mature eggs and nymphs before pests become entrenched.								
Maldison	1B	Contact	3	A	ALL (excl. QLD)	Registered in vegetables including lettuce (field) for control of Aphids, <b>Green Vegetable Bug</b> , Jassids, Leafhopper and Rutherglen Bug. [Apply at first sight of infestation: max no. of applications not specified]	H Bee:H	-
Petroleum Oil PER12221	-	Contact	1	A	ALL (excl. VIC)	Permitted for use in lettuce (field and protected) for control of Silverleaf Whitefly, Greenhouse Whitefly, Aphids, Green Mirid, <b>Green Vegetable Bug</b> , Grey Cluster Bug, Leafhoppers, Mites, Rutherglen Bug and Thrips. [Max. no. of applications and re-treatment interval not specified]	VL Bee:L	-
Trichlorfon (Lepidex)	1B	Contact	2	A	ALL	Registered in vegetables (field) for control of Cabbage White Butterfly, Cabbage Moth, <b>Green Vegetable Bug</b> and Rutherglen Bug. [Max no. of applications not specified; re-treatment interval 7-10 d]	H Bee:H	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta	28+4A	Contact & Ingestion	28	P-A	ALL	Registered in lettuce (field) as a seedling treatment for control of Corn Earworm, Native Budworm, Cluster Caterpillar, Looper, Lettuce Aphid, Green Peach Aphid, Brown Sowthistle Aphid, Silverleaf Whitefly, Western Flower Thrips, Vegetable Leafhopper and Lucerne Leafroller. Registered for control of <b>Green Vegetable Bug</b> in brassica vegetables and brassica leafy vegetables.	L-H Bee:H	R2
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	3	P-A	ALL	Registered in leafy vegetables including lettuce (field and protected) for control of Green Peach Aphid, Brown Sowthistle Aphid, Rutherglen Bug and Greenhouse Whitefly. US registration for suppression of Stink Bugs in berries, cotton, rice, soybean and succulent edible podded and dry beans.	M Bee:VH	-
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 and Whiteflies in leafy vegetables.	L Bee:VL	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, <b>Bugs</b> , Beetles/Weevils, Fruit Fly and Thrips.	-	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for Thrips, <b>Bugs</b> and Caterpillars.	-	-
<b>Jassids (Cicadellidae)</b>								
<b>Priority: Low</b>								
Jassids were ranked as a low priority in VIC & NSW. 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.								
Buprofezin (Applaud) Corteva PER82467	16	Contact & Ingestion	3	A	ALL (excl. VIC)	Permitted for use in leafy lettuce (field and protected) for control of <b>Jassids, Leafhoppers</b> and Greenhouse Whitefly. [Max. 2 applications per crop; re-treatment interval 14 d]	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta	28+4A	Contact & Ingestion	42	A	ALL	Registered in leafy vegetables including lettuce as a seedling treatment for control of Helicoverpa, Cluster Caterpillar, Looper, Lettuce Aphid, Green Peach Aphid, Brown Sowthistle Aphid, Silverleaf Whitefly, Western Flower Thrips, <b>Vegetable Leafhopper</b> , and Lucerne Leafroller. [Max 1 application per crop; seedlings should be transplanted within 48 h of application]	L-H Bee:H	R2
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, Caterpillars, Earwigs, Whitefly, Thrips and <b>Leafhoppers</b> . 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 (excl. QLD)	Registered in vegetables including lettuce (field) for control of Aphids, Green Vegetable Bug, <b>Jassids</b> , <b>Leafhopper</b> and Rutherglen Bug. [Apply at first sight of infestation: max no. of applications not specified]	H Bee:H	-
Petroleum Oil PER12221	-	Contact	1	A	ALL (excl. VIC)	Permitted for use in lettuce (field and protected) for control of Silverleaf Whitefly, Greenhouse Whitefly, Aphids, Green Mirid, Green Vegetable Bug, Grey Cluster Bug, <b>Leafhoppers</b> , Mites, Rutherglen Bug and Thrips. [Max. no. of applications and re-treatment interval not specified]	VL Bee:L	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	3	P-A	ALL	Registered in leafy vegetables including lettuce (field and protected) for control of Green Peach Aphid, Brown Sowthistle Aphid, Rutherglen Bug and Greenhouse Whitefly. US registration for control of <b>Leafhoppers</b> in berries, pome fruit and root and tuber vegetables.	M Bee:VH	-

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 control of <b>Leafhoppers</b> in brassica leafy vegetables, cucurbits, fruiting vegetables, leafy vegetables, legume vegetables, peanuts, root vegetables (except sugar beet), small fruit vine climbing (except fuzzy kiwifruit), taro, tuberous and corm vegetables and turnip greens.	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 2020/21 for Thrips, Bugs and Caterpillars.	-	-
<b>Looper Caterpillars</b> ( <i>Chrysodeixis</i> spp.)								
<b>Priority: Low</b>								
Looper Caterpillars were ranked as a low priority in VIC, QLD, NSW, WA, SA & TAS. The last two larval instars are the most voracious feeders and will usually eat the entire leaf but may avoid the midrib or other large veins. It is important to monitor crops for eggs and larvae by regular field scouting. Target sprays against mature eggs and larvae before pests become entrenched.								
<i>Bacillus thuringiensis subsp. kurstaki</i> (DiPel)	11A	Biological	NR	A	ALL	Registered in vegetables (field and protected) for control of Armyworm, Cotton Bollworm, Native Budworm, Cabbage Moth, Cabbage White Butterfly, <b>Green Looper</b> , Light Brown Apple Moth, <b>Pear Looper</b> , <b>Soybean Looper</b> , Vine Moth and <b>Tobacco Looper</b> . Most effective on larvae < 8 mm. [Apply a minimum of 2 sprays, 3 d apart; re-treatment interval 3-5 d]	VL Bee:L	-



Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta	28+4A	Contact & Ingestion	28	A	ALL	Registered in lettuce (field) as a seedling treatment for control of Corn Earworm, Native Budworm, Cluster Caterpillar, <b>Looper</b> , Lettuce Aphid, Green Peach Aphid, Brown Sowthistle Aphid, Silverleaf Whitefly, Western Flower Thrips, Vegetable Leafhopper and Lucerne Leafroller [Max 1 application per crop; seedlings should be transplanted within 48 h of application]	L-H Bee:H	R2
Diazinon	1B	Contact	14	A	ALL (excl. TAS)	Registered in lettuce (field) for control of <b>Caterpillars</b> and Cutworms. [Max no. of applications not specified]	H Bee:H	R3
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, <b>Caterpillars</b> , 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	-
Spinetoram (Success Neo) Corteva	5	Ingestion	3	A	ALL	Registered in leafy vegetables (field) for control of <b>Loopers</b> , Western Flower Thrips and <i>Helicoverpa</i> spp. [Max no. of applications not specified; re-treatment interval: 7-14 d]	M Bee:H	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	3 G:14	A	ALL	Registered in leafy vegetables (field and protected) for control of <b>Loopers</b> , <i>Helicoverpa</i> & Western Flower Thrips. [Max. 4 applications per season; re-treatment interval 7-14 d].	L Bee:L	-
Chlorantraniliprole (Coragen) FMC	28	Ingestion	3	P-A	ALL	Registered in lettuce for control of <i>Helicoverpa</i> . Registered for control of Soybean Looper in brassica vegetables and brassica leafy vegetables.	L Bee:VL	-
Emamectin (Proclaim Opti) Syngenta	6	Ingestion	3	P-A	ALL	Registered in lettuce (field and protected) for control of <i>Helicoverpa</i> . Registered for control of Loopers in brassica vegetables, root and tuber vegetables, leafy vegetables, brassica leafy vegetables, strawberries and legume vegetables.	M Bee:H	-
Flubendiamide (Belt) Bayer	28	Ingestion	1 NG	P-A	ALL	Registered in lettuce for control of <i>Helicoverpa</i> spp. Registered for control of Soybean Looper in brassica vegetables and brassica leafy vegetables.	L-M Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Indoxacarb (Avatar eVo) FMC	22A	Ingestion	3	P-A	ALL	Registered in lettuce (field) for control of Cotton Bollworm and Native Budworm. Registered for control of Soybean Looper in fruiting vegetables.	L Bee:H	R3
Methoxyfenozide (Prodigy) Corteva	18	Insect Growth Regulator		P		Registered for control of <b>Loopers</b> in pome fruit.	VL Bee:VL	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on <b>Lepidoptera</b> , 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 <b>Caterpillars</b> .	-	-
Tetraniliprole (Vayego) Bayer	28	Ingestion		P		Registered in almonds, macadamias, pomefruit, and stonefruit for various insect pests such as Fruit Fly suppression, Carpophillus Beetles, Weevils & Lepidoptera. Hort Innovation has several projects underway towards assisting registration in vegetables including Root & Tuber and Stalk & Stem. Canadian registration for control of Cabbageworm, Diamondback Moth, Cutworms, Armyworms, Flea Beetles and suppression of Aphids and Cabbage Looper in leafy vegetables.	M Bee:VH	-

**Webworm (Lepidoptera)**

**Priority: Low**

Webworm was ranked as a low priority in VIC, QLD, NSW, WA, SA & TAS. Webworm larvae are leaf-chewing pests of seedlings. It is important to monitor crops for eggs and larvae by regular field scouting. Target sprays against mature eggs and larvae before pests become entrenched.

Diazinon	1B	Contact	14	A	ALL (excl. TAS)	Registered in lettuce (field) for control of <b>Caterpillars</b> and Cutworms. [Max no. of applications not specified]	H Bee:H	R3
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, <b>Caterpillars</b> , 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
Chlorantraniliprole (Coragen) FMC	28	Ingestion	3	P-A	ALL	Registered in lettuce for control of <i>Helicoverpa</i> . US registration for control of Webworms in brassica vegetables, brassica leafy vegetables, cucurbits, fruiting vegetables, leafy vegetables and quinoa.	L Bee:VL	-
Emamectin (Proclaim Opti) Syngenta	6	Ingestion	3	P-A	ALL	Registered in lettuce (field and protected) for control of <i>Helicoverpa</i> . US registration for control of Webworms in brassica vegetables, brassica leafy vegetables, kohlrabi and tree nuts.	M Bee:H	-
Flubendiamide (Belt) Bayer	28	Ingestion	1 NG	P-A	ALL	Registered in lettuce for control of <i>Helicoverpa</i> spp.	L-M Bee:L	-
Indoxacarb (Avatar eVo) FMC	22A	Ingestion	3	P-A	ALL	Registered in lettuce (field) for control of Cotton Bollworm and Native Budworm. US registration for control of Webworms in brassica leafy vegetables.	L Bee:H	R3
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.	-	-
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 and <b>Caterpillars</b> .	-	-
<b>Redlegged Earth Mite (<i>Halotydeus destructor</i>)</b>								
<b>Priority: Low</b>								
Redlegged Earth Mite was ranked as a low priority in VIC, QLD, NSW, WA, SA & TAS. Can cause minor leaf feeding damage to newly emerged crops. MT16009 IPM Project Recommends: Control broadleaf weed hosts (e.g. capeweed) in the season prior to planting.								
Alpha-Cypermethrin (PER13301)	3A	Contact	3	A	ALL (excl. VIC)	Permitted for use in lettuce (field) for control of <b>Redlegged Earth Mite</b> and Vegetable Weevil. [Max 2 applications per crop; re-treatment interval 7 d]	VH Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Chlorpyrifos (Lorsban)	1B	Contact	NR	A	NSW	Registered in lettuce (field) for control of Vegetable Weevil, <b>Redlegged Earth Mite</b> and Blue Oat Mite. [Max no. of applications and re-treatment interval not specified]	H Bee:H	R1
Maldison	1B	Contact	3	A	ALL (excl. QLD)	Registered in vegetables including lettuce (field) for control of Aphids, Green Vegetable Bug, Jassids, Leafhopper, <b>Redlegged Earth Mite</b> (not TAS), Rutherglen Bug and Twenty-Eight Spotted Ladybird (not TAS). [Apply at first sight of infestation: max no. of applications not specified]	H Bee:H	-
<p><b>Two-Spotted Mite</b> (<i>Tetranychus urticae</i>)  <b>Priority: Low</b>  Two-Spotted Mite was ranked as a low priority in VIC, QLD, NSW, WA, SA &amp; TAS. 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.</p>								
Abamectin	6	Contact & Ingestion	21	A	ALL	Registered in lettuce (field) for control of <b>Two-Spotted Mite</b> and Western Flower Thrips. [Max. 2 applications per crop; re-treatment interval: 28 d]	M Bee:H	-
<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 & <b>Two-Spotted Spider Mites</b> . [Max. 3 application per crop; re-treatment interval 3-14 d]	L Bee:L	-
Bifenazate (Acramite) UPL PER14210	20D	Contact & Ingestion	15	A	QLD, SA & WA	Permitted for use in lettuce (protected) for control of <b>Two-Spotted Mite</b> . [Max. 1 application per crop]	L Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Petroleum Oil PER12221	-	Contact	1	A	ALL (excl. VIC)	Permitted for use in lettuce (field and protected) for control of Silverleaf Whitefly, Greenhouse Whitefly, Aphids, Green Mirid, Green Vegetable Bug, Grey Cluster Bug, Leafhoppers, <b>Mites</b> , Rutherglen Bug and Thrips. [Max. no. of applications and re-treatment interval not specified]	VL Bee:L	-
Potassium Salts of Fatty Acids (Natrasoap)	-	Contact	NR	A	ALL	Registered in vegetables (field and protected) for control of Aphids, Thrips, Mealybug, <b>Two Spotted Mites</b> , 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 and protected) for control of <b>Mites</b> . [Max no. of applications not specified; re-treatment interval 10-14 d]	M Bee:L	R3
Sulphur	UN	Contact	NR	A	ALL	Registered in vegetables (field and protected) for control of <b>Mites</b> . [Max no. of applications not specified; re-treatment interval 14 d]	L Bee:L	-
Emulsifiable Botanical Oils (Eco-Oil)	-	Contact	NR	P-A	ALL	Registered in vegetables for control of Greenhouse Whitefly. Registered for control of <b>Two-Spotted Mite</b> in tomatoes, cucumbers, capsicums, strawberries and ornamentals.	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	-
Etoxazole (Paramite) Sumitomo	10B	Contact		P		Registered for control of <b>Two-Spotted Mites</b> in pome fruit, stone fruit, almonds and grapes.	L Bee:VL	
Hexythiazox (Calibre) Nufarm	10A	Contact & Ingestion		P		Registered for control of <b>Two-Spotted Mites</b> in pome fruit, stone fruit and strawberries.	L Bee:VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spiromesifen (Oberon) Bayer	23	Ingestion		P		Australian Registration pending for control of <b>Mites</b> in various vegetables crops. Hort Innovation is undertaking data generation projects across multiple commodities for a new label registration in Australia.	M Bee:VL	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2022/23 for various pests including Thrips, Bugs, <b>Mites</b> and Caterpillars.	-	-
<b>Wireworms and False Wireworms</b> (Elateridae - <i>Tenebrionidae</i> spp.)								
<b>Priority: Low</b>								
Wireworms and False Wireworms were ranked as a low priority in VIC, QLD, NSW, WA, SA & TAS. Larvae are soil-dwelling and will attack newly germinated seedlings by chewing the leaves. Severe infestations can cause death of plants.								
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Soil fumigant	NR	A	ALL	Registered in vegetables for control of <b>Wireworms</b> . Leave soil undisturbed at least 7 d after treatment. Aeration before planting should be for a minimum of 21 days. <b>For use by professional and registered fumigators only.</b>	-	-
Dazomet (Basamid)	8F	Soil fumigant	NR	A	ALL	Registered as a pre-planting soil fumigation for control of <b>soil borne pests</b> , diseases & weeds. Soil moisture is essential for release of gas and plastic cover brings optimum results.	-	-
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.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
<b>Earwigs</b> ( <i>Forficula</i> spp.)								
<b>Priority: Low</b>								
Earwigs were ranked as a low priority in VIC & NSW. Although the adults have wings, they seldom fly and are mainly spread by human activity. In recent years, these earwigs have caused significant damage to broadacre and horticultural crops. It is important to monitor crops for eggs and nymphs by regular field scouting. Target sprays against mature eggs and nymphs before pests become entrenched.								
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, Caterpillars, <b>Earwigs</b> , 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	-
Chlorpyrifos (Lorsban)	1B	Contact	NR	P-A	NSW	Registered in lettuce (field) for control of Vegetable Weevil, Redlegged Earth Mite and Blue Oat Mite. Registered for control of European Earwig in stone fruit.	H Bee:H	R1
Indoxacarb (Avatar eVo) FMC	22A	Ingestion	3	P-A	ALL	Registered in lettuce (field) for control of Cotton Bollworm and Native Budworm. Registered for control of <b>Earwigs</b> in grapes.	L Bee:H	R3
<b>Slugs and Snails</b> (Gastropoda)								
<b>Priority: Low</b>								
Slugs and Snails were ranked as a low priority in VIC & NSW. They are active after dusk when chemical treatments can be most effective.								
Iron EDTA Complex	-	Contact & Ingestion	NR	A	ALL	Registered in all plants for the control of <b>Snails</b> and <b>Slugs</b> . Spread pellets evenly on ground. [Max no. of applications and re-treatment not specified]	-	-
Metaldehyde	-	Contact & Ingestion	7	A	ALL	Registered in vegetables for the control of <b>Snails</b> and <b>Slugs</b> . Spread pellets evenly on ground. [Max no. of applications and re-treatment not specified]	-	-
Methiocarb (Mesuro)	1A	Contact & Ingestion	NR	A	ALL	Registered in lettuce for control of common garden <b>Snails, Slugs, White Italian Snail</b> and <b>White Snail</b> . [Max no. of applications and re-treatment not specified]	-	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
<b>Fall Armyworm</b> ( <i>Spodoptera frugiperda</i> )								
<b>Priority: Unknown</b>								
Fall Armyworm was not ranked as a pest in leafy lettuce. 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 lettuce (field) for control of <b>Fall Armyworm</b> . [Max. 3 applications per crop; 2 consecutive; re-treatment interval 7 d]	L Bee:VL	-
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta PER89280	28+4A	Contact & Ingestion	42	A	ALL (excl. VIC)	Permitted for use in leafy vegetables including lettuce as a seedling treatment for control of <b>Fall Armyworm</b> . [Max. 1 application per crop]	L-H Bee:H	R2
Emamectin (Proclaim Opti) Syngenta PER89263	6	Ingestion	3 NG	A	ALL (excl. VIC)	Permitted for use in lettuce (field and protected) for control of <b>Fall Armyworm</b> . [Max 4 applications per crop; re-treatment interval: 7 d]	M Bee:H	-
Indoxacarb (Avatar eVo) FMC PER89278	22A	Contact	7	A	ALL (excl. VIC)	Permitted in leafy vegetables (field) for control of <b>Fall Armyworm</b> . [Max 4 applications per crop; re-treatment interval: 7 d]	L Bee:H	R3
Methomyl (Lannate) PER89293	1A	Contact	14	A	ALL	Permitted for use in lettuce (field) for control of <b>Fall Armyworm</b> . [Max. 3 application per crop; re-treatment interval not specified]	H Bee:H	R2
Spinetoram (Success Neo) Corteva PER89241	5	Ingestion	3	A	ALL (excl. VIC)	Permitted for use in leafy vegetables (field and protected) for control of <b>Fall Armyworm</b> . [Max. 4 applications per crop; re-treatment interval 7-14 d]	M Bee:H	-



Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spinosad (Entrust Organic) Corteva PER89870	5	Ingestion	3 G:14	A	ALL (excl. VIC)	Permitted for use in leafy vegetables (field and protected) for control of <b>Fall Armyworm</b> . [Max. 4 applications per season; re-treatment interval 7-14 d]	L Bee:L	-
<i>Spodoptera frugiperda</i> Multiple Nucleopolyhedrovirus (Fawligen) AgBiTech PER90820	31	Biological	NR	A	ALL	Permitted for use in leafy vegetables for control of <b>Fall Armyworm</b> . [Max. 10 applications per crop; re-treatment interval 3d]	VL Bee:L	-
Amorphous Silica (Abrade) Grow Choice	-	Contact		P		Registered for control of <i>Spodoptera</i> spp. in fruiting vegetables and permitted for control of <b>Fall Armyworm</b> 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 <b><i>Spodoptera</i> spp.</b> 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 <b>Fall Armyworm</b> in cotton, cereal grains, sweet corn, pastures & oilseeds.	-	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on <b>Lepidoptera</b> , 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 <b>Caterpillars</b> .	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Tetraniliprole (Vayego) Bayer	28	Ingestion		P		Registered in Australia in multiple crops for various insect pests such as Beetles, Weevils & <b>Lepidoptera</b> . Hort Innovation has several projects underway towards assisting registration in minor crops. Indonesia registration for control of Liriomyza Leafminers and <b>Fall Armyworm</b> in vegetable crops.	M Bee:VH	-
<b>Greenhouse Whitefly</b> ( <i>Trialeurodes vaporariorum</i> )								
<b>Priority: Unknown</b>								
Greenhouse Whitefly was not ranked as a pest in lettuce. It has been a pest of some concern in the past, and it may require control measures at times. High reproduction rates and a short generation time can led to rapid population build up, with nymphs and adults causing crop damage through sap feeding and production of honeydew.								
<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, <b>Greenhouse Whitefly</b> , 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	-
Buprofezin (Applaud) Corteva PER82467	16	Contact & Ingestion	3	A	ALL (excl. VIC)	Permitted for use in leafy lettuce (field and protected) for control of Jassids, Leafhoppers and <b>Greenhouse Whitefly</b> . [Max. 2 applications per crop; re-treatment interval 14 d]	L Bee:L	-
Emulsifiable Botanical Oil (Eco-Oil)	-	Contact	NR	A	ALL	Registered in vegetables for control of <b>Greenhouse Whitefly</b> . [Max. 3 application per crop; re-treatment interval 3-5 d]	L Bee:L	-
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, Caterpillars, Earwigs, <b>Whitefly</b> , 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 PER10918	4A	Contact & Ingestion	7	A	ALL	Permitted for use in leafy lettuce (field) as a soil application for control of <b>Greenhouse Whitefly</b> . [Max. 1 application per crop]	M Bee:M	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Petroleum Oil PER12221	-	Contact	1	A	ALL (excl. VIC)	Permitted for use in lettuce (field and protected) for control of Silverleaf Whitefly, <b>Greenhouse Whitefly</b> , Aphids, Green Mirid, Green Vegetable Bug, Grey Cluster Bug, Leafhoppers, Mites, Rutherglen Bug and Thrips. [Max. no. of applications and re-treatment interval not specified]	VL Bee:L	-
Potassium Salts of Fatty Acids (Natrasoap)	-	Contact	NR	A	ALL	Registered in vegetables (field and protected) for control of Aphids, Thrips, Mealybug, Two Spotted Mites, Spider Mite and <b>Whitefly</b> . Apply when temperatures are cooler. [Max no. of applications not specified; re-treatment interval 5-7 d]	L Bee:L	-
Potassium Salts of Fatty Acids (Natrasoap) PER13920	-	Contact	NR	A	ALL (excl. VIC)	Permitted for use in lettuce (protected) for control of <b>Greenhouse Whitefly</b> and Silverleaf Whitefly. [Max no. of applications not specified; re-treatment interval 5-7 d].	L Bee:L	-
Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in lettuce (field and protected) for control of Aphids, Cabbage White Butterfly, Pear and Cherry Slug, Rutherglen Bug, <b>Greenhouse Whitefly</b> , Light Brown Apple Moth, Plague Thrips, large-bodied caterpillars e.g. Grapevine Moth & Native Budworm. [Max no. of applications not specified; Re-treatment interval: 7 d]	VH Bee:H	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	3	A	ALL	Registered in leafy vegetables including lettuce (field and protected) for control of Green Peach Aphid, Brown Sowthistle Aphid, Rutherglen Bug and <b>Greenhouse Whitefly</b> . [Max no. of applications not specified; re-treatment interval 7-10 d;]	M Bee:VH	-
Afidopyropen (Versys) BASF	9D	Ingestion	1	P-A	ALL	Registered in leafy vegetables including lettuce (field) for control of Green Peach Aphid, Cabbage Aphid, Currant Lettuce Aphid, Cotton Aphid & suppression of Silverleaf Whitefly.	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta	28+4A	Contact & Ingestion	28	P-A	ALL	Registered in lettuce (field) as a seedling treatment for control of Corn Earworm, Native Budworm, Cluster Caterpillar, Looper, Lettuce Aphid, Green Peach Aphid, Brown Sowthistle Aphid, Silverleaf Whitefly, Western Flower Thrips, Vegetable Leafhopper and Lucerne Leafroller.	L-H Bee:H	R2
Pymetrozine (Chess) Syngenta	9B	Contact	3	P-A	ALL	Registered in lettuce (field and protected) for control of Brown Sow Thistle Aphid, Green Peach Aphid, Currant Lettuce Aphid, Brown Sowthistle Aphids and suppression of Silverleaf Whitefly.	L Bee:VL	R3
Pyriproxyfen (Admiral Advance) Sumitomo	7C	IGR	7	P-A	ALL	Registered in leafy lettuce (field and protected) for control of Silverleaf Whitefly. Registered for control of <b>Greenhouse Whitefly</b> in fruiting vegetables and cucurbits.	VL Bee L	-
Spirotetramat (Movento) Bayer	23	Ingestion	1	P-A	ALL	Registered in lettuce (protected and field) for control of Brown Sowthistle Aphid, Currant Lettuce Aphid, Green Peach Aphid and Western Flower Thrips. Registered for control of Silverleaf Whitefly in beans, peas, brassica vegetables, brassica leafy vegetables, cucurbits, fruiting vegetables, potatoes and sweet potatoes.	M Bee:VL	-
<i>Clitoria ternatea</i> Extract (Sero-X) Growth Agriculture	-	Biological	NR	P		Registered for control of <i>Helicoverpa</i> spp., Green Mirids and <b>Silverleaf Whitefly</b> 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 <b>Whitefly</b> , 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 control of <b>Whitefly</b> in cucurbits.	L Bee:VL	-
NUL3145 Nufarm	TBC			P		New product from Nufarm with activity on Scale, Nematodes, Mealybug and <b>Whitefly</b> .	-	-
<b>Leafminers</b> ( <i>Liriomyza</i> spp.)								
<b>Priority: Unknown</b>								
Leaf miner was not ranked as a pest in leafy lettuce. Dipteran Leafminers ( <i>Liriomyza</i> 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.								
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta PER91161	28+4A	Contact & Ingestion	28	A	ALL (excl. VIC)	Registered in leafy vegetables including lettuce as a seedling treatment for control of <i>Liriomyza</i> species, including <b>Vegetable Leafminer</b> ( <i>Liriomyza sativa</i> ), <b>Pea Leafminer / Serpentine Leafminer</b> ( <i>Liriomyza huidobrensis</i> ) & <b>American Serpentine Leafminer</b> ( <i>Liriomyza trifolii</i> ). [Max 1 application per crop; seedlings should be transplanted within 48 h of application]	L-H Bee:H	R2
Spinetoram (Success Neo) Corteva PER91155	5	Ingestion	3	A	ALL (excl. VIC)	Permitted in leafy vegetables including lettuce for control of <b>Liriomyza Leafminers</b> . [Max. 4 applications per crop; re-treatment interval 7-14 d]	M Bee:H	-
Spinosad (Entrust Organic) Corteva PER90928	5	Ingestion	3 G:14	A	ALL (excl. VIC)	Permitted for use in lettuce (field and protected) for control of <i>Liriomyza</i> species, including: <b>Vegetable Leafminer</b> ( <i>Liriomyza sativa</i> ), <b>Pea Leafminer / Serpentine Leafminer</b> ( <i>Liriomyza huidobrensis</i> ) & <b>American Serpentine Leafminer</b> ( <i>Liriomyza trifolii</i> ). [Max. 4 applications per crop; re-treatment interval 4 d]	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spirotetramat (Movento) Bayer PER88640	23	Ingestion	1	A	ALL (excl. VIC)	Permitted for use in lettuce (field and protected) for control of <b>Liriomyza Leafminers (<i>Liriomyza spp.</i>)</b> [Max. 3 applications per crop; re-treatment interval 7 d]	M Bee:VL	-
Abamectin	6	Contact & Ingestion	21	P-A	ALL	Registered in lettuce (field) for control of Two-Spotted Mite and Western Flower Thrips. Permitted for suppression of <b>Leafminers</b> including <b>Vegetable Leafminer</b> and <b>Serpentine Leafminer</b> in cucurbits, fruiting vegetables, leafy vegetables (except lettuce), legume vegetables, root and tuber vegetables, bulb onions, cabbage (head), celery, rhubarb and bulb vegetables (except bulb onions).	M Bee:H	-
Chlorantraniliprole (Coragen) FMC	28	Ingestion	3	P-A	ALL	Registered in lettuce (field and protected) for control of Cotton Bollworm and Native Budworm. Permitted for control of <b>Liriomyza Leafminers</b> in spinach and silverbeet.	L Bee:VL	-
Emamectin (Proclaim Opti) Syngenta	6	Ingestion	3	P-A	ALL	Registered in lettuce (field and protected) for control of <i>Helicoverpa</i> . Permitted for control of <b>Liriomyza</b> species, including <b>Vegetable Leafminer</b> in Brassica vegetables.	M Bee:H	-
Cyantraniliprole (Benevia) FMC	28	Contact		P		Permitted for use in bulb vegetables, fruiting vegetables (all) and potatoes for control of <b>Liriomyza</b> species, including: <b>Vegetable Leafminer (<i>Liriomyza sativae</i>)</b> , <b>Pea Leafminer/Serpentine Leafminer (<i>Liriomyza huidobrensis</i>)</b> and <b>American Serpentine Leafminer (<i>Liriomyza trifolii</i>)</b> .	L Bee:L	-
Cyromazine (Diptex 150 WP)	17	Insect Growth Regulator		P		Permitted for control of <b>Leafminers</b> including <b>Vegetable Leafminer</b> and <b>Serpentine Leafminer</b> in broccoli, cucurbits, fruiting vegetables, head lettuce, legume vegetables, root and tuber vegetables, and stalk and stem vegetables.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
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 <b>Liriomyza Leafminers</b> and Fall Armyworm in vegetable crops.	M Bee:VH	-

### **4.3 Weeds in leafy lettuce**

#### **4.3.1 Weed priorities**

<b>Common Name</b>	<b>Scientific Name</b>
<b>High</b>	
Groundsel	<i>Senecio</i> spp.
Wild Turnip	<i>Brassica</i> spp.
Fumitory	<i>Fumaria</i> spp.
Marshmallow	<i>Malva parviflora</i>
Potato Weed	<i>Galinsoga</i> spp.
Shepherd's Purse	<i>Capsella bursa-pastoris</i>
<b>Moderate</b>	
Stinging Nettle	<i>Urtica</i> spp.
Winter Grass	<i>Poa annua</i>
Cleavers	<i>Galium aparine</i>
Fleabane	<i>Conyza</i> spp.
Milk Thistle	<i>Sonchus</i> spp.
Blackberry Nightshade	<i>Solanum nigrum</i>
Chickweed	<i>Stellaria media</i>
Fat Hen	<i>Chenopodium album</i>
Pigweed	<i>Portulaca oleracea</i>
Common Thornapple	<i>Datura stramonium</i>
Slender Celery	<i>Ciclospermum leptophyllum</i>



The high priority weed issues based on the feedback received were Groundsel, Wild Turnip, Fumitory, Marshmallow, Potato Weed and Shepherd's Purse. Management options include the use of herbicides or fumigation prior to planting to start with a weed free seedbed, or the use of spot spraying in-crop or mechanical removal of weeds.

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.

### **Resistance management**

There are confirmed cases of resistance in Australia for Blackberry Nightshade (Group L at 2 sites).

Specific resistance management strategies for high resistance risk (A and B) and moderate resistance risk (C, D, F, G, I, J, K, L, M, N, Q and Z) herbicide modes of action are available on the CropLife Australia webpage<sup>8</sup>.

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<sup>8</sup> <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
<b>Groundsel</b> ( <i>Senecio</i> spp.)							
<b>Priority: High</b>							
Groundsel was ranked as a high priority in VIC, NSW & TAS, as a low priority in QLD and as a moderate priority in WA & SA. Highly invasive weed as it produces numerous seeds which disperse widely.							
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including <b>Groundsel</b> .	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
Phenmedipham (Betanal) Bayer PER81241	C**	Lettuce / Post-emergent	Permitted for use in lettuce (field) for control of grass and broadleaf weeds, including <b>Groundsel</b> . Apply within 14 days of transplanting or emergence of the crop, when the plants have become established, or at early crop stage when a majority of weeds have germinated and are at the 2-4 leaf stage. [Max. 1 application per crop]	28 NG	A	ALL (excl. VIC.)	-

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 grass and broadleaf weeds, including <b>Groundsel</b> , in fodder beet, red beet, silver beet, baby leaf spinach and baby leaf beet.		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 <b>Groundsel</b> in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
<b>Wild Turnip</b> ( <i>Brassica</i> spp.)							
<b>Priority: High</b>							
Wild Turnip was ranked as a high priority in VIC, QLD & TAS and as a moderate priority in NSW, WA & SA. It is a winter growing weed that competes aggressively with crops and runs to seed quickly.							
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including <b>Wild Turnip</b> .	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 <b>Wild Turnip</b> .	1 G:1	A	ALL	R3
Pendimethalin (Stomp)	D**	Lettuce / Pre-plant pre-emergent	Registered in lettuce (prior to transplanting) for control of grass and broadleaf weeds, including <b>Wild Turnip</b> . [Max no of applications not specified]	NR	A	ALL (excl. TAS)	-
Norflurazon (Zoliar) AgNova	F**		Registered for control of grass and broadleaf weeds including <b>Wild Radish</b> 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
<b>Fumitory</b> ( <i>Fumaria</i> spp.)							
<b>Priority: High</b>							
Fumitory was ranked as a high priority QLD & TAS and as a moderate priority in VIC, NSW, WA, & SA. It is a strongly competitive weed with highly persistent seeds making it an ongoing problem every year.							
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including <b>Fumitory</b> .	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 <b>Fumitory</b> .	1 G:1	A	ALL	R3
Pendimethalin (Stomp)	D**	Lettuce / Pre-plant pre-emergent	Registered in lettuce (prior to transplanting) for control of grass and broadleaf weeds, including suppression of <b>Fumitory</b> . [Max no of applications not specified]	NR	A	ALL (excl. TAS)	-
Phenmedipham (Betanal) Bayer PER81241	C**	Lettuce / Post-emergent	Permitted for use in lettuce (field) for control of grass and broadleaf weeds, including <b>Fumitory</b> . Apply within 14 days of transplanting or emergence of the crop, when the plants have become established, or at early crop stage when a majority of weeds have germinated and are at the 2-4 leaf stage. [Max. 1 application per crop]	28 NG	A	ALL (excl. VIC.)	-
Dimethenamid-P (Outlook) BASF	K**		Registered for control of grass and broadleaf weeds including <b>Fumitory</b> in sweet corn, beans, peas, pumpkins and kabocha.		P		-
Glufosinate-Ammonium (Basta) BASF	N**		Registered for control of grass and broadleaf weeds including <b>Fumitory</b> in berries, tomatoes, beans and fallow.		P		R3
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
<b>Marshmallow</b> ( <i>Malva parviflora</i> )							
<b>Priority: High</b>							
Marshmallow was ranked as a high priority QLD & TAS and as a moderate priority in VIC, NSW, WA, & SA. Adapted to a wide variety of environments and highly competitive weed. Control with knockdown herbicides can be unreliable.							
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including <b>Marshmallow</b> . The addition of a Group G herbicide will enhance activity on Marshmallow.	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 <b>Marshmallow</b> . The addition of a Group G herbicide will enhance activity on Marshmallow.	1 G:1	A	ALL	R3
Chloridazon (Pyramin) BASF	C**		Registered for control of grass and broadleaf weeds, including <b>Marshmallow</b> , in fodder beet, red beet, silver beet, baby leaf spinach and baby leaf beet.		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 <b>Small Flowered Mallow</b> in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
<b>Potato Weed</b> ( <i>Galinsoga</i> spp.)							
<b>Priority: High</b>							
Potato Weed was ranked as a high priority in VIC & QLD and as a moderate priority in NSW, WA, SA & TAS. It is spread via seed, producing several generations in one year that can remain dormant for some time. It forms a dense mat, outcompeting newly germinating crop seedlings. Cultivation may be required to supplement herbicide use.							
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including <b>Potato Weed</b> .	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 <b>Potato Weed</b> .	1 G:1	A	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Pendimethalin (Stomp)	D**	Lettuce / Pre-plant pre-emergent	Registered in lettuce (prior to transplanting) for control of grass and broadleaf weeds, including <b>Potato Weed</b> . [Max no of applications not specified]	NR	A	ALL (excl. TAS)	-
Phenmedipham (Betanal) Bayer PER81241	C**	Lettuce / Post-emergent	Permitted for use in lettuce (field) for control of grass and broadleaf weeds, including <b>Potato Weed</b> . Apply within 14 days of transplanting or emergence of the crop, when the plants have become established, or at early crop stage when a majority of weeds have germinated and are at the 2-4 leaf stage. [Max. 1 application per crop]	28 NG	A	ALL (excl. VIC.)	-
Chloridazon (Pyramin) BASF	C**		Registered for control of grass and broadleaf weeds, including <b>Potato Weed</b> , in fodder beet, red beet, silver beet, baby leaf spinach and baby leaf beet.		P		-
Glufosinate-Ammonium (Basta) BASF	N**		Registered for control of grass and broadleaf weeds including <b>Potato Weed</b> in berries, tomatoes, beans and fallow.		P		R3
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including <b>Potato Weed</b> in Brassica vegetables, culinary herbs, rhubarb, spinach, silverbeet, spring onions, beans, sweet corn, sweet potato and fallow.		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 <b>Potato Weed</b> in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
Propachlor (Ramrod) Nufarm	K**		Registered for control of broadleaf and grass weeds including <b>Potato Weed</b> in Brassica vegetables		P		R3

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
<b>Shepherd's Purse</b> ( <i>Capsella bursa-pastoris</i> )							
<b>Priority: High</b>							
Shepherd's Purse was ranked as a high priority in QLD & TAS and as a moderate priority in VIC, NSW, WA & SA. It is an annual weed that has seeds which can remain dormant for several years.							
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, including <b>Shepherd's Purse</b> .	1 G:1	A	ALL	R3
Pendimethalin (Stomp)	D**	Lettuce / Pre-plant pre-emergent	Registered in lettuce (prior to transplanting) for control of grass and broadleaf weeds, including <b>Shepherd's Purse</b> . [Max no of applications not specified]	NR	A	ALL (excl. TAS)	-
Phenmedipham (Betanal) Bayer PER81241	C**	Lettuce / Post-emergent	Permitted for use in lettuce (field) for control of grass and broadleaf weeds, including <b>Shepherd's Purse</b> . Apply within 14 days of transplanting or emergence of the crop, when the plants have become established, or at early crop stage when a majority of weeds have germinated and are at the 2-4 leaf stage. [Max. 1 application per crop]	28 NG	A	ALL (excl. VIC.)	-
Propyzamide	D**	Lettuce / Post-Plant, Pre-Emergent	Registered in lettuce for control of grass and broadacre weeds, including <b>Shepherd's Purse</b> . Apply immediately after sowing or transplanting. [Max. no. of applications not specified]	25	A	ALL	-
Chloridazon (Pyramin) BASF	C**		Registered for control of grass and broadleaf weeds, including <b>Shepherd's Purse</b> , in fodder beet, red beet, silver beet, baby leaf spinach and baby leaf beet.		P		-
Dimethenamid-P (Outlook) BASF	K**		Registered for control of grass and broadleaf weeds including <b>Shepherd's Purse</b> in sweet corn, beans, peas, pumpkins and kabocha.		P		-
Norflurazon (Zoliar) AgNova	F**		Registered for control of grass and broadleaf weeds including <b>Shepherd's Purse</b> in asparagus, citrus, grapes, nuts, stone & pome fruits.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including <b>Shepherd's Purse</b> in Brassica vegetables, culinary herbs, rhubarb, spinach, silverbeet, spring onions, beans, sweet corn, sweet potato and fallow.		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 <b>Shepherd's Purse</b> in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
Propachlor (Ramrod) Nufarm	K**		Registered for control of broadleaf and grass weeds including <b>Shepherd's Purse</b> in Brassica vegetables		P		R3
<b>Winter Grass (<i>Poa annua</i>)</b>							
<b>Priority: Moderate</b>							
Winter Grass was ranked as a high priority in WA & SA and as a moderate priority in VIC, QLD, NSW & TAS.							
Chlorthal-Dimethyl (Dacthal)	D**	Lettuce / Pre-emergent	Registered in lettuce for control of grass and broadleaf weeds, including <b>Winter Grass</b> . Spray at transplanting. [Max. no of applications not specified]	28	A	ALL	-
Clethodim (Select)	A***	Lettuce / Selective post-emergent	Registered in lettuce for control of various grass weeds including <b>Winter Grass</b> . Weeds should be 2 leaf to fully tillered stage. [Max. 1 application per crop]	28	A	ALL	R3
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including <b>Winter Grass</b> .	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
Pendimethalin (Stomp)	D**	Lettuce / Pre-plant pre-emergent	Registered in lettuce (prior to transplanting) for control of grass and broadleaf weeds, including <b>Winter Grass</b> . [Max no of applications not specified]	NR	A	ALL (excl. TAS)	-



Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Phenmedipham (Betanal) Bayer PER81241	C**	Lettuce / Post-emergent	Permitted for use in lettuce (field) for control of grass and broadleaf weeds, including <b>Winter Grass</b> . Apply within 14 days of transplanting or emergence of the crop, when the plants have become established, or at early crop stage when a majority of weeds have germinated and are at the 2-4 leaf stage. [Max. 1 application per crop]	28 NG	A	ALL (excl. VIC.)	-
Propyzamide	D**	Lettuce / Post-Plant, Pre-Emergent	Registered in lettuce for control of grass and broadacre weeds, including <b>Winter Grass</b> . Apply immediately after sowing or transplanting. [Max. no. of applications not specified]	25	A	ALL	-
Sethoxydim (Sertin)	A***	Lettuce / Post-emergent	Registered in lettuce for control of grass weeds. [Max no of applications not specified]	28	A	ALL	R3-
Chloridazon (Pyramin) BASF	C**		Registered for control of grass and broadleaf weeds, including <b>Winter Grass</b> , in fodder beet, red beet, silver beet, baby leaf spinach and baby leaf beet.		P		-
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including <b>Winter Grass</b> 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 <b>Winter Grass</b> in asparagus, citrus, grapes, nuts, stone & pome fruits.		P		-
Propachlor (Ramrod) Nufarm	K**		Registered for control of broadleaf and grass weeds including <b>Winter Grass</b> in Brassica vegetables		P		R3
<b>Cleavers</b> ( <i>Galium aparine</i> )							
<b>Priority: Moderate</b>							
Cleavers were ranked as a high priority in TAS, as a moderate priority in VIC, WA & SA and as a low priority in NSW & QLD.							
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds.	NR	A	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
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
NUL3438 Nufarm	TBC		New active in development, Nufarm claims activity on broadleaf weeds.		P		-
<b>Stinging Nettle</b> ( <i>Urtica</i> spp.)							
<b>Priority: Moderate</b>							
Stinging Nettle was ranked as a high priority in VIC and as a moderate priority in QLD & NSW. This is a soft herb whose leaves are sparsely covered with rigid, stinging hairs.							
Chlorthal-Dimethyl (Dacthal)	D**	Lettuce / Pre-emergent	Registered in lettuce for control of grass and broadleaf weeds, including <b>Stinging Nettle</b> . Spray at transplanting. [Max. no of applications not specified]	28	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, including <b>Stinging Nettle</b> .	1 G:1	A	ALL	R3
Pendimethalin (Stomp)	D**	Lettuce / Pre-plant pre-emergent	Registered in lettuce (prior to transplanting) for control of grass and broadleaf weeds, including suppression of <b>Nettles</b> . [Max no of applications not specified]	NR	A	ALL (excl. TAS)	-
Phenmedipham (Betanal) Bayer PER81241	C**	Lettuce / Post-emergent	Permitted for use in lettuce (field) for control of grass and broadleaf weeds, including <b>Nettles</b> . Apply within 14 days of transplanting or emergence of the crop, when the plants have become established, or at early crop stage when a majority of weeds have germinated and are at the 2-4 leaf stage. [Max. 1 application per crop]	28 NG	A	ALL (excl. VIC.)	-
Propyzamide	D**	Lettuce / Post-Plant, Pre-Emergent	Registered in lettuce for control of grass and broadacre weeds, including <b>Nettles</b> . Apply immediately after sowing or transplanting. [Max. no. of applications not specified]	25	A	ALL	-

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including <b>Stinging Nettle</b> in Brassica vegetables, culinary herbs, rhubarb, spinach, silverbeet, spring onions, beans, sweet corn, sweet potato and fallow.		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 <b>Stinging Nettle</b> in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
Propachlor (Ramrod) Nufarm	K**		Registered for control of broadleaf and grass weeds including <b>Stinging Nettle</b> in Brassica vegetables		P		R3
<b>Fleabane</b> ( <i>Conyza</i> spp.)							
<b>Priority: Moderate</b>							
Fleabane was ranked as a moderate priority in VIC, QLD, NSW, WA & TAS, and as a low priority in SA. A problem weed because it seeds and grows prolifically and is difficult to control, particularly with knockdown herbicides.							
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, including <b>Fleabane</b> .	1 G:1	A	ALL	R3
NUL3438 Nufarm	TBC		New active in development, Nufarm claims activity on broadleaf weeds.		P		-
Propachlor (Ramrod) Nufarm	K**		Registered for control of broadleaf and grass weeds including <b>Fleabane</b> in Brassica vegetables		P		R3

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
<b>Milk Thistle / Common Sowthistle</b> ( <i>Sonchus</i> spp.)							
<b>Priority: Moderate</b>							
Milk Thistle was ranked as a moderate priority in VIC, QLD & NSW. Spring to autumn are the best times to control Thistle. Spraying at early stages of growth is the most effective.							
Chlorthal-Dimethyl (Dacthal)	D**	Lettuce / Pre-emergent	Registered in lettuce for control of grass and broadleaf weeds, including <b>Sowthistle</b> . Spray at transplanting. [Max. no of applications not specified]	28	A	ALL	-
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including <b>Common Sowthistle</b> .	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 <b>Sowthistle</b> .	1 G:1	A	ALL	R3
Pendimethalin (Stomp)	D**	Lettuce / Pre-plant pre-emergent	Registered in lettuce (prior to transplanting) for control of grass and broadleaf weeds, including suppression of <b>Common Sowthistle</b> . [Max no of applications not specified]	NR	A	ALL (excl. TAS)	-
Phenmedipham (Betanal) Bayer PER81241	C**	Lettuce / Post-emergent	Permitted for use in lettuce (field) for control of grass and broadleaf weeds, including <b>Common Sowthistle</b> . Apply within 14 days of transplanting or emergence of the crop, when the plants have become established, or at early crop stage when a majority of weeds have germinated and are at the 2-4 leaf stage. [Max. 1 application per crop]	28 NG	A	ALL (excl. VIC.)	-
Chloridazon (Pyramin) BASF	C**		Registered for control of grass and broadleaf weeds, including <b>Sowthistle</b> , in fodder beet, red beet, silver beet, baby leaf spinach and baby leaf beet.		P		-
Dimethenamid-P (Outlook) BASF	K**		Registered for control of grass and broadleaf weeds including <b>Sowthistle</b> 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 <b>Sowthistle</b> in berries, tomatoes, beans and fallow.		P		R3
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including <b>Common Sowthistle</b> 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 <b>Sowthistle</b> 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 <b>Sowthistle</b> in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
Propachlor (Ramrod) Nufarm	K**		Registered for control of broadleaf and grass weeds including <b>Milk Thistle</b> in Brassica vegetables		P		R3
<b>Blackberry Nightshade (<i>Solanum nigrum</i>)</b>							
<b>Priority: Moderate</b>							
Blackberry Nightshade was ranked as a moderate priority in VIC & QLD. Prolific weed that is widely adapted and difficult to eradicate, mainly due to its long-term seed viability.							
Chlorthal-Dimethyl (Dacthal)	D**	Lettuce / Pre-emergent	Registered in lettuce for control of grass and broadleaf weeds, including <b>Blackberry Nightshade</b> . Spray at transplanting. [Max. no of applications not specified]	28	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, including <b>Blackberry Nightshade</b> .	1 G:1	A	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Pendimethalin (Stomp)	D**	Lettuce / Pre-plant pre-emergent	Registered in lettuce (prior to transplanting) for control of grass and broadleaf weeds, including suppression of <b>Blackberry Nightshade</b> . [Max no of applications not specified]	NR	A	ALL (excl. TAS)	-
Phenmedipham (Betanal) Bayer PER81241	C**	Lettuce / Post-emergent	Permitted for use in lettuce (field) for control of grass and broadleaf weeds, including <b>Blackberry Nightshade</b> . Apply within 14 days of transplanting or emergence of the crop, when the plants have become established, or at early crop stage when a majority of weeds have germinated and are at the 2-4 leaf stage. [Max. 1 application per crop]	28 NG	A	ALL (excl. VIC.)	-
Propyzamide	D**	Lettuce / Post-Plant, Pre-Emergent	Registered in lettuce for control of grass and broadacre weeds, including <b>Blackberry Nightshade</b> . Apply immediately after sowing or transplanting. [Max. no. of applications not specified]	25	A	ALL	-
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. <b>Blackberry Nightshade</b> is listed as moderately susceptible at a high rate.		P		-
Chloridazon (Pyramin) BASF	C**		Registered for control of grass and broadleaf weeds, including <b>Blackberry Nightshade</b> , in fodder beet, red beet, silver beet, baby leaf spinach and baby leaf beet.		P		-
Dimethenamid-P (Outlook) BASF	K**		Registered for control of grass and broadleaf weeds including <b>Blackberry Nightshade</b> in sweet corn, beans, peas, pumpkins and kabocha.		P		-
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including <b>Blackberry Nightshade</b> 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
Norflurazon (Zoliar) AgNova	F**		Registered for control of grass and broadleaf weeds including <b>Blackberry Nightshade</b> 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 <b>Blackberry Nightshade</b> in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
<b>Chickweed</b> ( <i>Stellaria media</i> )							
<b>Priority: Moderate</b>							
Chickweed was ranked as a moderate priority in VIC & SA. A low growing, winter annual weed that can continue growing all through summer.							
Chlorthal-Dimethyl (Dacthal)	D**	Lettuce / Pre-emergent	Registered in lettuce for control of grass and broadleaf weeds, including <b>Chickweed</b> . Spray at transplanting. [Max. no of applications not specified]	28	A	ALL	-
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including <b>Chickweed</b> .	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
Pendimethalin (Stomp)	D**	Lettuce / Pre-plant pre-emergent	Registered in lettuce (prior to transplanting) for control of grass and broadleaf weeds, including <b>Chickweed</b> . [Max no of applications not specified]	NR	A	ALL (excl. TAS)	-
Phenmedipham (Betanal) Bayer PER81241	C**	Lettuce / Post-emergent	Permitted for use in lettuce (field) for control of grass and broadleaf weeds, including <b>Chickweed</b> . Apply within 14 days of transplanting or emergence of the crop, when the plants have become established, or at early crop stage when a majority of weeds have germinated and are at the 2-4 leaf stage. [Max. 1 application per crop]	28 NG	A	ALL (excl. VIC.)	-

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Propyzamide	D**	Lettuce / Post-Plant, Pre-Emergent	Registered in lettuce for control of grass and broadacre weeds, including <b>Chickweed</b> . Apply immediately after sowing or transplanting. [Max. no. of applications not specified]	25	A	ALL	-
Chloridazon (Pyramin) BASF	C**		Registered for control of grass and broadleaf weeds, including <b>Chickweed</b> , in fodder beet, red beet, silver beet, baby leaf spinach and baby leaf beet.		P		-
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including suppression of <b>Chickweed</b> 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 <b>Chickweed</b> 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 <b>Chickweed</b> in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
Propachlor (Ramrod) Nufarm	K**		Registered for control of broadleaf and grass weeds including <b>Chickweed</b> in Brassica vegetables		P		R3
<b>Fat Hen</b> ( <i>Chenopodium album</i> )							
<b>Priority: Moderate</b>							
Fat Hen was ranked as a moderate priority in VIC & QLD. Herbicide control can be difficult and targeting weeds at early growth stages is critical.							
Chlorthal-Dimethyl (Dacthal)	D**	Lettuce / Pre-emergent	Registered in lettuce for control of grass and broadleaf weeds, including <b>Fat Hen</b> . Spray at transplanting. [Max. no of applications not specified]	28	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



Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
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
Pendimethalin (Stomp)	D**	Lettuce / Pre-plant pre-emergent	Registered in lettuce (prior to transplanting) for control of grass and broadleaf weeds, including <b>Fat Hen</b> . [Max no of applications not specified]	NR	A	ALL (excl. TAS)	-
Phenmedipham (Betanal) Bayer PER81241	C**	Lettuce / Post-emergent	Permitted for use in lettuce (field) for control of grass and broadleaf weeds, including <b>Fat Hen</b> . Apply within 14 days of transplanting or emergence of the crop, when the plants have become established, or at early crop stage when a majority of weeds have germinated and are at the 2-4 leaf stage. [Max. 1 application per crop]	28 NG	A	ALL (excl. VIC.)	-
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. <b>Fat Hen</b> is listed as susceptible.		P		-
Chloridazon (Pyramin) BASF	C**		Registered for control of grass and broadleaf weeds, including <b>Fat Hen</b> , in fodder beet, red beet, silver beet, baby leaf spinach and baby leaf beet.		P		-
Dimethenamid-P (Outlook) BASF	K**		Registered for control of grass and broadleaf weeds including <b>Fat Hen</b> in sweet corn, beans, peas, pumpkins and kabocho.		P		-
Glufosinate-Ammonium (Basta) BASF	N**		Registered for control of grass and broadleaf weeds including <b>Fat Hen</b> in berries, tomatoes, beans and fallow.		P		R3
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including <b>Fat Hen</b> 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
Norflurazon (Zoliar) AgNova	F**		Registered for control of grass and broadleaf weeds including suppression of <b>Fat Hen</b> 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 <b>Fat Hen</b> in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
Propachlor (Ramrod) Nufarm	K**		Registered for control of broadleaf and grass weeds including <b>Fat Hen</b> in Brassica vegetables		P		R3
<b>Pigweed</b> ( <i>Portulaca oleracea</i> )							
<b>Priority: Moderate</b>							
Pigweed was ranked as a moderate priority in QLD & WA. Summer growing weed that competes aggressively in-crop and can be difficult to control with herbicides.							
Chlorthal-Dimethyl (Dacthal)	D**	Lettuce / Pre-emergent	Registered in lettuce for control of grass and broadleaf weeds, including <b>Pigweed</b> . Spray at transplanting. [Max. no of applications not specified]	28	A	ALL	-
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including <b>Pigweed</b> .	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 <b>Pigweed</b> .	1 G:1	A	ALL	R3
Pendimethalin (Stomp)	D**	Lettuce / Pre-plant pre-emergent	Registered in lettuce (prior to transplanting) for control of grass and broadleaf weeds, including <b>Pigweed</b> . [Max no of applications not specified]	NR	A	ALL (excl. TAS)	-

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Phenmedipham (Betanal) Bayer PER81241	C**	Lettuce / Post-emergent	Permitted for use in lettuce (field) for control of grass and broadleaf weeds, including <b>Pigweed</b> . Apply within 14 days of transplanting or emergence of the crop, when the plants have become established, or at early crop stage when a majority of weeds have germinated and are at the 2-4 leaf stage. [Max. 1 application per crop]	28 NG	A	ALL (excl. VIC.)	-
Chloridazon (Pyramin) BASF	C**		Registered for control of grass and broadleaf weeds, including <b>Pigweed</b> , in fodder beet, red beet, silver beet, baby leaf spinach and baby leaf beet.		P		-
Dimethenamid-P (Outlook) BASF	K**		Registered for control of grass and broadleaf weeds including <b>Pigweed</b> in sweet corn, beans, peas, pumpkins and kabocha.		P		-
Glufosinate-Ammonium (Basta) BASF	N**		Registered for control of grass and broadleaf weeds including <b>Pigweed</b> 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 <b>Pigweed</b> 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 <b>Pigweed</b> 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 <b>Pigweed</b> in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
<b>Common Thornapple (<i>Datura stramonium</i>)</b>							
<b>Priority: Moderate</b>							
Common Thornapple was ranked as a moderate priority in QLD.							
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including <b>Common Thornapple</b> .	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 <b>Thornapple</b> .	1 G:1	A	ALL	R3
Phenmedipham (Betanal) Bayer PER81241	C**	Lettuce / Post-emergent	Permitted for use in lettuce (field) for control of grass and broadleaf weeds, including <b>Common Thornapple</b> . Apply within 14 days of transplanting or emergence of the crop, when the plants have become established, or at early crop stage when a majority of weeds have germinated and are at the 2-4 leaf stage. [Max. 1 application per crop]	28 NG	A	ALL (excl. VIC.)	-
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including suppression of <b>Common Thornapple</b> in Brassica vegetables, culinary herbs, rhubarb, spinach, silverbeet, spring onions, beans, sweet corn, sweet potato and fallow.		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 <b>Thornapple</b> in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
<b>Slender Celery (<i>Ciclospermum leptophyllum</i>)</b>							
<b>Priority: Moderate</b>							
Slender Celery was ranked as a moderate priority in QLD.							
Glyphosate (Roundup)	M**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds.	NR	A	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
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
NUL3438 Nufarm	TBC		New active in development, Nufarm claims activity on broadleaf weeds.		P		-

## 5. References

### 5.1 Information:

AgChem Access Priority Access Forum	<a href="https://www.agrifutures.com.au/national-rural-issues/agvet-chemicals/">https://www.agrifutures.com.au/national-rural-issues/agvet-chemicals/</a>
Australian Pesticide and Veterinary Medicines Authority	<a href="http://www.apvma.gov.au">www.apvma.gov.au</a>
APVMA Chemical review	<a href="https://apvma.gov.au/chemicals-and-products/chemical-review/listing">https://apvma.gov.au/chemicals-and-products/chemical-review/listing</a>
APVMA MRLs	<a href="http://www.legislation.gov.au/Details/F2021C00634">www.legislation.gov.au/Details/F2021C00634</a>
APVMA Permit search	<a href="https://productsearch.apvma.gov.au/permits">https://productsearch.apvma.gov.au/permits</a>
APVMA Product search	<a href="https://productsearch.apvma.gov.au/products">https://productsearch.apvma.gov.au/products</a>
AUSVEG	<a href="https://ausveg.com.au">https://ausveg.com.au</a>
Codex MRL database	<a href="http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/">http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/</a>
Cotton Pest Management Guide 2018-19	<a href="https://www.cottoninfo.com.au/publications/cotton-pest-management-guide">https://www.cottoninfo.com.au/publications/cotton-pest-management-guide</a>
CropLife Australia (resistance management)	<a href="https://www.croplife.org.au/resources/programs/resistance-management/">https://www.croplife.org.au/resources/programs/resistance-management/</a>
Growcom – Infopest Database	<a href="http://www.infopest.com.au">www.infopest.com.au</a>
Hort Innovation	<a href="http://www.horticulture.com.au">www.horticulture.com.au</a>

### 5.2 Abbreviations and Definitions:

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

Appendix 2. Products available for control of insects, mites and other pests in leafy lettuce

Appendix 3. Products available for weed control in leafy lettuce

Appendix 4. Current permits for use in leafy lettuce

Appendix 5. Leafy Lettuce Maximum Residue Limits (MRLs)

Appendix 6. Leafy Lettuce Agrichemical Regulatory Risk Assessment

## Appendix 1. Products available for disease control in leafy lettuce

Active Ingredient (Trade Name)	Chemical group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Vegetables	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. <i>For use by professional and registered fumigators only.</i>	ALL	NR	-
Azoxystrobin (Amistar)	11	Lettuce (field) / Foliar	Suppression of Sclerotinia Rot	ALL	14	-
		Lettuce (field) / In-furrow spray or plug hole drench	Bottom Rot ( <i>Rhizoctonia solani</i> )		NR NG	
Azoxystrobin + Oxathiapiprolin (Orondis Flexi) Syngenta	11+49	Lettuce (field)	Control of Downy Mildew and suppression of Alternaria and Sclerotinia.	ALL	42 NG	-
<i>Bacillus amyloliquefaciens</i> (Serenade Opti) Bayer PER87630	BM 02	Lettuce (field & protected)	Bacterial Blight ( <i>Xanthomonas</i> spp.)	ALL	NR	-
Boscalid (Filan) BASF	7	Leafy vegetables (field & protected)	Sclerotinia Rot	ALL	7	-
Captan PER14326	M4	Leafy lettuce (protected)	Grey Mould	ALL (excl. VIC.)	7	-
Chlorothalonil (Bravo) PER14964	M5	Lettuce seedlings prior to planting in the field / head and leafy varieties	Anthracnose or Shot Hole ( <i>Microdochium panattonianum</i> )	ALL (excl. VIC)	21	R3
Copper	M1	Lettuce (field & protected)	Downy Mildew, Bacterial Leaf Spot, and Anthracnose	ALL	1	-
Cyprodinil + Fludioxonil (Switch) Syngenta	9+12	Lettuce (field & protected)	Anthracnose ( <i>Microdochium panattonianum</i> ), Sclerotinia Rot (Lettuce Drop) & Botrytis Grey Mould	ALL	7	R3



Active Ingredient (Trade Name)	Chemical group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Dazomet (Basamid)	8F	Pre-plant fumigant in seed beds	For control of soil fungi including <i>Pythium</i> , <i>Phytophthora</i> , <i>Sclerotinia</i> , <i>Sclerotium</i> , <i>Rhizoctonia</i> , <i>Verticillium</i> , <i>Plasmodiophora</i> , <i>Armillaria</i> and <i>Fusarium</i> spp.	ALL	NR	-
Dimethomorph + Mancozeb (Acrobat + Mancozeb) PER14958	40+M3	Leafy lettuce (field & protected)	Downy Mildew	ALL	14 NG	R2
Fenhexamid Imtrade	17	Lettuce / head & leafy varieties (field & protected)	Grey Mould or Botrytis Rot	ALL	3	-
Fludioxonil + Pydiflumetofen (Miravis Prime) Syngenta	12+7	Lettuce (field & protected)	Grey Mould ( <i>Botrytis cinerea</i> ) White Mould ( <i>Sclerotinia sclerotiorum</i> , <i>Sclerotinia minor</i> )	ALL	3 NG	R3
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Lettuce (field & protected)	Lettuce Drop / Sclerotinia Rot ( <i>Sclerotinia sclerotiorum</i> , <i>Sclerotinia minor</i> )	ALL	7 NG	-
Iodine	M	Lettuce / Post Harvest Dip	Bacteria & Fungi	ALL	NR	-
Iprodione (Rovral)	2	Lettuce (field)	Sclerotinia Rot (Lettuce Drop) Botrytis Grey Mould	ALL TAS & WA	7	R2
Mancozeb	M3	Lettuce (field)	Downy Mildew, Anthracnose & Septoria Leaf Spot	ALL	14	R2
Mancozeb + Metalaxyl-M (Ridomil Gold MZ) Syngenta	M3+4	Lettuce (field & protected)	Downy Mildew, Anthracnose, and Septoria Leaf Spot	ALL	14	R2
Mandestrobin (Intuity) Sumitomo	11	Lettuce (field)	Sclerotinia Rot	ALL	7	-

Active Ingredient (Trade Name)	Chemical group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Mandipropamid (Revus) Syngenta	40	Lettuce / all types (field and protected)	Downy Mildew ( <i>Bernia lactucae</i> )	ALL	1	-
Metalaxyl-M (Ridomil Gold) Syngenta PER14318	4	Lettuce grown as a winter crop in clay-to-clay loam soils / pre-plant treatment (field)	Damping Off ( <i>Pythium</i> & <i>Phytophthora</i> spp.)	ALL (excl. VIC)	NR	-
Metham Sodium	-	Food crops / Pre-plant fumigant	Fungus 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)	M3	Lettuce (field & protected)	Downy Mildew Septoria Leaf Spot	ALL NSW, VIC, TAS, SA & WA	7	R2
Oxathiapiprolin (Zorvec Enicade) Corteva	49	Lettuce / head & leafy (field & protected)	Downy Mildew ( <i>Bernia lactucae</i> , <i>Peronospora farinose</i> )	ALL	3	-
Penthiopyrad (Fontelis) Corteva	7	Lettuce (field & protected)	Sclerotinia Rot, Botrytis Grey Mould & Powdery Mildew	ALL	3	-
Phosphorous Acid PER13698	33	Leafy lettuce (protected)	Downy Mildew	ALL (excl. VIC)	1	-
Potassium Bicarbonate (EcoCarb) PER13695	M2	Lettuce (field & protected)	Powdery Mildew	ALL (excl. VIC)	NR	-
Prochloraz (Octave) PER81131	3	Leafy or open-head lettuce (field)	Anthracnose ( <i>Microdochium panattonianum</i> )	ALL	7 NG	-
Propamocarb Hydrochloride + Fluopicolide (Infinito) Bayer	28+43	Lettuce (field & protected)	Downy Mildew	ALL	7	-

Active Ingredient (Trade Name)	Chemical group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Propineb (Antracol) Bayer	M3	Lettuce (field)	Downy Mildew	VIC, TAS & WA	3	R2
Propineb + Oxadixyl (Rebound) Kiwi Rural Trading	4+M3	Lettuce (field)	Downy Mildew	ALL	3	R2
Pyrimethanil (Scala) Bayer PER12565	9	Lettuce (protected)	Botrytis Grey Mould	ALL (excl. VIC)	3	-
Quintozene (Terraclor)	14	Lettuce	Bottom Rot ( <i>Rhizoctonia</i> )	ALL	4 NG	-
Tebuconazole	3	Lettuce (field)	Sclerotinia Rot	ALL	35	R3
Thiram	7	Lettuce (field)	Anthracoise & Botrytis	QLD, WA, SA, VIC, TAS & NT	7	R2
Tolclofos-Methyl (Rizolex) PER14431	14	Lettuce (field)	Bottom Rot ( <i>Rhizoctonia solani</i> )	ALL (excl. VIC)	NR NG	-

## **Appendix 2. Products available for control of insects, mites and other pests in leafy lettuce**

<b>Active Ingredient (Trade Name)</b>	<b>Chemical group</b>	<b>Situation</b>	<b>Pests / Comments</b>	<b>States</b>	<b>WHP Days</b>	<b>Regulatory risk</b>
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Vegetables	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. <i>For use by professional and registered fumigators only.</i>	ALL	NR	-
Abamectin	6	Lettuce (field)	Two-Spotted Mite & Western Flower Thrips	ALL	3	-
Afidopyropen (Versys) BASF	9D	Leafy Vegetables including lettuce (field)	Green Peach Aphid, Cabbage Aphid, Currant Lettuce Aphid, Cotton Aphid, Corn Aphid and suppression of Silverleaf Whitefly.	ALL	1	-
Alpha-Cypermethrin	3A	Lettuce (field)	<i>Helicoverpa</i> spp. Considered effective against <i>H. punctigera</i> but only with limited efficacy against <i>H. armigera</i> .	ALL	3	-
Alpha-Cypermethrin PER13301	3A	Lettuce (field)	Red-Legged Earth Mite, Vegetable Weevil	ALL (excl. VIC)	3	-
<i>Bacillus thuringiensis</i> subsp. <i>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>Bacillus thuringiensis</i> (Vectobac) PER14694	11A	Lettuce (protected)	Fungus Gnats ( <i>Sciaridae</i> spp)	ALL (excl. VIC)	NR	-
<i>Beauveria bassiana</i> (Velifer) BASF	UNF	Protected vegetables and 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	-

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Bifenazate (Acramite) UPL PER14210	20D	Lettuce / Head & Leafy Varieties (protected)	Two-Spotted Mite	QLD, SA & WA	15	-
Buprofezin (Applaud) Corteva PER82467	16	Lettuce / Leafy Varieties (field & protected)	Jassids, Leafhoppers, and Greenhouse Whitefly	ALL (excl. VIC)	3	-
Chlorantraniliprole (Coragen) FMC	28	Lettuce / Leaf & Closed Head Varieties (field & protected)	Cotton Bollworm & Native Budworm (Helicoverpa)	ALL	3	-
Chlorantraniliprole (Coragen) FMC PER89259	28	Lettuce (field)	Fall armyworm ( <i>Spodoptera frugiperda</i> )	ALL (excl. VIC)	1	-
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta	28+4A	Leafy Vegetables including Lettuce / Seedling Treatment	Corn Earworm, Native Budworm, Cluster Caterpillar, Looper, Lettuce Aphid, Green Peach Aphid, Brown Sowthistle Aphid, Silverleaf Whitefly, Western Flower Thrips, Vegetable Leafhopper, and Lucerne Leafroller	ALL	28	R2
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta PER89280	28+4A	Leafy Vegetables including Lettuce / Seedling Treatment	Fall Armyworm ( <i>Spodoptera frugiperda</i> )	ALL (excl. VIC)	42	R2
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta PER91161	28+4A	Leafy Vegetables including lettuce / Seedling Treatment	<i>Liriomyza</i> species, including Vegetable Leafminer ( <i>Liriomyza sativa</i> ), Pea Leafminer / Serpentine Leafminer ( <i>Liriomyza huidobrensis</i> ) & American Serpentine Leafminer ( <i>Liriomyza trifolii</i> ).	ALL (excl. VIC)	28	R2
Chlorpyrifos (Lorsban)	1B	Lettuce (field)	Vegetable Weevil (Desianthan Weevil in NSW & WA), Redlegged Earth Mite and Blue Oat Mite	NSW	NR	R1

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Dazomet (Basamid)	8F	General Fumigant	Soil borne pests, diseases & weeds	ALL	NR	-
Diazinon	1B	Lettuce (field)	Caterpillars, Cutworms	ALL (excl. TAS)	14	R3
Emamectin (Proclaim Opti) Syngenta	6	Lettuce (field & protected)	<i>Helicoverpa</i> spp.	ALL	3 NG	-
Emamectin (Proclaim Opti) Syngenta PER89263	6	Lettuce (field & protected)	Fall Armyworm ( <i>Spodoptera frugiperda</i> )	ALL (excl. VIC)	3	-
Emulsifiable Botanical Oils (Eco-Oil)	-	Vegetables (field & protected)	Greenhouse Whitefly	ALL	NR	-
Emulsifiable Botanical Oils (Eco-Oil) PER14077	-	Lettuce (protected)	Silverleaf Whitefly (biotype B)	ALL (excl. VIC)	NR	-
Flubendiamide (Belt) Bayer	28	Lettuce / Head & Leafy (field & protected)	Helicoverpa spp.	ALL	1	-
Fipronil (Regent) PER83203	2B	Lettuce / Head and Leafy Varieties (field)	Onion Thrips and Western Flower Thrips	ALL (excl. VIC)	10	R3
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Vegetables	Ants, Aphids, Caterpillars, Earwigs, Whitefly, Thrips and Leafhoppers. Suitable for organic growers.	ALL	1	-
Helicoverpa NPV (Vivus Max) AgBiTech	31	Lettuce (field & protected)	Cotton Bollworm, Corn Earworm, Tobacco Budworm and Native Budworm	ALL	NR	-
Imidacloprid	4A	Lettuce / Head & Leafy / Seedling Drench (field)	Currant-Lettuce Aphid	ALL	28	R2
Imidacloprid PER10918	4A	Leafy Lettuce (field)	Greenhouse Whitefly	ALL	7	R2

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Imidacloprid PER12351	4A	Leafy Lettuce (Soil application / field)	Silverleaf Whitefly	ALL (excl. VIC)	NR	R2
Indoxacarb (Avatar eVo) FMC	22A	Lettuce / Head & Leafy (field)	Cotton Bollworm and Native Budworm	ALL	3 NG	R3
Indoxacarb (Avatar eVo) FMC PER89278	22A	Leafy Vegetables (field)	Fall Armyworm ( <i>Spodoptera frugiperda</i> )	ALL (excl. VIC)	7	R3
Indoxacarb + Novaluron (Plemax) Adama	22A+15	Lettuce (field)	Cabbage White Butterfly, Cotton Bollworm, Native Budworm, Cabbage Cluster Caterpillar, Centre Grub, Cluster Caterpillar, Diamondback Moth	ALL	3 NG	R3
Iron EDTA Complex	-	All plants	Snails and Slugs	ALL	NR	-
Maldison	1B	Lettuce (field)	Aphids, Green Vegetable Bug, Jassids, Leaf Hopper, Red Legged Earth Mite (not TAS), Rutherglen Bug, Twenty-Eight Spotted Ladybird (not TAS).	ALL (excl. QLD)	3	-
Metaldehyde	-	Vegetables	Snails and slugs	ALL	7	-
Methiocarb (Mesurol)	1A	Lettuce (field)	Garden Snails, Slugs, White Italian Snail and White Snail	ALL	NR	R2
Methomyl (Lannate)	1A	Lettuce / Head & Leafy (field)	<i>Helicoverpa</i> spp., Cluster Caterpillar, and Western Flower Thrips	ALL	7	R2
Methomyl (Lannate) PER89293	1A	Lettuce	Fall Armyworm ( <i>Spodoptera frugiperda</i> )	ALL	14	R2
Permethrin (Ambush)	3A	Lettuce	Cluster Caterpillar ( <i>Spodoptera litura</i> )	ALL	2	-

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Petroleum Oil PER12221	UN	Lettuce (field & protected)	Silverleaf Whitefly, Greenhouse Whitefly, Aphids, Green Mirid, Green Vegetable Bug, Grey Cluster Bug, Leafhoppers, Mites, Rutherglen Bug & Thrips	ALL (excl. VIC)	1	-
Pirimicarb (Aphidex)	1A	Lettuce (field)	Aphids	ALL	2	R3
Potassium Salts of Fatty Acids (Natrasoap)	-	Vegetables (field & protected)	Aphids, Thrips, Mealybug, Two-Spotted Mite, Spider Mite and Whitefly	ALL	NR	-
Potassium Salts of Fatty Acids (Natrasoap) PER13920	-	Lettuce (protected)	Greenhouse Whitefly & Silverleaf Whitefly	ALL (excl. VIC)	NR	-
Propargite (Omite)	12C	Vegetables (field & protected)	Mites	ALL	7	R3
Pymetrozine (Chess) Syngenta	9B	Lettuce / Head & Leafy (field & protected)	Brown Sowthistle Aphid, Green Peach Aphid, Currant Lettuce Aphid and suppression of Silverleaf Whitefly	ALL	3	R3
Pyrethrins (Pyganic)	3A	Lettuce (field)	Aphids	ALL	NR	-
Pyrethrins + Piperonyl Butoxide	3A	Lettuce (field & protected)	Aphids, Cabbage White Butterfly, Pear And Cherry Slug, Rutherglen Bug, Greenhouse Whitefly, Light Brown Apple Moth, Plague Thrips, large-bodied caterpillars e.g. Grapevine Moth & Native Budworm	ALL	1	-
Pyriproxyfen (Admiral Advance) Sumitomo	7C	Leafy Lettuce (field & protected)	Silverleaf Whitefly ( <i>Bemisia tabaci</i> )	ALL	7	-
Spinetoram (Success Neo) Corteva	5A	Leafy Vegetables (field)	Loopers, Helicoverpa spp. and Western Flower Thrips	ALL	3	-



Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Spinetoram (Success Neo) Corteva PER89241	5	Leafy Vegetables (field & protected)	Fall Armyworm ( <i>Spodoptera frugiperda</i> )	ALL (excl. VIC)	1	
Spinetoram (Success Neo) Corteva PER91155	5	Lettuce (field & protected)	Liriomyza Leafminers ( <i>Liriomyza</i> spp.)	ALL (excl. VIC)	3	-
Spinosad (Entrust Organic) Corteva	5	Leafy Vegetables including Lettuce (field & protected)	Loopers, Helicoverpa & Western Flower Thrips	ALL	3 G:14	-
Spinosad (Entrust Organic) Corteva PER89870	5	Leafy Vegetables including Lettuce (field & protected)	Fall Armyworm ( <i>Spodoptera frugiperda</i> )	ALL	3 G:14	-
Spinosad (Entrust Organic) Corteva PER90928	5	Leafy Vegetables including Lettuce (field & protected)	Liriomyza Leafminers	ALL (excl. VIC)	3 G:14	-
Spirotetramat (Movento) Bayer	23	Lettuce / Head & Leafy (field & protected)	Brown Sowthistle Aphid, Currant Lettuce Aphid, Green Peach Aphid, and Western Flower Thrips.	ALL	1	-
Spirotetramat (Movento) Bayer PER88640	23	Lettuce / Head & Leafy (field & protected)	Liriomyza Leafminers ( <i>Liriomyza</i> spp.)	ALL (excl. VIC)	1	-
<i>Spodoptera frugiperda</i> Multiple Nucleopolyhedrovirus (Fawligen) AgBiTech PER90820	31	Leafy Vegetables	Fall Armyworm	ALL	NR	-

<b>Active Ingredient (Trade Name)</b>	<b>Chemical group</b>	<b>Situation</b>	<b>Pests / Comments</b>	<b>States</b>	<b>WHP Days</b>	<b>Regulatory risk</b>
Sulfoxaflor (Transform) Corteva	4C	Lettuce / All Varieties (field & protected)	Green Peach Aphid, Brown Sowthistle Aphid, Greenhouse Whitefly & Rutherglen Bug	ALL	3	-
Sulphur	UN	Vegetables (field & protected)	Mites	ALL	NR	-
Trichlorfon (Lepidex)	1B	Vegetables (field)	Cabbage White Butterfly, Cabbage Moth, Green Vegetable Bug, and Rutherglen Bug	QLD & NT	2	R2
		Lettuce (field)	Cutworm			

### **Appendix 3. Products available for weed control in leafy lettuce**

<b>Active ingredient (Trade Name)</b>	<b>Chemical group</b>	<b>Situation</b>	<b>Comment / Use / Weed</b>	<b>WHP (days)</b>	<b>States</b>	<b>Regulatory risk</b>
1,3-dichloropropene + Chloropicrin (Telone C-35)	8B	Vegetables / General fumigant	Plant parasitic Nematodes, Symphylans, Wireworms, soil borne diseases and suppression of weeds. <i>For use by professional and registered fumigators only.</i>	NR	ALL	-
Clethodim (Select)	A***	Lettuce / Selective post-emergent	Grass Weeds	28	ALL	R3
Chlorthal-Dimethyl (Dacthal)	D**	Lettuce	Grass and Broadleaf Weeds	28	ALL	-
Fluazifop-P (Fusilade)	A***	Selective post-emergent	Grass Weeds	28 G:49	ALL	-
Glyphosate (Roundup)	M**	General knockdown / Vegetables	Grass and Broadleaf Weeds as a pre-crop spray	NR	ALL	R3
Paraquat + Diquat (SpraySeed)	L**	General knockdown	Grass and Broadleaf Weeds	NR	ALL	R3
Pendimethalin (Stomp)	D**	Pre-plant residual	Broadleaf and Grass Weeds	NR	ALL	-
Phenmedipham (Betanal) Bayer PER81241	C**	Lettuce (field transplants only-all types)	Grass and Broadleaf Weeds	28 NG	ALL (excl. VIC)	-
Propyzamide	D**	Lettuce / Selective pre-emergent and early post-emergent / Direct sown lettuce only	Broadleaf and grass Weeds	25	ALL	-
Sethoxydim (Sertin)	A***	Lettuce / Post-emergent	Grass Weeds	28	ALL	R3

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

#### **Appendix 4. Current permits for use in leafy lettuce**

<b>Permit No.</b>	<b>Description</b>	<b>Issued Date</b>	<b>Expiry Date</b>	<b>Permit Holder</b>
PER13301 Version 3	Alpha-cypermethrin / Lettuce / Red-Legged Earth Mite, Vegetable Weevil (field)	12-Jun-12	31-May-25	Hort Innovation
PER87630	<i>Bacillus amyloliquefaciens</i> (Serenade Opti) / Lettuce / Bacterial Spot/Blight ( <i>Xanthomonas</i> spp.) (Suppression only).	18-Jun-19	30-Jun-22	Hort Innovation
PER14694 Version 3	<i>Bacillus thuringiensis</i> (Vertobac) / Lettuce / Fungus gnats ( <i>Sciaridae</i> spp) (protected cropping only)	01-Jun-14	30-Jun-24	Hort Innovation
PER14210 Version 4	Bifenazate (Acramite) / Lettuce, head & leafy varieties / Two-spotted mite (protected cropping only)	17-Oct-13	30-Apr-22	Hort Innovation
PER82467 Version 3	Buprofezin (Applaud) / Lettuce -leafy varieties / Jassids, Leafhoppers & Greenhouse whitefly	07-Jul-17	30-Jun-25	Hort Innovation
PER14326 Version 2	Captan / Leafy lettuce / Grey Mould (protected)	19-Dec-13	30-Nov-21	Hort Innovation
PER89259	Chlorantraniliprole (Coragen) / Various, including Leafy Vegetables & Lettuce / Fall Armyworm (field)	06-Mar-20	31-Mar-23	Hort Innovation
PER89280	Chlorantraniliprole + Thiamethoxam (Durivo) / Leafy Vegetables including Lettuce / Fall armyworm (seedling treatment)	12-Mar-20	31-Mar-23	Hort Innovation
PER91161	Chlorantraniliprole + Thiamethoxam (Durivo) / Leafy Vegetables / Leafminers ( <i>Liriomyza</i> spp.)	9-Jun-21	30-Jun-24	Hort Innovation
PER14964 Version 2	Chlorothalonil / Lettuce seedlings (head and leafy varieties, plant nursery phase) / Anthracnose or Shot Hole ( <i>Microdochium panattonianum</i> ) (seedling treatment)	21-Dec-14	13-Jul-26	Hort Innovation
PER81867 Version 2	Cyromazine (Diptex 150 WP) / Leafy Vegetables (excluding head lettuce) / Leafminers ( <i>Liriomyza</i> spp.) *These crops must be destroyed if treated and must not be made available for human consumption	02-Dec-19	30-Nov-23	Hort Innovation
PER89263	Emamectin (Proclaim Opti) / Leafy vegetables / Fall Armyworm	10-Mar-20	31-Mar-23	Hort Innovation
PER14077 Version 2	Botanical Oil (Eco-Oil) / Lettuce (Greenhouse and hydroponic) / Silverleaf Whitefly (protected)	01-Oct-13	30-Sep-23	Hort Innovation
PER83203 Version 2	Fipronil (Regent) / Lettuce (head and leafy varieties) / Onion Thrips & Western Flower Thrips (field)	16-Mar-27	31-Mar-22	Hort Innovation

<b>Permit No.</b>	<b>Description</b>	<b>Issued Date</b>	<b>Expiry Date</b>	<b>Permit Holder</b>
PER10918 Version 3	Imidacloprid / Leafy lettuce / Greenhouse Whitefly (field)	30-Jun-15	31-Dec-23	Hort Innovation
PER12351 Version 3	Imidacloprid / Leafy lettuce / Silverleaf Whitefly (field)	30-Mar-15	30-Apr-25	Hort Innovation
PER89278	Indoxacarb (Avatar) / Leafy Vegetables / Fall Armyworm (field)	13-Mar-20	31-Mar-23	Hort Innovation
PER14958 Version 2	Mancozeb and Dimethomorph (Acrobat) / Leafy lettuce / Downy Mildew	21-Dec-14	31-Dec-22	Hort Innovation
PER14318 Version 2	Metalaxyl-M (Ridomil Gold 480) / Lettuce / Damping off ( <i>Pythium</i> and <i>Phytophthora</i> spp.) (Lettuce grown as winter crop, in clay to clay loam soils)	23-Dec-13	30-Sep-22	Hort Innovation
PER89293	Methomyl (Lannate) / Head & Leafy Lettuce / Fall Armyworm	10-Apr-20	30-Apr-23	Hort Innovation
PER12221 Version 4	Petroleum oil / Lettuce / Greenhouse Whitefly, Sweet Potato Whitefly, Silverleaf Whitefly	29-Jun-12	30-Nov-22	Hort Innovation
PER81241 Version 3	Phenmedipham (Betanal) / Lettuce / Weeds as per product label (field transplants only-all types)	29-May-15	31-May-25	Hort Innovation
PER13698 Version 3	Phosphorous Acid / Lettuce - leafy and hydroponic / Downy Mildew (protected)	01-Oct-12	30-Sep-22	Hort Innovation
PER13695 Version 3	Potassium Bicarbonate (Ecocarb) / Lettuce / Powdery Mildew	31-Oct-12	31-Jul-25	Hort Innovation
PER13920 Version 2	Potassium Salts of Fatty Acids (Natrasoap) / Lettuce (glasshouse and hydroponic) / Greenhouse Whitefly and Silverleaf Whitefly (protected)	01-Mar-13	31-Mar-23	Hort Innovation
PER81131 Version 3	Prochloraz (Octave) / Leafy or Open-Head Lettuce / Anthracnose ( <i>Microdochium panattonianum</i> ) (field only)	02-Feb-16	31-Dec-23	Hort Innovation
PER12565 Version 3	Pyrimethanil (Scala) / Lettuce / Botrytis Grey Mould (protected only)	05-Apr-12	30-Sep-22	Hort Innovation
PER89241	Spinetoram (Success Neo) / Leafy Vegetables / Fall Armyworm	06-Mar-20	31-Mar-23	Hort Innovation
PER91155	Spinetoram (Success Neo) / Leafy Vegetables / / Leafminers ( <i>Liriomyza</i> spp.)	9-Jun-21	30-Jun-24	Hort Innovation
PER89870	Spinosad (Entrust Organic) / Leafy Vegetables / Fall Armyworm	21-Jul-20	31-Jul-23	Hort Innovation

<b>Permit No.</b>	<b>Description</b>	<b>Issued Date</b>	<b>Expiry Date</b>	<b>Permit Holder</b>
PER90928	Spinosad (Entrust Organic) / Leafy Vegetables / Leafminers ( <i>Liriomyza</i> spp.)	23-Apr-21	30-Apr-24	Hort Innovation
PER88640	Spirotetramat (Movento) / Lettuce (Head lettuce and Leafy lettuce) / Leafminers ( <i>Liriomyza</i> spp.)	18-May-20	31-May-23	Hort Innovation
PER90820 Version 3	<i>Spodoptera frugiperda</i> Multiple Nucleopolyhedrovirus (Fawligen) / Various including Leafy Vegetables / Fall Armyworm	30-Mar-21	31-Mar-24	AgBiTech
PER14431 Version 2	Tolclofos-Methyl (Rizolex) / Lettuce / Bottom Rot ( <i>Rhizoctonia solani</i> ) (field)	21-Mar-14	30-Jun-22	Hort Innovation

## **Appendix 5. Leafy Lettuce Maximum Residue Limits (MRLs)**

CODEX commodity groupings of Leafy vegetables:

VL 0053      Leafy vegetables  
VL 0483      Lettuce, leaf

Note: Major export markets for Leafy Lettuce include Singapore, Hong Kong, Malaysia, Indonesia and Thailand. Available information indicates that in the absence specific limits in legislation that most countries defer to Codex, followed by EU MRL standards or applies a 0.01ppm default value. Food exported to New Zealand from Australia may be legally sold if it complies with Australian requirements. MRLs and legislation are subject to change; the values presented should not be relied on.

<b>Chemical</b>	<b>Codex</b>	<b>Description</b>	<b>APVMA MRL mg/kg</b>	<b>Codex MRL mg/kg</b>
Abamectin	VL0483	Lettuce, leaf	T1	-
Acibenzolar-S-methyl	VL0483	Lettuce, leaf	-	0.4
Afidopyropen	VL0053	Leafy vegetables	5	-
Aldrin and Dieldrin	VL0053	Leafy vegetables	-	E0.05
	VL0483	Lettuce, leaf	E0.1	-
Ametoctradin	VL0053	Leafy vegetables	50	50
Azoxystrobin	VL0483	Lettuce, leaf	-	3
	VL0053	Leafy vegetables	15	-
Benalaxyl	VL0483	Lettuce, leaf	*0.01	-
Benfluralin	VL0483	Lettuce, leaf	T*0.05	-
Bifenazate	VL0483	Lettuce, leaf	T20	-
Bifenthrin	VL0053	Leafy vegetables {except Chervil; Mizuna; Rucola [rocket]}	*0.01	-
Boscalid	VL0053	Leafy vegetables	30	40
Buprofezin	VL0483	Lettuce, leaf	T10	-
Captan	VL0483	Lettuce, leaf	T15	-
Chlorantranilprole	VL0053	Leafy vegetables {except Lettuce, head; Rucola [rocket]}	15	-
	VL0053	Leafy vegetables {except radish leaves}	-	20
Chlorothalonil	VL0483	Lettuce, leaf	T10	-
Chlorthal-dimethyl	VL0483	Lettuce, leaf	2	-
Clothianidin	VL0053	Leafy vegetables	0.7	2
Cyantranilprole	VL0053	Leafy vegetables {except Lettuce, head}	-	20
Cyazofamid	VL0053	Leafy vegetables {except brassica leafy vegetables}	-	10
Cycloxydim	VL0483	Lettuce, leaf	-	1.5
Cypermethrins	VL0053	Leafy vegetables	-	0.7
Cyprodinil	VL0053	Leafy vegetables {except brassica leafy vegetables}	10	50
Cyromazine	VL0483	Lettuce, leaf	-	4
Deltamethrin	VL0053	Leafy vegetables	-	2
Diazinon	VL0483	Lettuce, leaf	-	0.5
Dichlobenil	VL0053	Leafy vegetables	-	0.3

Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Dicofol		Vegetables (some exceptions)	5	-
Difenoconazole	VL0483	Lettuce, leaf	-	2
Dimethomorph	VL0053	Leafy vegetables	15	-
	VL0483	Lettuce, leaf	-	9
Dinotefuran	VL0053	Leafy vegetables	-	6
Diquat		Vegetables (some exceptions)	*0.05	-
Dithiocarbamates (mancozeb, metham, metiram, thiram, zineb and ziram)	VL0053	Leafy vegetables	5	-
Emamectin benzoate	VL0483	Lettuce, leaf	0.2	0.7
Fenamidone	VL0483	Lettuce, leaf	-	0.9
Fenhexamid	VL0483	Lettuce, leaf	T50	30
Fenitrothion	VL0483	Lettuce, leaf	0.5	-
Fenpyrazamine	VL0483	Lettuce, leaf	-	1.5
Fipronil	VL0483	Lettuce, leaf	T0.1	-
Fonicamid	VL0483	Lettuce, leaf	-	8
Fluazifop-P-butyl	VL0053	Leafy vegetables {except Lettuce, head}	T2	-
	VL0483	Lettuce, leaf	-	0.01
Flubendiamide	VL0483	Lettuce, leaf	-	7
	VL0053	Leafy vegetables {except Lettuce, head}	10	-
Fludioxonil	VL0053	Leafy vegetables	15	-
	VL0483	Lettuce, leaf	-	40
Fluensulfone	VL0053	Leafy vegetables	-	1
Fluopicolide	VL0053	Leafy vegetables	30	30
Fluopyram	VL0483	Lettuce, leaf	15	15
Fosetyl Al	VL0053	Leafy vegetables [except Rucola [rocket]; Spinach]	T0.2	-
	VL0483	Lettuce, leaf	-	40
Glufosinate-ammonium	VL0483	Lettuce, leaf	-	0.4
Glyphosate	VL0053	Leafy vegetables	*0.1	-
Haloxypop	VL0053	Leafy vegetables	T0.5	-
Imidacloprid	VL0053	Leafy vegetables {except Lettuce, head}	20	-
Indoxacarb	VL0483	Lettuce, leaf	-	3
	VL0053	Leafy vegetables {except Lettuce, head}	5	-
Iprodione	VL0483	Lettuce, leaf	5	25
Isofetamid	VL0483	Lettuce, leaf	-	7
Maldison	VL0483	Lettuce, leaf	2	-
Mandestrobin	VL0483	Lettuce, leaf	7	-
Mandipropamid	VL0053	Leafy vegetables	30	25
Metalaxyl	VL0053	Leafy vegetables	0.3	-
Metaldehyde		Vegetables	1	-
Methiocarb		Vegetables	0.1	-
Methomyl	VL0483	Lettuce, leaf	2	0.2
Methoxyfenozide	VL0483	Lettuce, leaf	T30	30



Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Myclobutanil	VL0053	Leafy vegetables	-	0.05
Novaluron	VL0053	Leafy vegetables	5	-
Oxadixyl	VL0053	Leafy vegetables	T5	-
Oxathiapiprolin	VL0053	Leafy vegetables {except Lettuce, head}	15	-
	VL0483	Lettuce, leaf	-	5
Paraquat	VL0053	Leafy vegetables	-	0.07
Pendimethalin	VL0053	Leafy vegetables	*0.05	-
	VL0483	Lettuce, leaf	-	4
Penthiopyrad	VL0053	Leafy vegetables {except Brassica leafy vegetables; Lettuce, head}	50	-
	VL0053	Leafy vegetables {except Brassica leafy vegetables}	-	30
Permethrin	VL0483	Lettuce, leaf	5	-
Phenmedipham	VL0053	Leafy vegetables {except Chard [silver beet]}	T1	-
Phorate	VL0053	Leafy vegetables	T*0.01	-
Phosphorous acid	VL0053	Leafy vegetables	T150	-
Piperonyl butoxide	VL0483	Lettuce, leaf	-	50
Pirimicarb	VL0053	Leafy vegetables	7	-
	VL0483	Lettuce, leaf	-	5
Prochloraz	VL0483	Lettuce, leaf	T3	-
Propamocarb	VL0053	Leafy vegetables	70	-
	VL0483	Lettuce, leaf	-	100
Propargite		Vegetables	3	-
Propineb	VL0483	Lettuce, leaf	10	-
Propyzamide	VL0483	Lettuce, leaf	1	-
Pydiflumetofen	VL0053	Leafy vegetables {except Brassica leafy vegetables}	T30	-
Pymetrozine	VL0053	Leafy vegetables	5	-
Pyrethrin		Vegetables	1	-
Pyrimethanil	VL0483	Lettuce, leaf	20	-
Pyriproxyfen	VL0483	Lettuce, leaf	5	-
Quinoxifen	VL0483	Lettuce, leaf	-	20
Quintozene	VL0483	Lettuce, leaf	0.3	-
Sethoxydim	VL0483	Lettuce, leaf	0.2	-
Spinetoram	VL0053	Leafy vegetables	0.7	-
	VL0483	Lettuce, leaf	-	10
Spinosad	VL0053	Leafy vegetables	5	10
Spiromesifen	VL0053	Leafy vegetables	-	15
Spirotetramat	VL0053	Leafy vegetables	-	7
	VL0483	Lettuce, leaf	15	-
Sulfoxaflor	VL0053	Leafy vegetables {except Lettuce, head}	5	-
	VL0053	Leafy vegetables	-	6
Tebuconazole	VL0483	Lettuce, leaf	0.1	-
Tebufenozide	VL0053	Leafy vegetables	-	10

<b>Chemical</b>	<b>Codex</b>	<b>Description</b>	<b>APVMA MRL mg/kg</b>	<b>Codex MRL mg/kg</b>
Thiamethoxam see also Clothianidin	VL0053	Leafy vegetables	2	3
Tolclofos-methyl	VL0483	Lettuce, leaf	*0.01	2
Trichlorfon		Vegetables (some exceptions)	0.1	-
Trifloxystrobin	VL0483	Lettuce, leaf	15	-

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

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

T =Temporary MRL

E = The MRL is based on extraneous residues

Sources: APVMA MRLs: Agricultural and Veterinary Chemicals Code (MRL Standard) Instrument 2019. Compilation 4. Prepared 10 July 2021. CODEX MRLs: CODEX Alimentarius International Food Standards database (July 2021), <http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/>

## **Appendix 6. Leafy Lettuce Agrichemical Regulatory Risk Assessment**

### **Leafy Lettuce 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 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 lettuce as well as current initiatives aimed at addressing identified pest management deficiencies.

## Leafy Lettuce Agrichemical Regulatory Risk Assessment

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

Problem	Active Constituents	Chemical Group	Comment	Activities
<b>INSECT AND MITE PESTS</b>				
Ants	Pyrethrins	<b>3A</b>		
<b>Aphids</b>				
Aphids	Malathion/Maldison	<b>1B</b>	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
	Pirimicarb	<b>1A</b>	Codex: JMPR Periodic re-evaluation 2022/23 EU: Candidate for substitution	
	Petroleum oil (PER12221)	-		
Brown sowthistle aphid	Chlorantraniliprole + thiamethoxam	<b>4A + 28</b>	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered <sup>1</sup> USA: Re-registration with new risk mitigation measures	
	Pymetrozine	<b>9B</b>	EU: Being phased out Codex: No registrant support	
	Spirotetramat	<b>23</b>		
	Sulfoxaflor	<b>4C</b>	USA: Pollinator concerns	
Cabbage aphid	Afidopyropen	<b>9D</b>		
	Pyrethrins	<b>3A</b>		
Cotton aphid	Afidopyropen	<b>9D</b>		
	Pymetrozine	<b>9B</b>	EU: Being phased out Codex: No registrant support	

Problem	Active Constituents	Chemical Group	Comment	Activities
Currant lettuce aphid	Afidopyropen	9D		
	Chlorantraniliprole + thiamethoxam	4A + 28	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	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		
Green peach aphid	Afidopyropen	9D		
	Chlorantraniliprole + thiamethoxam	4A + 28	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered 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	

Problem	Active Constituents	Chemical Group	Comment	Activities
<b>Beetles</b>				
28-spotted potato ladybird	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
Spotted vegetable weevil	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	
Vegetable weevil	Alpha-cypermethrin (PER13301)	3A	EU: Proposed restricted authorisation & Candidate for substitution	
	Carbaryl	1A	Canada: Review recently completed, retained but with a large number of uses deleted Codex: Toxicology review scheduled 2020 EU: deregistered	
	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	
<b>Caterpillars/Lepidoptera</b>				
Armyworm	<i>B thuringiensis</i>	11A		
Cabbage white butterfly	<i>B thuringiensis</i>	11A		
	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
	Pyrethrins	3A		
Caterpillars	<i>B thuringiensis</i>	11A		
	Diazinon	1B	EU: Deregistered Codex : To be reviewed by 2020/21.	
	Pyrethrins	3A		
	Spinetoram	5		

Problem	Active Constituents	Chemical Group	Comment	Activities
Cluster caterpillar	Chlorantraniliprole + thiamethoxam	<b>4A + 28</b>	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Emamectin benzoate	<b>6</b>		
	Methomyl	<b>1A</b>	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
	Permethrin	<b>3A</b>		
Cucumber moth	Emamectin benzoate	<b>6</b>		
Cutworms	Diazinon	<b>1B</b>	EU: Deregistered Codex: To be reviewed by 2020/21.	
	Trichlorfon	<b>1B</b>	APVMA: nominated for review Codex: No MRLs EU: deregistered US: No MRLs	
Diamondback (Cabbage) moth	<i>B thuringiensis</i>	<b>11A</b>		
	Malathion/Maldison	<b>1B</b>	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
	Pyrethrins	<b>3A</b>		
Fall armyworm	Chlorantraniliprole (PER89259)	<b>28</b>		
	Chlorantraniliprole + thiamethoxam (PER89280)	<b>4A + 28</b>	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Emamectin benzoate (PER89263)	<b>6</b>		

Problem	Active Constituents	Chemical Group	Comment	Activities
Fall armyworm	Indoxacarb (PER89278)	<b>22A</b>	EU: Proposed non-renewal	
	Methomyl (PER89293)	<b>1A</b>	APVMA: nominated for review Canada: Re-evaluation completed (2018). Majority of uses removed EU: No authorisations (expired 31/8/19)	
	Spinetoram (PER89241)	<b>5</b>		
	Spinosad (PER89870)	<b>5</b>		
Helicoverpa species Native Budworm ( <i>H. punctigera</i> ) Corn earworm/Cotton bollworm ( <i>H. armigera</i> )	Alpha-cypermethrin	<b>3A</b>	EU: Proposed restricted authorisation & Candidate for substitution	
	<i>B thuringiensis</i>	<b>11A</b>		
	Chlorantraniliprole	<b>28</b>		
	Chlorantraniliprole + thiamethoxam	<b>4A + 28</b>	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Emamectin benzoate	<b>6</b>		
	Flubendiamide	<b>28</b>		
	Helicoverpa NPV	-		
	Indoxacarb	<b>22</b>	EU: Proposed non-renewal	
	Methomyl	<b>1A</b>	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
	Spinetoram	<b>5</b>		
	Spinosad	<b>5</b>		



Problem	Active Constituents	Chemical Group	Comment	Activities
Loopers	<i>B thuringiensis</i>	11A		
	Spinetoram	5		
	Spinosad	5		
	Chlorantraniliprole + thiamethoxam	4A + 28	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
Lucerne leafroller	Chlorantraniliprole + thiamethoxam	4A + 28	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
Soybean looper	<i>B thuringiensis</i>	11A		
Tomato grub	Emamectin benzoate (PER14907)	6		

Problem	Active Constituents	Chemical Group	Comment	Activities	
<b>Grasshoppers/Locusts</b>					
Australian plague locust	Alpha-cypermethrin (PER10927)	<b>3A</b>	EU: Proposed restricted authorisation & Candidate for substitution		
	Chlorpyrifos (PER11843)	<b>1B</b>	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		
	Fenitrothion	<b>1B</b>	EU: No authorisation in place		
	Malathion/Maldison (PER11843)	<b>1B</b>	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23		
Field crickets	Chlorpyrifos	<b>1B</b>	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		
Migratory locust	Chlorpyrifos (PER11843)	<b>1B</b>			
	Fenitrothion	<b>1B</b>			EU: No authorisation in place
	Malathion/Maldison (PER11843)	<b>1B</b>			APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23
Mole crickets	Chlorpyrifos	<b>1B</b>	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		
Small plague locust	Fenitrothion	<b>1B</b>	EU: No authorisation in place		
Spur-throated locust	Alpha-cypermethrin (PER10927)	<b>3A</b>	EU: Proposed restricted authorisation & Candidate for substitution		
	Chlorpyrifos (PER11843)	<b>1B</b>	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		

Problem	Active Constituents	Chemical Group	Comment	Activities
Spur-throated locust	Fenitrothion	<b>1B</b>	EU: No authorisation in place	
	Malathion/Maldison (PER11843)	<b>1B</b>	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
Wingless grasshopper	Fenitrothion	<b>1B</b>	EU: No authorisation in place	
<b>Jassids/Plant bugs</b>				
Green mirid	Petroleum oil (PER12221)	-		
Green vegetable bug	Malathion/Maldison	<b>1B</b>	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
	Petroleum oil (PER12221)	-		
Grey cluster bug	Petroleum oil (PER12221)	-		
Jassids/Leafhoppers	Buprofezin (PER82467)	<b>16</b>	EU: In the process of deleting MRLs	
	Malathion/Maldison	<b>1B</b>	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
	Petroleum oil (PER12221)	-		
	Pyrethrins	<b>3A</b>		
Rutherglen bug	Malathion/Maldison	<b>1B</b>	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
	Petroleum oil (PER12221)	-		
	Pyrethrins	<b>3A</b>		
	Sulfoxaflor	<b>4C</b>	USA: Pollinator concerns	
Vegetable leafhopper	Chlorantraniliprole + thiamethoxam	<b>4A + 28</b>	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	

Problem	Active Constituents	Chemical Group	Comment	Activities
<b>Mites</b>				
Blue oat mite	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	
Mites	Petroleum oil (PER12221)	-		
Redlegged earth mite	Alpha-cypermethrin (PER13301)	3A	EU: Proposed restricted authorisation & Candidate for substitution	
	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	
	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
Two-spotted (Red spider) mite	Bifenazate (PER14210)	20D	EU: Proposed non-renewal	
	Pyrethrins	3A		
<b>Thrips</b>				
Onion thrips	Fipronil (PER83203)	2B	APVMA: Under review Codex: Re-evaluation scheduled for 2021/22 EU: No authorisation in place	
Plague thrips	Pyrethrins	3A		
Thrips	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
	Petroleum oil (PER12221)	-		
	Pyrethrins	3A		

Problem	Active Constituents	Chemical Group	Comment	Activities
Western flower thrips	Abamectin	6		
	Chlorantraniliprole + thiamethoxam	4A + 28	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Methomyl	1A	APVMA: nominated for review Canada: Re-evaluation completed (2018). Majority of uses removed EU: No authorisations	
	Fipronil (PER83203)	2B	APVMA: Under review Codex: Re-evaluation scheduled for 2021/22 EU: No authorisation in place	
	Spinetoram	5		
	Spinosad	5		
<b>Whitefly</b>				
Greenhouse whitefly	Buprofezin (PER82467)	16	EU: In the process of deleting MRLs	
	Imidacloprid (PER10918)	4A	APVMA: Under review Canada: Under review EU: Removal of all field uses USA: Re-registration with new risk mitigation measures	
	Petroleum oil (PER12221)	-		
	Potassium salts (PER13920)			
	Pyrethrins	3A		
	Sulfoxaflor	4C	USA: Pollinator concerns	

Problem	Active Constituents	Chemical Group	Comment	Activities
Silverleaf whiteflies	Afidopyropen	9D		
	Chlorantraniliprole + thiamethoxam	4A + 28	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	ECO-Oil (PER14077)	-		
	Imidacloprid (PER12351)	4A	APVMA: Under review Canada: Under review EU: Removal of all field uses USA: Re-registration with new risk mitigation measures	
	Petroleum oil (PER12221)	-		
	Potassium salts (PER13920)	-		
	Pymetrozine	9B	EU: Being phased out Codex: No registrant support	
	Pyriproxyfen	7C	EU: Authorisation renewal process underway	
Whitefly	Pyrethrins	3A		
<b>Other</b>				
Earwig	Pyrethrins	3A		
Fungus gnats	<i>B thuringiensis thuringiensis</i> sub sp. israelensis (PER14694)	11A		
Leafminer	Spirotetramat (PER88640)	23		

Problem	Active Constituents	Chemical Group	Comment	Activities
<b>DISEASES</b>				
Alternaria leaf spots	Azoxystrobin + oxathiapiprolin	<b>11 + 49</b>		
Anthracnose	Chlorothalonil (PER14964)	<b>M5</b>	APVMA : Nominated for review Canada: Review recently completed; continued use considered acceptable EU : Deregistered <sup>ii</sup> .	
	Copper	<b>M1</b>	EU: Candidate for substitution	
	Cyprodinil + fludioxonil	<b>9 + 12</b>	Cyprodinil: Canada: Currently under reviewed EU: Candidate for substitution Fludioxonil: EU: Currently under reviewed Candidate for substitution	
	Dimethomorph	<b>40</b>		
	Mancozeb	<b>M3</b>	APVMA: Nominated for review Canada: Many uses cancelled Codex: To be reviewed 2022/23 EU: Authorisation not renewed	
	Prochloraz (PER81131) (field only)	<b>3</b>	Codex: Periodic re-evaluation scheduled for 2021/22 EU: Candidate for substitution	
	Thiram	<b>M3</b>	APVMA : Nominated for review Canada: Proposed cancelling of all foliar uses Codex : To be reviewed 2022/23 EU: No authorisation in place	
Bacterial spot	<i>B. amyloliquefaciens</i> (PER87630)	<b>BM02</b>		
	Copper	<b>M1</b>	EU: Candidate for substitution	
Base rot/Bottom rot	Azoxystrobin	<b>11</b>		
	Tolclofos-methyl (PER14431)	<b>14</b>	EU: Proposed restricted authorisation	

Problem	Active Constituents	Chemical Group	Comment	Activities
Botrytis/Grey mould	Captan (PER14326)			
	Cyprodinil + fludioxonil	9 + 12	Cyprodinil: Canada: Currently under reviewed EU: Candidate for substitution Fludioxonil: EU: Currently under reviewed Candidate for substitution	
	Fenhexamid	17		
	Iprodione	2	EU: Deregistered Canada: Majority of food crop uses deleted Codex: Review scheduled for 2022/23	
	Pyrimethanil (PER12565)	9		
	Thiram	M3	APVMA : Nominated for review Canada: Proposed cancelling of all foliar uses Codex : To be reviewed 2022/23 EU: No authorisation in place	
Damping off	Metalaxyl-M (PER14318)	4	EU: Metalaxyl-M restricted use approval	
Downy mildew	Azoxystrobin + oxathiapiprolin	11 + 49		
	Copper	M1	EU: Candidate for substitution	
	Dimethomorph (PER14958)	40		
	Fluopicolide +propamocarb HCl	28 + 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	
	Mandipropamid	40		
	Metiram	M3	APVMA : Nominated for review Canada: Proposed cancelling of foliar uses Codex : To be reviewed 2022/23	
	Oxadixyl +propineb	4 + M3	Oxadixyl: EU: No authorisations Propineb APVMA : Nominated for review EU: No authorisation Codex : To be reviewed 2022/23	



Problem	Active Constituents	Chemical Group	Comment	Activities
Downy mildew	Oxathiapiprolin	49		
	Phosphorous acid (PER13698)	33		
	Propineb	M3	APVMA : Nominated for review EU: No authorisation Codex : To be reviewed 2022/23	
Dry leaf spot	Copper	M1	EU: Candidate for substitution	
Powdery mildew	Penthiopyrad	7		
	Potassium bicarbonate (PER13695)	M2		
Sclerotinia rot	Azoxystrobin	11		Data generation project ST17000 underway for Leafy vegetables crop group label registration with Bayer Luna Sensation & Luna Experience
	Azoxystrobin + oxathiapiprolin	11 + 49		
	Boscalid	7		
	Cyprodinil + fludioxonil	9 + 12	Cyprodinil: Canada: Currently under reviewed EU: Candidate for substitution Fludioxonil: EU: Currently under reviewed Candidate for substitution	
	Iprodione	2	EU: Deregistered Canada: Majority of food crop uses deleted Codex: Review scheduled for 2022/23	
	Mandestrobin	11		
Sclerotinia rot	Penthiopyrad	7		
	Tebuconazole	3	APVMA : Nominated for review	
Septoria leaf spot	Dimethomorph	40		
	Mancozeb	M3	APVMA: Nominated for review Canada: Many uses cancelled Codex: To be reviewed 2022/23 EU: Authorisation not renewed	
	Metiram	M3	APVMA : Nominated for review Canada: Proposed cancelling of foliar uses Codex : To be reviewed 2022/23	
	Thiram	M3	APVMA : Nominated for review Canada: Proposed cancelling of all foliar uses Codex : To be reviewed 2022/23 EU: No authorisation in place	

Problem	Active Constituents	Chemical Group	Comment	Activities
<b>WEEDS</b>				
Broadleaf weeds and grasses	Chloridazon	C	EU: No authorisation in place	
	Chlorthal-dimethyl	D	EU: No authorisation in place	
	Clethodim	A	Codex: MRLs proposed for deletion	
	Fluazifop-P	A		
	Haloxyfop-P (PER14959)	A	EU: Candidate for substitution	
	Pendimethalin	D	EU: Candidate for substitution	
	Phenmedipham (PER81241)	C	EU: Currently under review	
	Propyzamide	D		
	Sethoxydim	A	EU: No authorisation in place	
<b>Plant growth regulator</b>				
Post-harvest	1-Methylcyclopropene			
Root growth promotant	Indole butyric acid (IBA)			

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<sup>i</sup> Use of thiamethoxam limited to permanent greenhouses and that the resulting crop stays its entire life cycle within a permanent greenhouse, so that it is not replanted outside.

<sup>ii</sup> 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>