



Head Lettuce

Strategic Agrichemical Review Process
(SARP)

July 2021

Hort Innovation
Project – VG18004

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

SARP Service Provider:

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Purpose of the report:

This report was funded by Hort Innovation to investigate the pest problem, agrichemical usage and pest management alternatives for the Head 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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**Hort
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Strategic levy investment

**VEGETABLE
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 Head 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:

Common name	Scientific name
Downy Mildew	<i>Bremia lactucae</i>
Sclerotinia Rot / Lettuce Drop	<i>Sclerotinia minor, Sclerotinia sclerotiorum</i>
Botrytis Rot	<i>Botrytis cinerea</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:

Common name	Scientific name
Green Peach Aphid	<i>Myzus persicae</i>
Currant Lettuce Aphid	<i>Nasonovia ribis-nigri</i>
Rutherglen Bug	<i>Nysius vinitor</i>
Cotton Bollworm / Corn Earworm	<i>Helicoverpa armigera</i>
Native Budworm	<i>Helicoverpa punctigera</i>
Western Flower Thrips	<i>Frankliniella occidentalis</i>
Plague Thrips	<i>Thrips imaginis</i>

1.3 Weeds

The high priority weeds are:

Common Name	Scientific Name
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>

2. The Australian Head Lettuce Industry

The Australian Head Lettuce industry is a major horticultural industry. Head Lettuce refers to heading lettuce varieties, which are usually sold as a whole headed unit. Leafy lettuces are discussed in a separate SARP.

Head Lettuce is predominately grown near the major capitals to ensure fresh supply to demand. Major production regions include the Lockyer Valley and Darling Downs regions in Queensland; the Sydney Basin in New South Wales; the Gippsland region in Victoria and Gingin and Perth in WA.

Production for the year ending in June 2020¹ was 135,119 tonnes with a value of \$206m. Almost 100% is sent to the fresh market with <1% sent for export.

Three main varieties of heading lettuce dominate this production value: Iceberg (crisphead - *Lactuca sativa L.*) (75%), Cos (*Lactuca sativa L. var. longifolia Lam.*) (20%) and Oak (*Lactuca sativa L., var. capitata*) (4%). The remaining 1% of production is accounted for by other fancy leaf varieties such as butter leaf.

Australia is a net exporter of Head Lettuce. For the year ending June 2020, Australia exported 427 tonnes of fresh lettuce, the majority of which was sent to Singapore (80%) followed by Philippines (4%), Fiji (3%), Thailand (3%), and Hong Kong (2%).

Fresh Head Lettuce Seasonality by State

State	19/20 t	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
New South Wales (7%)	9,139												
Victoria (39%)	53,261												
Queensland (38%)	51,285												
Western Australia (11%)	14,586												
South Australia (5%)	6,197												
Tasmania (<1%)	643												
Availability legend			High		Medium		Low					None	

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

Seasonality by Head Lettuce Variety

Variety	19/20 t	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Iceberg	101,603												
Cos	26,752												
Oak	5,269												
Other Fancy	1,486												
Availability legend			High		Medium		Low					None	

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

3. Introduction

3.1 Background

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

Growers may face severe losses from diseases, pests and weeds due to a lack of registered or approved (via a permit) chemical control tools. Environmental concerns, consumer demands, and public opinion are also significant influences in the marketplace related to pest management practices. Industry IPM practitioners must strive to implement best management practices and tools to incorporate a pest management regime where strategies work in harmony with each other to achieve the desired effects while posing the least risks.

In combination with cultural practices, pesticides are important tools in Head 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 Head 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 Head 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 Head 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 Head 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 for the Vegetable Industry² which covers Head 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 their potential to enter, establish, and spread in Australia (e.g., environmental factors, host range, vectors) and the cost to industry of control measures.

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

3.2 Minor use permits and registration

From a pesticide access perspective, the APVMA classifies lettuce as a major crop. The crop fits within the APVMA crop group 013A: Leafy greens. Therefore, access to minor use permits can be relatively difficult and permit requests need to be in accordance with the APVMA's minor use guidance³.

Possible justification for future permit applications could be based on:

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

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

³ <https://apvma.gov.au/node/10931>

3.3 Methods

The current update of the Head 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>Head Lettuce Agrichemical Regulatory Risk Assessment Document 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 Head Lettuce as well as current initiatives aimed at addressing identified pest management deficiencies.</p>
VG18004 – Vegetable Strategic Agrichemical Review Process (SARP) Report Updates	<p>SARP updated via a desktop audit: 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 & 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&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 head lettuce

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

Appendix 3. Products available for weed control in head lettuce

Appendix 4. Current permits for use in head lettuce

Appendix 5. Head Lettuce Maximum Residue Limits (MRLs)

Appendix 6. Head Lettuce Agrichemical Regulatory Risk Assessment

4. Diseases, Pests and Weeds of Head 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 website⁴.

In chapter 4, information on regulatory risk derived from project MT17019 - Regulatory support and coordination (Appendix 6) has been incorporated.

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

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

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

4.1 Diseases of head lettuce

4.1.1 Disease priorities

Common name	Scientific name
High	
Downy Mildew	<i>Bremia lactucae</i>
Sclerotinia Rot / Lettuce Drop	<i>Sclerotinia minor</i> , <i>Sclerotinia sclerotiorum</i>
Botrytis Rot	<i>Botrytis cinerea</i>
Septoria Spot / Late Blight	<i>Septoria apiicola</i>
Moderate	
Anthracoze	<i>Microdochium panattonianum</i>
Bacterial Spot	<i>Xanthomonas campestris pv. vesicatoria</i>
Dry Leaf Spot	<i>Xanthomonas campestris pv. vitians</i>
Pythium	<i>Pythium</i> spp.
Corky Root	<i>Rhizomonas suberifaciens</i>
Varnish Spot	<i>Pseudomonas</i> spp.
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
Low	
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.

The most important disease issues based on the feedback received were Downy Mildew, Sclerotinia Rot, Botrytis Rot and Septoria Leaf Spot. Available and potential products for control of these diseases are detailed in Section 4.1.2.

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 Mildew⁵, Botrytis⁶ and Sclerotinia⁶ in lettuce are available on the Croplife website.

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

⁶ <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
Downy Mildew (<i>Bremia lactucae</i>)							
Priority: High							
Downy Mildew was ranked as a high priority in VIC, QLD, NSW, WA, 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 Downy Mildew 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 Downy Mildew , Bacterial Leaf Spot, and Anthracnose. [Max. no. of applications not specified; re-treatment interval 7-10 d]	-
Dimethomorph (Acrobat) BASF	40	Protectant & Curative	14	A	ALL	Registered in head varieties of lettuce for control of Downy Mildew , Anthracnose and Septoria Leaf Spot. [Max. 2 consecutive applications per crop; re-treatment interval 7-10 d]	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Dimethomorph + Mancozeb (Acrobat WDG) BASF	40+M3	Protectant & Curative	14	A	ALL	Registered in head lettuce for control of Downy Mildew , Anthracnose and Septoria Leaf Spot. [Max. 4 applications per crop; 2 consecutive; re-treatment interval 7-10 d]	R2
Mancozeb	M3	Protectant	14	A	ALL	Registered in lettuce (field) for control of Downy Mildew , 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 Downy Mildew , Anthracnose and Septoria Leaf Spot. [Max. 2 consecutive applications per crop; re-treatment interval 7-10 d]	R2
Mandipropamid (Revus) Syngenta	40	Protectant & Curative	1	A	ALL	Registered in lettuce (all types, field and protected) for control of Downy Mildew . [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 Downy Mildew . [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 Downy Mildew . [Max. 3 applications per crop; 2 consecutive; re-treatment interval 7-10 d]	-
Phosphorous Acid PER13698	33	Curative	1	A	ALL (excl. VIC)	Permitted in leafy lettuce and hydroponics (protected) for control of Downy Mildew . [Max. no. 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 Downy Mildew . [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 Downy Mildew . [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
Propineb + Oxadixyl (Rebound) Kiwi Rural Trading	M3+4	Protectant & Curative	3	A	ALL	Registered in lettuce (field) for control of Downy Mildew . [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 Downy Mildew in Brassica leafy vegetables, cucurbits, leafy vegetables, spinach, and suppression of Downy Mildew in bulb onion.	-
Cyazofamid (Ranman) UPL	21	Protectant		P		Registered for control of Late Blight in potatoes and White Blister in broccoli, Downy Mildew in Brassica seedlings and Brassica leafy seedlings. As a result of the APVMA permit to label project, Pythium damping off in spinach & silverbeet and other uses covered under permits are now on the registered label. US registration for control of Downy Mildew in herbs, brassica leafy vegetables, cucurbits, grapes, hops, leafy greens, succulent-podded and succulent-shelled beans and bulb vegetables.	-
Dimethomorph + Amitoctradin (Zampro) AgNova	40+45	Protectant		P		Registered for control of Downy Mildew in grape vines. Pending label extension for control of Downy Mildew in grapes, bulb onion, spring onion, leafy vegetables including head lettuce and brassica leafy vegetables, cucurbits, beetroot and poppies. Canadian registration for control of Downy Mildew in leafy vegetables including lettuce.	-
Hydrogen Peroxide + Peroxyacetic Acid (Peratec Plus)	M	Protectant		P		Registered for control of Downy Mildew in brassica vegetables, bulb vegetables and grapes.	-
Polyoxin-D (Intervene) Nufarm	19	Protectant		P		Pending registration for control of Botrytis and Powdery Mildew in grapes, Botrytis, Powdery Mildew and Rhizopus Fruit Rot in berries, and Powdery Mildew, Alternaria and Fruit Spot in apples. US registration for control of Downy Mildew in ornamentals.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Sclerotinia Rot / Lettuce Drop (<i>Sclerotinia minor</i> , <i>Sclerotinia sclerotiorum</i>)							
Priority: High							
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.							
Azoxystrobin (Amistar)	11	Protectant & Curative	14	A	ALL	Registered in lettuce (field) as a foliar application for suppression of Sclerotinia Rot . [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 Sclerotinia . [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 Sclerotinia Rot . 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, Sclerotinia Rot (Lettuce Drop) and Botrytis Grey Mould. [Max. 2 applications per crop; re-treatment interval 7 d]	R3
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> , Sclerotinia , <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 White Mould . [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 Lettuce Drop . [Max. 2 applications per crop; re-treatment interval 7-14 d]	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Iprodione (Rovral)	2	Protectant & Curative	7	A	ALL	Registered in lettuce (field) for control of Sclerotinia Rot . [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 Sclerotinia Rot . [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> , Sclerotinia 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 Sclerotinia Rot , 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 Sclerotinia Rot . [Max. 2 applications per crop; re-treatment interval 7-10 d]	R3
<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 Sclerotinia in fruiting vegetables.	-
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 Sclerotinia in brassica leafy greens and sunflowers. Hort Innovation project ST17000 is generating data to support a label extension for control of Sclerotinia in leafy vegetables.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
NUL3446	TBC			P		Fungicide in development from Nufarm with activity on <i>Sclerotinia</i> spp.	-
Botrytis Rot (<i>Botrytis cinerea</i>)							
Priority: High							
Botrytis Rot was ranked as a high priority QLD, NSW & SA and as a moderate priority in VIC, WA & 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.							
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 Botrytis Grey Mould . [Max. 2 applications per crop; re-treatment interval 7 d]	R3
Fenhexamid Imtrade	17	Protectant	3	A	ALL	Registered in lettuce (field and protected) for control of Botrytis Grey Mould . [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 Grey Mould 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 Botrytis Grey Mould . [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, Botrytis Grey Mould 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 Botrytis Grey Mould . [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 & Botrytis . [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
<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 Botrytis in artichoke, asparagus, berries, bulb vegetables, fruiting vegetables, grapes, cucurbits, grapes, herbs/spices, legume vegetables, root/tuber and corm vegetables, stone fruit and kiwi.	-
<i>Aureobasidium pullulans</i> (Botector) Nufarm	BM 02	Biological		P		Registered for control of Botrytis in berries, fruiting vegetables and grapes.	-
<i>Bacillus amyloliquefaciens strain MBI 600</i> (Serifel) BASF	BM 02	Biological	NR	P		Registered for control of Botrytis in grapevines and strawberries. US registration for control of Botrytis in artichoke, asparagus, berries, brassica leafy vegetables, bulb vegetables, fruiting vegetables, grapes, leafy vegetables, legume vegetables, pome fruit, stone fruit and tobacco.	-
BLAD (ProBlad Plus)	BM 01	Biological	NR	P		Registered for control of Brown Rot and Blossom Blight in stone fruit. US registration for control of Botrytis in fruiting vegetables, grapes, strawberries and ornamentals.	-
Florylpicoxamid (Adavelt) Corteva	21	Protective & Curative		P		New active in development from Corteva with activity on Septoria, Powdery Mildew, Botrytis , Anthracnose, Alternaria, Scab, Monilinia, Rust and <i>Mycosphaerella</i> spp. Scheduled for JMPR evaluation in 2023.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of Botrytis in almond, artichoke, berries, brassica vegetables, Brassica leafy greens, stone fruit, dill seed, pome fruit, small fruit vine climbing (except fuzzy kiwifruit), herbs, hops, leafy greens, cucurbits, pistachio, fruiting vegetables and root vegetables (except sugar beet).	R3
Polyoxin-D (Intervene) Nufarm	19	Protectant		P		Pending registration for control of Botrytis and Powdery Mildew in grapes, Botrytis, Powdery Mildew and Rhizopus Fruit Rot in berries, and Powdery Mildew, Alternaria and Fruit Spot in apples.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Septoria Spot / Late Blight (<i>Septoria apiicola</i>)							
Priority: High							
Septoria Spot was ranked as a high priority in QLD & WA, as a moderate priority in VIC & 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.							
Dimethomorph (Acrobat) BASF	40	Protectant & Curative	14	A	ALL	Registered in head varieties of lettuce for control of Downy Mildew, Anthracnose and Septoria Leaf Spot . [Max. 2 consecutive applications per crop; re-treatment interval 7-10 d]	-
Dimethomorph + Mancozeb (Acrobat WDG) BASF	40+M3	Protectant & Curative	14	A	ALL	Registered in head lettuce for control of Downy Mildew, Anthracnose and Septoria Leaf Spot . [Max. 4 applications per crop; 2 consecutive; re-treatment interval 7-10 d]	R2
Mancozeb	M3	Protectant	14	A	ALL	Registered in lettuce (field) for control of Downy Mildew, 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 Downy Mildew, Anthracnose and Septoria Leaf Spot . [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 Septoria Leaf Spot . [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 Septoria Spot 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 Septoria spp. 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

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Florylpicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New active in development from Corteva with activity on Septoria , Powdery Mildew, Botrytis, Anthracnose, Alternaria, Scab, Monilinia, Rust and <i>Mycosphaerella</i> spp. Scheduled for JMPR evaluation in 2023.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of Septoria in dry and succulent beans and pistachios.	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 Septoria Spot in leafy vegetables.	-
Anthracnose (<i>Microdochium panattonianum</i>)							
Priority: Moderate							
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 Anthracnose . [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 Anthracnose . [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 Anthracnose , Sclerotinia Rot (Lettuce Drop) and Botrytis Grey Mould. [Max. 2 applications per crop; re-treatment interval 7 d]	R3
Dimethomorph (Acrobat) BASF	40	Protectant & Curative	14	A	ALL	Registered in head varieties of lettuce for control of Downy Mildew, Anthracnose and Septoria Leaf Spot. [Max. 2 consecutive applications per crop; re-treatment interval 7-10 d]	-
Dimethomorph + Mancozeb (Acrobat WDG) BASF	40+M3	Protectant & Curative	14	A	ALL	Registered in head lettuce for control of Downy Mildew, Anthracnose and Septoria Leaf Spot. [Max. 4 applications per crop; 2 consecutive; re-treatment interval 7-10 d]	R2

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Mancozeb	M3	Protectant	14	A	ALL	Registered in lettuce (field) for control of Downy Mildew, 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 Downy Mildew, Anthracnose and Septoria Leaf Spot. [Max. 2 consecutive applications per crop; re-treatment interval 7-10 d]	R2
Prochloraz (Octave)	3	Protectant & Curative	7 NG	A	ALL	Registered in field grown lettuce and nursery stock prior to transplant (closed head varieties only) for control of Anthracnose prior to transplantation. [Max. no. of applications not specified; re-treatment interval 7-14 d]	-
Thiram	M3	Protectant	7	A	QLD, WA, SA, VIC, TAS & NT	Registered in lettuce (field) for control of Anthracnose & 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 Anthracnose in avocado and mango.	-
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 Anthracnose in berries and tuberous and corm vegetables, suppression of Anthracnose 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 Anthracnose in tropical and sub-tropical fruit.	-
<i>Aureobasidium pullulans</i> (Botector) Nufarm	BM 02	Biological	NR	P		Registered for control of Anthracnose in berries.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
<i>Bacillus amyloliquefaciens</i> strain MBI 600 (Serifel) BASF	BM 02	Biological	NR	P		Registered for control of Botrytis in grapevines and strawberries. US registration for control of Anthracnose 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 Anthracnose in sweet corn.	R3
Florypicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New active in development from Corteva with activity on Septoria, Powdery Mildew, Botrytis, Anthracnose , Alternaria, Scab, Monilinia, Rust and <i>Mycosphaerella</i> spp. Scheduled for JMPR evaluation in 2023.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of Anthracnose 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 Anthracnose 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 Anthracnose in almonds, grapes and low-growing berries.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Bacterial Spot (<i>Xanthomonas campestris pv. vesicatoria</i>) Priority: Moderate							
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 Bacterial Blight (<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, Bacterial Leaf Spot & 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.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Dry Leaf Spot (<i>Xanthomonas campestris</i> pv. <i>vitians</i>)							
Priority: Moderate							
Dry Leaf Spot was ranked as a high priority in QLD, as a moderate priority in VIC, 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.	-
Pythium (<i>Pythium</i> spp.)							
Priority: Moderate							
Pythium was ranked as a high priority in SA and as a moderate priority in VIC, QLD, NSW, WA & 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 Pythium . For use by professional and registered fumigators only.	-

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> , <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]	-
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.	-
<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 <i>Pythium</i> spp. 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.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
NUL3163 Nufarm	TBC			P		New active in development from Nufarm with activity on <i>Fusarium</i> , <i>Pythium</i> & <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 <i>Pythium</i> , <i>Fusarium</i> and <i>Rhizoctonia</i> . Apply prior to onset of disease season.	-
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> .	-
Corky Root (<i>Rhizomonas suberifaciens</i>) Priority: Moderate							
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> . <i>For use by professional and registered fumigators only.</i>	-
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.	-
Varnish Spot (<i>Pseudomonas</i> spp.) Priority: Moderate 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.)	-
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.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Lettuce Necrotic Yellow Virus (LNYV) Priority: Moderate Lettuce Necrotic Yellows was ranked as a moderate priority in VIC, QLD & 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.							
Tomato Spotted Wilt Virus (TSWV) Priority: Moderate Tomato Spotted Wilt Virus was ranked as a moderate priority in VIC, QLD & 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.							
Lettuce Big-Vein Virus (LBV) Mirafiori Lettuce Virus (MiLV) Priority: Moderate Lettuce Big-Vein was ranked as a moderate priority in VIC & QLD. It is favoured by cool, wet soil conditions and is transmitted from plant to plant by the soilborne fungus <i>Oplidium brassicae</i> . Control measures are limited to reducing waterlogging if possible and crop rotation to break the disease cycle in lettuce fields.							
Lettuce Mosaic Virus (LMV) Priority: Moderate Lettuce Mosaic Virus was ranked as a moderate priority in VIC & 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.							
Cucumber Mosaic Virus (CMV) Turnip Mosaic Virus (TuMV) Priority: Unknown 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.							

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Damping Off (<i>Pythium</i> spp., <i>Phytophthora</i> spp., <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp.) Priority: Low 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 <i>Fusarium</i> , <i>Verticillium</i> Wilts, <i>Rhizoctonia</i> and <i>Pythium</i> . <i>For use by professional and registered fumigators only.</i>	-
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.	-
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]	-
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.	-
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>).	-

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.	-
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 Phytophthora 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 Pythium Damping Off 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
Fosetyl-Aluminium (Aliette)	33	Curative		P		Registered for control of <i>Phytophthora</i> spp. in apples, peaches, avocados & pineapples.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
NUL3163 Nufarm	TBC			P		New active in development from Nufarm with activity on <i>Fusarium, Pythium & Rhizoctonia</i> .	-
<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, Fusarium and Rhizoctonia .	-
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, Phytophthora, Rhizoctonia</i> and <i>Thielaviopsis</i> .	-
Powdery Mildew (<i>Erysiphe cichoracearum</i>)							
Priority: Low							
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 Powdery Mildew . [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 Powdery Mildew [Max. no. of applications not specified; re-treatment interval: 10-14 d]	-
<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 Powdery Mildew in eggplant. US registration for control of Powdery Mildew 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 Powdery Mildew in brassica vegetables cucurbits, fruiting vegetables, grapes, specific leaf petioles, leafy greens, root and tuber vegetables, mustard greens, potato, root vegetables. strawberry and tuberous and corm vegetables.	R3

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. Registered for control of Powdery Mildew in apples.	-
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 Powdery Mildew in cucurbits.	-
ADM1700F Adama	TBC			P		Fungicide in development from Adama with Powdery Mildew activity	-
BLAD (ProBlad Plus)	BM 01	Biological	NR	P		Registered for control of Brown Rot and Blossom Blight in stone fruit. US registration for control of Powdery Mildew in cucurbits, fruiting vegetables, grapes, hops, pome fruit and strawberries.	-
Boscalid + Kresoxim-Methyl (Colliss) BASF	7+11	Protectant & Curative		P		Registered for control of Powdery Mildew in cucurbits.	-
Bupirimate (Nimrod) Adama	8	Protectant & Curative		P		Registered for control of Powdery Mildew in apples, cucurbits, cut flower, eggplant, melons, nursery stock, ornamentals, peppers and strawberries.	-
Cyflufenamid (Flute) AgNova	U6	Protectant & Curative		P		Registered for control of Powdery Mildew in cucurbits, grapevines and strawberries.	-
Florylpicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New active in development from Corteva with activity on Septoria, Powdery Mildew , Botrytis, Anthracnose, Alternaria, Scab, Monilinia, Rust and <i>Mycosphaerella</i> spp. Scheduled for JMPR evaluation in 2023.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of Powdery Mildew in almonds, brassica leafy greens, cucurbits, grapes, hops, dry and succulent beans, stone fruit and sunflowers.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Hydrogen Peroxide + Peroxyacetic Acid (Peratec Plus)	M	Protectant		P		Registered for control of Powdery Mildew 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 Powdery Mildew in grapes, low-growing berries and pome fruit.	-
Mefentrifluconazole (Belanty) BASF	3	Systemic		P		Registered for control of Powdery Mildew in grapes.	-
Metrafenone (Vivando) BASF	U8	Protectant		P		Registered for control of Powdery Mildew in cucurbits and grapes.	-
Polyoxin-D (Intervene) Nufarm	19	Protectant		P		Pending registration for control of Botrytis and Powdery Mildew in grapes, Botrytis, Powdery Mildew and Rhizopus Fruit Rot in berries, and Powdery Mildew , Alternaria and Fruit Spot in apples.	-
Proquinazid (Talendo) Corteva	13	Protectant		P		Registered for control of Powdery Mildew in fruiting vegetables, cucurbits, grapes and pome fruit.	-
Pyriofenone (Kusabi) AgNova	50	Protectant & Curative		P		Registered for control of Powdery Mildew in cucurbits and grapes.	-
<i>Streptomyces lydicus</i> (Actinovate)	BM 02	Biological	NR	P		Registered for control of Powdery Mildew in strawberries, carrots, cucurbits, fruiting vegetables and verbena.	-
Tea Tree Oil (Timorex)	46	Protectant				Registered for control of Powdery Mildew in fruiting vegetables, cucurbits and grapes.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Rhizoctonia Base Rot (<i>Rhizoctonia</i> spp.)							
Priority: Low							
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, <i>Rhizoctonia</i> and <i>Pythium</i> . <i>For use by professional and registered fumigators only.</i>	-
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 Bottom Rot (<i>Rhizoctonia solani</i>) . [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> , <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.	-
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 Bottom Rot (<i>Rhizoctonia solani</i>) . [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 Rhizoctonia 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 Rhizoctonia spp. in artichoke, asparagus, brassica leafy vegetables, bulb vegetables, cucurbits, corn, fruiting vegetables, leafy vegetables, legume vegetables, oilseeds, soybean, strawberries and root and tuber vegetables.	-
Fludioxonil + Metalaxyl-M (Maxim XL) Syngenta	12+4	Protectant & Curative		P		Registered for the control of Rhizoctonia Rot in Canola seedlings and for control of Damping Off in canola, industrial hemp, maize, oilseed mustard, silverbeet, sorghum, spinach and sweet corn.	R3
Fludioxonil + Sedaxane (Vibrance Premium Seed Treatment) Syngenta	12+7	Protectant & Curative		P		Registered in potatoes for control of Black Scurf (Rhizoctonia), Silver Surf, Black Rot, Gangrene and Fusarium Dry Rot and suppression of Scab. Hort innovation is conducting research for use in beetroot to control Rhizoctonia .	R3
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant		P		Registered for control of Yellow Sigatoka, Leaf Speckle and Cordana Leaf Spot in bananas. US registration for control of Rhizoctonia in cucurbits and for suppression of Rhizoctonia in Brassica leafy vegetables.	R3
NUL3163 Nufarm	TBC			P		New active in development from Nufarm with activity on <i>Fusarium</i> , <i>Pythium</i> & Rhizoctonia .	-

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 Rhizoctonia spp. 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 Rhizoctonia .	-
Thiophanate-Methyl + Etridiazole (Banrot)	1+14	Protectant		P		Registered in container grown ornamentals and in ground bedding plants as a post plant soil drench for control of <i>Pythium</i> , <i>Phytophthora</i> , Rhizoctonia and <i>Thielaviopsis</i> .	-
Bacterial Soft Rot (<i>Erwinia</i> spp.)							
Priority: Low							
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 Erwinia spp. 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 Erwinia spp. in pome fruit and root and tuber vegetables (except sugar beet).	-

4.2 Insects, mites and other pests of Head Lettuce

4.2.1 Insect, mite and other pest priorities

Common name	Scientific name
High	
Green Peach Aphid	<i>Myzus persicae</i>
Currant Lettuce Aphid	<i>Nasonovia ribis-nigri</i>
Rutherglen Bug	<i>Nysius vinitor</i>
Cotton Bollworm / Corn Earworm	<i>Helicoverpa armigera</i>
Native Budworm	<i>Helicoverpa punctigera</i>
Western Flower Thrips	<i>Frankliniella occidentalis</i>
Plague Thrips	<i>Thrips imaginis</i>
Moderate	
Silverleaf Whitefly	<i>Bemisia tabaci</i> Biotype B & Q
Soldier Beetle	<i>Chauliognathus pulchellus</i>
Low	
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	<i>Tenebrionidae</i> spp. / <i>Elateridea</i> spp.
Earwigs	Dermaptera
Slugs And Snails	Gastropoda

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

New Pest to Australia (unknown priority)	
Fall Armyworm	<i>Spodoptera frugiperda</i>
Vegetable Leafminer	<i>Liriomyza sativae</i>
Pea leaf miner/Serpentine Leaf miner	<i>Liriomyza huidobrensis</i>
American Serpentine Leaf miner	<i>Liriomyza trifolii</i>

The highest priority insect pests identified by the survey are Currant Lettuce Aphid, Green Peach Aphid, Helicoverpa, Rutherglen Bug, Western Flower Thrips and Plague Thrips. Available and potential products for control of these insects and mites are detailed in Section 4.2.2.

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 Website⁷. 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.

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

4.2.2 Available and potential products for priority insects and mites

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

Availability		Regulatory risk (refer to Appendix 6)	
A	Available via either registration or permit approval	R1	Short-term: Critical concern over retaining access
P	Potential - a possible candidate to pursue for registration or permit	R2	Medium-term: Maintaining access of significant concern
P-A	Potential, already approved in the crop for another use	R3	Long-term: Potential issues associated with use - Monitoring required
Withholding Period (WHP) – Number of days from last treatment to harvest (H) or Grazing (G)			
Harvest	H	Not Required when used as directed	NR
Grazing	G	No Grazing Permitted	NG
IPM – indicative overall impact on beneficials (based on the Cotton Pest Management Guide 2018-19 and cotton use patterns)			
VL – Very low; L – Low; M – Moderate; H – High; VH – Very High; - not specified			

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Green Peach Aphid (<i>Myzus persicae</i>)								
Priority: High								
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 Green Peach Aphid , 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, Green Peach Aphid & Two-Spotted Spider Mites. [Max. 3 application per crop; re-treatment interval 3-14 d]	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
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, 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, Aphids , Caterpillars, Earwigs, Whitefly, Thrips and Leafhoppers. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-
Maldison	1B	Contact	3	A	ALL (excl. QLD)	Registered in vegetables including lettuce (field) for control of Aphids , 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, 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	-
Pirimicarb (Aphidex) Adama	1A	Contact & Ingestion	2	A	ALL	Registered in lettuce (field) for control of Aphids . 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 Aphids , Thrips, Mealybug, Two Spotted Mites, Spider Mite and Whitefly. Apply when temperatures are cooler. [Max no. of applications not specified; re-treatment interval 5-7 d]	L Bee:L	-
Pymetrozine (Chess) Syngenta	9B	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 Silverleaf Whitefly. [Max. 2 applications per crop; re-treatment interval: 7 d]	L Bee:VL	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
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 & 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, Green Peach Aphid 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 Green Peach Aphid , Brown Sowthistle Aphid, Greenhouse Whitefly and suppression of Rutherglen Bug. [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	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	-
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 early 2023.	-	-
Fonicamid (Mainman) UPL	9C	Ingestion		P		Registered for control of Green Peach Aphid in canola, cucurbits and potato.	M Bee:L	-

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. Pending label extension for control of Silverleaf Whitefly, Green Peach Aphid and Cotton Aphid in green beans, sweet potatoes and potatoes. 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	-
Currant Lettuce Aphid (<i>Nasonovia ribis-nigri</i>)								
Priority: High								
Currant Lettuce Aphid was ranked as a high priority in VIC & WA, and as a moderate priority in QLD, NSW, 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 Green Peach Aphid , Cabbage Aphid, Currant Lettuce Aphid, Cotton Aphid & suppression of Silverleaf Whitefly. [Max. 4 applications per crop; re-treatment interval 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, 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, Aphids , Caterpillars, Earwigs, Whitefly, Thrips and Leafhoppers. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Imidacloprid	4A	Contact	28	A	ALL	Registered in lettuce as a seedling treatment for control of Current Lettuce Aphid . [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 Aphids , 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, 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	-
Pirimicarb (Aphidex) Adama	1A	Contact & Ingestion	2	A	ALL	Registered in lettuce (field) for control of Aphids . 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 Aphids , Thrips, Mealybug, Two Spotted Mites, Spider Mite and Whitefly. Apply when temperatures are cooler. [Max no. of applications not specified; re-treatment interval 5-7 d]	L Bee:L	-
Pymetrozine (Chess) Syngenta	9B	Contact	3	A	ALL	Registered in lettuce (field and protected) for control of Brown Sow Thistle Aphid, Green Peach Aphid, Current 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 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. [Max no. of applications not specified; 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
Spirotetramat (Movento) Bayer	23	Ingestion	1	A	ALL	Registered in lettuce (protected and field) for control of Brown Sowthistle Aphid, Current Lettuce Aphid , 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, Greenhouse Whitefly and suppression of Rutherglen Bug.	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, 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 Aphids and Silverleaf Whitefly in cucurbits; Aphids in potatoes; Aphids and Mealybugs in apples and pears; Aphids and Mirids in cotton. US registration for control of Aphids , including Red Lettuce Aphid (<i>Nasonovia ribis-nigri</i>) in leafy greens.	M Bee:L	-

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. Pending label extension for control of Silverleaf Whitefly, Green Peach Aphid and Cotton Aphid in green beans, sweet potatoes and potatoes. US registration for control of Aphids 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
Rutherglen Bug (<i>Nysius vinitor</i>)								
Priority: High								
Rutherglen Bug was ranked as a high priority in VIC, QLD, NSW, WA & SA and as a moderate priority in 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 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, Leafhoppers, Mites, Rutherglen Bug and Thrips. [Max. no. of applications and re-treatment interval not specified]	VL Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
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 & 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, Greenhouse Whitefly and suppression of Rutherglen Bug . [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 Rutherglen Bug . [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. Pending label extension for control of Silverleaf Whitefly, Green Peach Aphid and Cotton Aphid in green beans, sweet potatoes and potatoes. US registration for control of Leafhoppers, Aphids and Whiteflies in leafy vegetables.	L Bee:VL	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for Thrips, Bugs and Caterpillars.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Cotton Bollworm / Corn Earworm (<i>Helicoverpa armigera</i>) Native Budworm (<i>Helicoverpa punctigera</i>) Priority: High <i>Helicoverpa</i> was ranked as a high priority in VIC, QLD & NSW, and as a moderate priority in WA, SA & 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.								
Alpha-Cypermethrin	3A	Contact	3	A	ALL	Registered in lettuce (field) for control of <i>Helicoverpa</i> spp. 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	-
<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, 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 Cotton Bollworm and Native Budworm. [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 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 [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

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Emamectin (Proclaim Opti) Syngenta	6	Ingestion	3	A	ALL	Registered in lettuce (field and protected) for control of Helicoverpa . [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 Helicoverpa spp. [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 Cotton Bollworm and Native Budworm . [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 Cotton Bollworm and Native Budworm . [Max. 3 applications per crop; re-treatment interval: 7 d]	L Bee:H	R3
Indoxacarb + Novaluron (Plemax) Adama	22A+1 5	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 Helicoverpa spp. , 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 & 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, Western Flower Thrips and Helicoverpa spp. [Max no. of applications not specified; 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	5	Ingestion	3 G:14	A	ALL	Registered in leafy vegetables (field and protected) for control of Loopers, <i>Helicoverpa</i> & 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 <i>Helicoverpa spp.</i> , 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	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2023 for control of Thrips, Bugs, Mites and Caterpillars .	-	-
<p>Western Flower Thrips (<i>Frankliniella occidentalis</i>) Plague Thrips (<i>Thrips imaginis</i>) Priority: High</p> <p>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.</p>								
Abamectin	6	Contact & Ingestion	21	A	ALL	Registered in lettuce (field) for control of Two-Spotted Mite and Western Flower Thrips . [Max. 2 applications per crop; re-treatment interval: 28 d]	M Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
<i>Beauveria bassiana</i> (Velifer) BASF	UNF	Biological	NR	A	ALL	Registered in protected vegetables and ornamentals for suppression of various pests including Western Flower Thrips , Onion Thrips, Greenhouse Whitefly, Silverleaf Whitefly, Sweet Potato Whitefly, Green Peach Aphid & Two-Spotted Spider Mites. [Max. 3 application per crop; re-treatment interval 3-14 d]	L Bee:L	-
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, 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
Fipronil (Regent) PER83203	2B	Contact	10	A	ALL (excl. VIC)	Permitted for use in lettuce (field) for control of Onion Thrips & Western Flower Thrips . [Max. 3 applications per crop; re-treatment interval 14 d]	M Bee:VH	R3
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, Caterpillars, Earwigs, Whitefly, Thrips and Leafhoppers. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-
Methomyl (Lannate)	1A	Contact	7	A	ALL	Registered in lettuce (field) for control of <i>Helicoverpa</i> spp., Cluster Caterpillar and Western Flower Thrips . [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 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 for control of Aphids, Thrips , Mealybug, Two Spotted Mites, Spider Mite and Whitefly. Apply when temperatures are cooler. [Max no. of applications not specified; re-treatment interval 5-7 d]	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
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 & 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, 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 Loopers, <i>Helicoverpa</i> & Western Flower Thrips . [Max. 4 applications per season; re-treatment interval 7-14 d].	L Bee:L	-
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 Western Flower Thrips . [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 Thrips . Pending regulatory approvals, first market introduction in Australia is expected by late 2022 or early 2023.	-	-
Flupyradifurone (Sivanto 200 SL) Bayer	4D	Contact & Ingestion		P		Registered in macadamia for control of Macadamia Lace Bug, Banana Spotting Bug, Fruit Spotting Bug and suppression of Scirtothrips. Pending label extension for control of Silverleaf Whitefly, Green Peach Aphid and Cotton Aphid in green beans, sweet potatoes and potatoes. US registration for suppression of Thrips in berries, citrus, fruiting vegetables, tropical and subtropical fruit.	L Bee:VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2023 for Thrips , Bugs, Mites and Caterpillars. Hort Innovation project ST20003 is generating data to support a label registration for control of Thrips in brassica leafy vegetables.	-	-
Silverleaf Whitefly (<i>Bemisia tabaci</i>)								
Priority: Moderate								
Silverleaf Whitefly was ranked as a low priority in VIC, WA & SA, and as a moderate priority in QLD, NSW & TAS. 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 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, 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 , 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 Silverleaf Whitefly (biotype B). [Max. 2 application per crop; re-treatment interval 2 d]	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, Caterpillars, Earwigs, Whitefly , Thrips and Leafhoppers. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-
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 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 Whitefly . 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 Silverleaf Whitefly . [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 Silverleaf Whitefly . [Max. 2 applications per crop; re-treatment interval: 7 d]	L Bee:VL	R3
<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 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
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	29	Ingestion		P		Registered for control of Aphids and Silverleaf Whitefly 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. Pending label extension for control of Silverleaf Whitefly , Green Peach Aphid and Cotton Aphid in green beans, sweet potatoes and potatoes. US registration for control of Whitefly 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 Whitefly .	-	-
Pyriproxyfen (Admiral Advance) Sumitomo	7C	IGR		P		Registered for control of Silverleaf Whitefly in cotton, cucurbits, leafy lettuce, sweet potatoes, fruiting vegetables and nursery stock.	VL Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Soldier Beetle (<i>Chauliognathus pulchellus</i>)								
Priority: Moderate								
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 have strong nocturnal activity. Adults chew plants at or just beneath ground level and may chew right through the plant.								
Dazomet (Basamid)	8F	Soil fumigant	NR	A	ALL	Registered as a pre-planting soil fumigation for control of soil borne pests , 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	-
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 other soil pests, and a foliar treatment for the control of chewing pests in various crops.	-	-
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 early 2023.	-	-

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, 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	-
Leafminer Flies (<i>Scaptomyza flava</i>)								
Priority: Low								
Leafminer Flies were ranked as a low priority in VIC, QLD, NSW & WA, and as a moderate priority in SA & TAS. 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	-
Spirotetramat (Movento) Bayer PER88640	23	Ingestion	1	P-A	ALL (excl. VIC)	Permitted for use in lettuce (field and protected) for control of Liriomyza 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	-

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 (field and protected) for control of Cotton Bollworm and Native Budworm. Permitted for control of Liriomyza 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 Liriomyza Leafminers in snow peas, sugar snap peas and green beans.	M Bee:H	-
Cutworm (<i>Agrotis</i> spp.)								
Priority: Low								
Cutworm was ranked as a low priority in VIC, QLD & TAS and as a moderate priority in NSW, WA & SA. 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.								
Dazomet (Basamid)	8F	Soil fumigant	NR	A	ALL	Registered as a pre-planting soil fumigation for control of soil borne pests , 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 Cutworms . [Max no. of applications not specified]	H Bee:H	R3
Trichlorfon (Lepidex)	1B	Contact	2	A	ALL	Registered in lettuce (field) for control of Cutworm . 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
African Black Beetle (<i>Heteronychus arator</i>)								
Priority: Low								
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 soil borne pests , 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 other soil pests, and a foliar treatment for the control of chewing pests in various crops.	-	-
Dimpropyridaz (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 early 2023.	-	-
Green Vegetable Bug (<i>Nezara viridula</i>)								
Priority: Low								
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, Green Vegetable Bug , Jassids, Leafhopper and Rutherglen Bug. [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, 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, Green Vegetable Bug and Rutherglen Bug. [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. Pending label extension for control of Silverleaf Whitefly, Green Peach Aphid and Cotton Aphid in green beans, sweet potatoes and potatoes. US registration for control of Leafhoppers, Aphids and Whiteflies in leafy vegetables.	L Bee:VL	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for Thrips, Bugs and Caterpillars.	-	-
Jassids (Cicadellidae)								
Priority: Low								
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.								
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, Vegetable Leafhopper , and Lucerne Leafroller. [Max 1 application per crop; seedlings should be transplanted within 48 h of application]	L-H Bee:H	R2

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, 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 Aphids, 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, 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	-
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, Greenhouse Whitefly and suppression of Rutherglen Bug. US registration for control of Leafhoppers in berries, pome fruit and root and tuber vegetables.	M Bee:VH	-
Flupyradifurone (Sivanto 200 SL) Bayer	4D	Systemic, ingestion & contact		P		Registered in macadamia for control of Macadamia lace bug, Banana spotting bug, Fruit spotting bug and suppression of scirtothrips. Pending label extension for control of Silverleaf Whitefly, Green Peach Aphid and Cotton Aphid in green beans, sweet potatoes and potatoes. US registration for control of Leafhoppers in brassica vegetables.	L Bee:VL	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for Thrips, Bugs and Caterpillars.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Looper Caterpillars (<i>Chrysodeixis</i> spp.)								
Priority: Low								
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, 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 + 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, 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
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, Caterpillars , Earwigs, Whitefly, Thrips and Leafhoppers. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-
Spinetoram (Success Neo) Corteva	5	Ingestion	3	A	ALL	Registered in leafy vegetables (field) for control of Loopers , Western Flower Thrips and <i>Helicoverpa</i> spp. [Max no. of applications not specified; 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	5	Ingestion	3 G:14	A	ALL	Registered in leafy vegetables (field and protected) for control of Loopers , <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	-
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 Loopers in pome fruit.	VL Bee:VL	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2023 for Thrips, Bugs, Mites and Caterpillars .	-	-
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 Caterpillars and Cutworms. [Max no. of applications not specified]	H Bee:H	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, Caterpillars , Earwigs, Whitefly, Thrips and Leafhoppers. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee:H	-
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.	-	-
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2023 for Thrips, Bugs and Caterpillars .	-	-
Redlegged Earth Mite (<i>Halotydeus destructor</i>)								
Priority: Low								
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 Redlegged Earth Mite 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, Redlegged Earth Mite 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, Redlegged Earth Mite (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	-
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 other soil pests, and a foliar treatment for the control of chewing pests in various crops.	-	-
<p>Two-Spotted Mite (<i>Tetranychus urticae</i>) Priority: Low</p> <p>Two-Spotted Mite was ranked as a low priority in VIC, QLD, NSW, WA, SA & 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 Two-Spotted Mite 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 & Two-Spotted Spider Mites . [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 Two-Spotted Mite . [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, 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 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 Mites . [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 Mites . [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 Two-Spotted Mite 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 Two-Spotted Mites in pome fruit, stone fruit, almonds and grapes.	L Bee:VL	
Spiromesifen (Oberon) Bayer	23	Ingestion		P		Australian Registration pending for control of Mites in various vegetables crops. Hort Innovation is undertaking data generation projects across multiple commodities for a new label registration in Australia.	M Bee:VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2022/23 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-
Wireworms and False Wireworms (<i>Tenebrionidae</i> spp. / <i>Elateridea</i> spp.)								
Priority: Low								
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 Wireworms . Leave soil undisturbed at least 7 d after treatment. Aeration before planting should be for a minimum of 21 days. For use by professional and registered fumigators only.	-	-
Dazomet (Basamid)	8F	Soil fumigant	NR	A	ALL	Registered as a pre-planting soil fumigation for control of soil borne pests , 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.	-	-
Earwigs (Dermaptera)								
Priority: Low								
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, 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	-
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 Earwigs in grapes.	L Bee:H	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Broflanilide (Vedira) BASF	30	Contact & Ingestion		P		Pending registration as an ant bait. It also has potential uses as a seed treatment for the control of Wireworms and other soil pests, and a foliar treatment for the control of chewing pests in various crops.	-	-
Slugs and Snails (Gastropoda)								
Priority: Low								
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 Snails and Slugs . 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 Snails and Slugs . 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 Snails, Slugs, White Italian Snail and White Snail . [Max no. of applications and re-treatment not specified]	-	R2
Fall Armyworm (<i>Spodoptera frugiperda</i>)								
Priority: Unknown								
Fall Armyworm was not ranked as a pest in head 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 Fall Armyworm . [Max. 3 applications per crop; 2 consecutive; re-treatment interval 7 d]	L Bee:VL	-
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta PER89280	28+4A	Contact & Ingestion	28	A	ALL (excl. VIC)	Permitted for use in leafy vegetables including lettuce as a seedling treatment for control of Fall Armyworm . [Max. 1 application per crop]	L-H Bee:H	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Emamectin (Proclaim Opti) Syngenta PER89263	6	Ingestion	3 NG	A	ALL (excl. VIC)	Permitted for use in lettuce (field and protected) for control of Fall Armyworm . [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 Fall Armyworm . [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 Fall Armyworm . [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 Fall Armyworm . [Max. 4 applications per crop; re-treatment interval 7-14 d]	M Bee:H	-
Spinosad (Entrust Organic) Corteva PER89870	5	Ingestion	3 G:14	A	ALL (excl. VIC)	Permitted for use in leafy vegetables (field and protected) for control of Fall Armyworm . [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 Fall Armyworm . [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 Fall Armyworm in sweet corn.	L Bee:L	-
Magnet Insect Attractant Technology PER89398	-	Attractant		P		Permitted for control of Fall Armyworm in cotton, cereal grains, sweet corn, pastures & oilseeds.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
SYNFOI21 Syngenta	TBC			P		SYNFOI21 is not registered but the first global application is proposed for 2023 for Thrips, Bugs, Mites and Caterpillars .	-	-
Leafminers (<i>Liriomyza</i> spp.) Priority: Unknown Leafminer was not ranked as a pest in head 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 Vegetable Leafminer (<i>Liriomyza sativa</i>) , Pea Leafminer / Serpentine Leafminer (<i>Liriomyza huidobrensis</i>) & American Serpentine Leafminer (<i>Liriomyza trifolii</i>) . [Max 1 application per crop; seedlings should be transplanted within 48 h of application]	L-H Bee:H	R2
Cyromazine (Diptex 150 WP) PER81867	17	Insect Growth Regulator	H:7 NG	A	ALL	Permitted in head lettuce for control of Leafminers including Vegetable Leafminer and Serpentine Leafminer . [Max. 6 applications per crop; min. re-treatment interval 7 d]	-	-
Spinetoram (Success Neo) Corteva PER91155	5	Ingestion	3	A	ALL (excl. VIC)	Permitted in leafy vegetables including lettuce for control of <i>Liriomyza</i> Leafminers . [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 Vegetable Leafminer (<i>Liriomyza sativa</i>) , Pea Leafminer / Serpentine Leafminer (<i>Liriomyza huidobrensis</i>) & American Serpentine Leafminer (<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 Liriomyza Leafminers (<i>Liriomyza</i> spp.) [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 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 Liriomyza 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 Liriomyza species, including Vegetable Leafminer in Brassica vegetables.	M Bee:H	-
Cyantraniliprole (Benevia) FMC	28	Ingestion		P		Permitted for use in bulb vegetables, fruiting vegetables (all) and potatoes for control of Liriomyza species, including Vegetable Leafminer (<i>Liriomyza sativae</i>) , Pea Leafminer/Serpentine Leafminer (<i>Liriomyza huidobrensis</i>) and American Serpentine Leafminer (<i>Liriomyza trifolii</i>) .	L Bee:L	-
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	-

4.3 Weeds in Head Lettuce

4.3.1 Weed priorities

Common Name	Scientific Name
High	
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>
Moderate	
Winter Grass	<i>Poa annua</i>
Cleavers	<i>Galium aparine</i>
Stinging Nettle	<i>Urtica</i> spp.
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>Cyclosporum leptophyllum</i>

The high priority weed issues based on the feedback received were Fumitory, Groundsel, Marshmallow, Potato Weed, Shepherd's Purse and Wild Turnip. 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 webpage⁸.

⁸ <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		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			

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Groundsel (<i>Senecio</i> spp.)							
Priority: High							
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 Groundsel .	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 Groundsel . 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 Groundsel , 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 Groundsel in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
Wild Turnip (<i>Brassica</i> spp.)							
Priority: High							
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 Wild Turnip .	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 Wild Turnip .	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 Wild Turnip . [Max no of applications not specified]	NR	A	ALL (excl. TAS)	-
Norflurazon (Zoliar) AgNova	F**		Registered for control of grass and broadleaf weeds including Wild Turnip 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
Fumitory (<i>Fumaria</i> spp.)							
Priority: High							
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 Fumitory .	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 Fumitory .	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 Fumitory . [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 Fumitory . 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 Fumitory in sweet corn, beans, peas, pumpkins and kabocha.		P		-
Glufosinate-Ammonium (Basta) BASF	N**		Registered for control of grass and broadleaf weeds including Fumitory 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
Marshmallow (<i>Malva parviflora</i>)							
Priority: High							
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 Marshmallow . 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 Marshmallow . 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 Marshmallow , 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 Small Flowered Mallow in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
Potato Weed (<i>Galinsoga</i> spp.)							
Priority: High							
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 Potato Weed .	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 Potato Weed .	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 Potato Weed . [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 Potato Weed . 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 Potato Weed , 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 Potato Weed in berries, tomatoes, beans and fallow.		P		R3
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including Potato Weed 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 Potato Weed 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 Potato Weed in Brassica vegetables		P		R3

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Shepherd's Purse (<i>Capsella bursa-pastoris</i>)							
Priority: High							
Shepherd's Purse was ranked as a high priority in QLD and 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 Shepherd's Purse .	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 Shepherd's Purse . [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 Shepherd's Purse . 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 Shepherd's Purse . 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 Shepherd's Purse , 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 Shepherd's Purse in sweet corn, beans, peas, pumpkins and kabocha.		P		-
Norflurazon (Zoliar) AgNova	F**		Registered for control of grass and broadleaf weeds including Shepherd's Purse 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 Shepherd's Purse 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 Shepherd's Purse 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 Shepherd's Purse in Brassica vegetables		P		R3
Winter Grass (<i>Poa annua</i>)							
Priority: High							
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 Winter Grass . 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 Winter Grass . 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 Winter Grass .	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 Winter Grass . [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 Winter Grass . 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 Winter Grass . 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 Winter Grass , 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 Winter Grass 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 Winter Grass in asparagus, citrus, grapes, nuts, stone & pome fruits.		P		-
Propachlor (Ramrod) Nufarm	K**		Registered for control of broadleaf and grass weeds including Winter Grass in Brassica vegetables		P		R3
Cleavers (<i>Galium aparine</i>)							
Priority: High							
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		-
Stinging Nettle (<i>Urtica</i> spp.)							
Priority: High							
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 Stinging Nettle . 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 Stinging Nettle .	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 Nettles . [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 Nettles . 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 Nettles . 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 Stinging Nettle 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 Stinging Nettle 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 Stinging Nettle in Brassica vegetables		P		R3
Fleabane (<i>Conyza</i> spp.)							
Priority: Moderate							
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 Fleabane .	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 Fleabane in Brassica vegetables		P		R3

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Milk Thistle / Common Sowthistle (<i>Sonchus</i> spp.)							
Priority: Moderate							
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 Sowthistle . 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 Common Sowthistle .	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 Sowthistle .	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 Common Sowthistle . [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 Common Sowthistle . 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 Sowthistle , 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 Sowthistle 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 Sowthistle in berries, tomatoes, beans and fallow.		P		R3
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including Common Sowthistle 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 Sowthistle 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 Sowthistle 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 Milk Thistle in Brassica vegetables		P		R3
Blackberry Nightshade (<i>Solanum nigrum</i>)							
Priority: Moderate							
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 Blackberry Nightshade . 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 Blackberry Nightshade .	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 Blackberry Nightshade . [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 Blackberry Nightshade . 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 Blackberry Nightshade . 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. Blackberry Nightshade is listed as moderately susceptible at a high rate.		P		-
Chloridazon (Pyramin) BASF	C**		Registered for control of grass and broadleaf weeds, including Blackberry Nightshade , 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 Blackberry Nightshade in sweet corn, beans, peas, pumpkins and kabocho.		P		-
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including Blackberry Nightshade in Brassica vegetables, culinary herbs, rhubarb, spinach, silverbeet, spring onions, beans, sweet corn, sweet potato and fallow.		P		-
Norflurazon (Zoliar) AgNova	F**		Registered for control of grass and broadleaf weeds including Blackberry Nightshade in asparagus, citrus, grapes, nuts, stone & pome fruits.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
NUL3438 Nufarm	TBC		New active in development, Nufarm claims activity on broadleaf weeds.		P		-
Oxyfluorfen (Goal)	G**		Registered for control of grass and broadleaf weeds, including Blackberry Nightshade in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
Chickweed (<i>Stellaria media</i>)							
Priority: Moderate							
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 Chickweed . 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 Chickweed .	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 Chickweed . [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 Chickweed . 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 Chickweed . 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
Chloridazon (Pyramin) BASF	C**		Registered for control of grass and broadleaf weeds, including Chickweed , 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 Chickweed 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 Chickweed 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 Chickweed 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 Chickweed in Brassica vegetables		P		R3
Fat Hen (<i>Chenopodium album</i>)							
Priority: Moderate							
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 Fat Hen . 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 Fat Hen .	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 Fat Hen . [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 Fat Hen . 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. Fat Hen is listed as susceptible.		P		-
Chloridazon (Pyramin) BASF	C**		Registered for control of grass and broadleaf weeds, including Fat Hen , 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 Fat Hen in sweet corn, beans, peas, pumpkins and kabocha.		P		-
Glufosinate-Ammonium (Basta) BASF	N**		Registered for control of grass and broadleaf weeds including Fat Hen in berries, tomatoes, beans and fallow.		P		R3
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including Fat Hen in Brassica vegetables, culinary herbs, rhubarb, spinach, silverbeet, spring onions, beans, sweet corn, sweet potato and fallow.		P		-
Norflurazon (Zoliar) AgNova	F**		Registered for control of grass and broadleaf weeds including suppression of Fat Hen in asparagus, citrus, grapes, nuts, stone & pome fruits.		P		-
NUL3438 Nufarm	TBC		New active in development, Nufarm claims activity on broadleaf weeds.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Oxyfluorfen (Goal)	G**		Registered for control of grass and broadleaf weeds, including Fat Hen 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 Fat Hen in Brassica vegetables		P		R3
Pigweed (<i>Portulaca oleracea</i>)							
Priority: Moderate							
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 Pigweed . 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 Pigweed .	NR	A	ALL	R3
Paraquat + Diquat (SpraySeed)	L**	Pre-plant knockdown	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds, including Pigweed.	1 G:1	A	ALL	R3
Pendimethalin (Stomp)	D**	Lettuce / Pre-plant pre-emergent	Registered in lettuce (prior to transplanting) for control of grass and broadleaf weeds, including Pigweed . [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 Pigweed . 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 Pigweed , in fodder beet, red beet, silver beet, baby leaf spinach and baby leaf beet.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Dimethenamid-P (Outlook) BASF	K**		Registered for control of grass and broadleaf weeds including Pigweed in sweet corn, beans, peas, pumpkins and kabocha.		P		-
Glufosinate-Ammonium (Basta) BASF	N**		Registered for control of grass and broadleaf weeds including Pigweed in berries, tomatoes, beans and fallow.		P		R3
S-Metolachlor (Dual Gold) Syngenta	K**		Registered for control of grass and broadleaf weeds including suppression of Pigweed in Brassica vegetables, culinary herbs, rhubarb, spinach, silverbeet, spring onions, beans, sweet corn, sweet potato and fallow.		P		-
Norflurazon (Zoliar) AgNova	F**		Registered for control of grass and broadleaf weeds including Pigweed in asparagus, citrus, grapes, nuts, stone & pome fruits.		P		-
NUL3438 Nufarm	TBC		New active in development, Nufarm claims activity on broadleaf weeds.		P		-
Oxyfluorfen (Goal)	G**		Registered for control of grass and broadleaf weeds, including Pigweed in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
Common Thornapple (<i>Datura stramonium</i>)							
Priority: Moderate							
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 Common Thornapple .	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 Thornapple .	1 G:1	A	ALL	R3

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 Common Thornapple . 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 Common Thornapple 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 Thornapple in fallow, Brassica vegetables and fruit and nut trees. Compatible with glyphosate and diquat/paraquat.		P		-
Slender Celery (<i>Ciclospermum leptophyllum</i>)							
Priority: Moderate							
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
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	https://www.agrifutures.com.au/national-rural-issues/agvet-chemicals/
Australian Pesticide and Veterinary Medicines Authority	www.apvma.gov.au
APVMA Chemical review	https://apvma.gov.au/chemicals-and-products/chemical-review/listing
APVMA MRLs	www.legislation.gov.au/Details/F2021C00634
APVMA Permit search	https://productsearch.apvma.gov.au/permits
APVMA Product search	https://productsearch.apvma.gov.au/products
AUSVEG	https://ausveg.com.au
Codex MRL database	http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/
Cotton Pest Management Guide 2018-19	https://www.cottoninfo.com.au/publications/cotton-pest-management-guide
CropLife Australia (resistance management)	https://www.croplife.org.au/resources/programs/resistance-management/
Growcom – Infopest Database	www.infopest.com.au
Hort Innovation	www.horticulture.com.au

5.2 Abbreviations and Definitions:

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

5.3 Acknowledgements:

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

6. Appendices:

Appendix 1. Products available for disease control in head lettuce

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

Appendix 3. Products available for weed control in head lettuce

Appendix 4. Current permits for use in head lettuce

Appendix 5. Head Lettuce Maximum Residue Limits (MRLs)

Appendix 6. Head Lettuce Agrichemical Regulatory Risk Assessment

Appendix 1. Products available for disease control in head 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	3 NG	-
<i>Bacillus amyloliquefaciens</i> (Serenade Opti) Bayer PER87630	BM 02	Lettuce	Bacterial Blight (<i>Xanthomonas</i> spp.)	ALL	NR	-
Boscalid (Filan) BASF	7	Leafy vegetables (field & protected)	Sclerotinia Rot	ALL	7	-
Chlorothalonil (Bravo) PER14964	M5	Lettuce seedlings prior to planting in the field	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 (Acrobat) BASF	40	Lettuce (head varieties only)	Downy mildew, Anthracnose, and Septoria leaf spot	ALL	14	-
Dimethomorph + Mancozeb (Acrobat WDG) BASF	40+M3	Lettuce (head varieties only)	Downy Mildew, Anthracnose and Septoria Leaf Spot	ALL	14	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

Active Ingredient (Trade Name)	Chemical group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Mandestrobin (Intuity) Sumitomo	11	Lettuce (field)	Sclerotinia Rot	ALL	7	-
Mandipropamid (Revus) Syngenta	40	Lettuce (field & protected)	Downy Mildew (<i>Bernia lactucae</i>)	ALL	1	-
Metalaxyl-M (Ridomil Gold) Syngenta PER14318	4	Lettuce / Pre-Plant Treatment	Damping Off (<i>Pythium</i> and <i>Phytophthora</i> spp.)	ALL (excl. VIC)	NR	-
Metham Sodium	-	General pre-plant soil fumigation	Fungal diseases including <i>Rhizoctonia</i> , <i>Pythium</i> , <i>Fusarium</i> , <i>Phytophthora</i> , <i>Verticillium</i> , <i>Sclerotinia</i> and Club Root of crucifers.	ALL	NR	-
Metiram (Polyram)	M3	Lettuce (field & protected)	Downy Mildew	ALL	7	R2
			Septoria Leaf Spot	NSW, VIC, TAS, SA & WA		
Oxathiapiprolin (Zorvec Enicade) Corteva	49	Lettuce (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	-	Lettuce	Powdery Mildew	ALL (excl. VIC)	NR	-
Prochloraz (Octave)	3	Field grown lettuce and nursery stock prior to transplant (closed head varieties only)	Anthracnose (<i>Microdochium panattonianum</i>)	ALL	7	-

Active Ingredient (Trade Name)	Chemical group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Propamocarb Hydrochloride + Fluopicolide (Infinito) Bayer	28+43	Lettuce (field and protected)	Downy Mildew	ALL	7	-
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 only)	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)	Anthracnose & Botrytis	QLD, WA, SA, VIC, TAS & NT	7	R2
Tolclofos-Methyl (Rizolex) PER14431	14	Lettuce (field grown)	Bottom Rot (<i>Rhizoctonia solani</i>)	ALL (excl. VIC)	NR NG	-

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

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Vegetables	Plant parasitic Nematodes, Symphylans, Wireworms, soil borne diseases and suppression of weeds. <i>For use by professional and registered fumigators only.</i>	ALL	NR	-
Abamectin	6	Head lettuce (field grown only)	Two-Spotted Mite, Western Flower Thrips	ALL (excl. VIC)	3	-
Afidopyropen (Versys) BASF	9D	Head & Leafy Lettuce (field)	Green Peach Aphid, Cabbage Aphid, Currant Lettuce Aphid, Cotton/ Melon Aphid & 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 only)	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 cropping)	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	-
Bifenazate (Acramite) UPL PER14210	20D	Lettuce (protected only)	Two-Spotted Mite	QLD, SA & WA	15	-

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Chlorantraniliprole (Coragen) FMC	28	Lettuce (field & protected)	Cotton Bollworm and Native Budworm (<i>Helicoverpa</i> spp.)	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)	28	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)	Redlegged Earth Mite and Blue Oat Mite	NSW	NR	R1
Cyromazine (Diptex) PER81867	17	Head Lettuce (field & protected)	Vegetable Leaf Miner	ALL	7 NG	-
Dazomet (Basamid)	8F	General fumigant	Soil borne pests, diseases & weeds.	ALL	NR	-
Diazinon	1B	Lettuce (field)	Caterpillars, Cutworms	ALL (excl. TAS)	14	R3

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
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 (Greenhouse and hydroponic)	Silverleaf Whitefly (biotype B)	ALL (excl. VIC)	NR	-
Flubendiamide (Belt) Bayer	28	Lettuce (field & protected)	<i>Helicoverpa</i> spp.	ALL	1	-
Fipronil (Regent) PER83203	2B	Lettuce (field grown only)	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 / Seedling Drench (field)	Currant-Lettuce Aphid	ALL	42	R2
Indoxacarb (Avatar eVo) FMC	22A	Lettuce (field grown only, NOT hydroponic)	Cotton Bollworm and Native Budworm (<i>Helicoverpa</i> spp.)	ALL	3 NG	R3

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Indoxacarb (Avatar eVo) FMC PER89278	22A	Leafy Vegetables	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, Jassid, Leaf Hopper, Red Legged Earth Mite (not TAS), Rutherglen Bug, Twenty-Eight Spotted Ladybird (not TAS)	ALL	3	R3
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 (field grown only, NOT hydroponic)	<i>Helicoverpa</i> spp. larvae and ova, Cluster Caterpillar and Western Flower Thrips	ALL	7	R2
Methomyl (Lannate) PER89293	1A	Lettuce	Fall Armyworm (<i>Spodoptera frugiperda</i>)	ALL	14	
Permethrin (Ambush)	3A	Lettuce	Cluster Caterpillar (<i>Spodoptera litura</i>)	ALL	2	-
Petroleum Oil PER12221	UN	Lettuce (field & protected)	Silverleaf Whitefly, Greenhouse Whitefly, Aphids, Green Mirid, Green Vegetable Bug, Grey Cluster Bug, Leafhoppers, Mites, Rutherglen Bug and Thrips	ALL (excl. VIC)	1	-
Pirimicarb (Aphidex)	1A	Lettuce (field)	Aphids	ALL	2	R3

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Potassium Salts of Fatty Acids (Natrasoap)	-	Vegetables (field & protected)	Aphids, Thrips, Mealybug, Two-Spotted Mite, Spider Mite and Whitefly	ALL	Nil	-
Potassium Salts of Fatty Acids (Natrasoap) PER13920	-	Lettuce (protected)	Greenhouse Whitefly and Silverleaf Whitefly	ALL (excl. VIC)	Nil	-
Propargite (Omite)	12C	Vegetables (field & protected)	Mites	ALL	7	R3
Pymetrozine (Chess) Syngenta	9B	Lettuce (field & protected)	Brown Sowthistle Aphid, Green Peach Aphid, Currant Lettuce Aphid, and suppression of Silverleaf Whitefly	ALL	3	R3
Pyrethrins (Pyganic)	3A	Lettuce (field)	Pea 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 and Native Budworm	ALL	1	-
Spinetoram (Success Neo) Corteva	5A	Leafy vegetables (field)	Loopers, <i>Helicoverpa</i> spp. and Western Flower Thrips	ALL	3	-
Spinetoram (Success Neo) Corteva PER89241	5	Leafy Vegetables (field & protected)	Fall Armyworm (<i>Spodoptera frugiperda</i>)	ALL (excl. VIC)	3	-
Spinetoram (Success Neo) Corteva PER91155	5	Lettuce (field & protected)	Liriomyza Leafminers (<i>Liriomyza</i> spp.)	ALL (excl. VIC)	3	-

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Spinosad (Entrust Organic) Corteva	5	Leafy vegetables including lettuce (field & protected)	Loopers, <i>Helicoverpa</i> & 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)	<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)	1 G:14	-
Spirotetramat (Movento) Bayer	23	Lettuce (field & protected)	Brown Sowthistle Aphid, Currant Lettuce Aphid, Green Peach Aphid and Western Flower Thrips.	ALL	1	-
Spirotetramat (Movento) Bayer PER88640	23	Lettuce (protected & field)	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	-
Sulfoxaflor (Transform) Corteva	4C	Lettuce (field & protected)	Green Peach Aphid, Brown Sowthistle Aphid, Greenhouse Whitefly and suppression of 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	ALL	2	R2
		Lettuce (field)	Cutworm	QLD & NT		

Appendix 3. Products available for weed control in head lettuce

Active ingredient (Trade Name)	Chemical group	Situation	Comment / Use / Weed	WHP (days)	States	Regulatory risk
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Vegetables	Plant parasitic Nematodes, Symphylans, Wireworms, soil borne diseases and suppression of weeds. <i>For use by professional and registered fumigators only.</i>	ALL	NR	-
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)	Grass and Broadleaf Weeds	28 NG	ALL (excl. VIC)	R3
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	-

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

Appendix 4. Current permits for use in head lettuce

Permit No.	Description	Issued Date	Expiry Date	Permit Holder
PER13301 Version 3	Alpha-Cypermethrin / Lettuce (field only) / Red-Legged Earth Mite, Vegetable Weevil	12-Jun-12	31-May-25	Hort Innovation
PER87630	<i>Bacillus amyloliquefaciens</i> (Serenade Opti) / Lettuce / Bacterial Spot/Blight	18-Jun-19	30-Jun-22	Hort Innovation
PER14694 Version 3	<i>Bacillus thuringiensis</i> (Vectobac) / Lettuce / Fungus Gnats (<i>Sciaridae</i> spp)	01-Jun-14	30-Jun-24	Hort Innovation
PER14210 Version 4	Bifenazate (Acramite) / Lettuce, head & leafy varieties) / Two-Spotted Mite Grown in protected situations only	17-Oct-13	30-Apr-22	Hort Innovation
PER89259	Chlorantraniliprole (Coragen) / Lettuce / Fall Armyworm	06-Mar-20	31-Mar-23	Hort Innovation
PER89280	Chlorantraniliprole + Thiamethoxam (Durivo) / Leafy Vegetables / Fall Armyworm	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 4	Chlorothalonil / Lettuce Seedlings (head and leafy varieties, plant nursery phase) / Anthracnose or Shot Hole (<i>Microdochium panattonianum</i>)	21-Dec-14	31-Jul-26	Hort Innovation
PER81867 Version 2	Cyromazine (Diptex 150 WP) / Head Lettuce (field & protected) / Leafminers (<i>Liriomyza</i> spp.)	02-Dec-19	30-Nov-23	Hort Innovation
PER89263	Emamectin (Proclaim Opti) / Lettuce / Fall Armyworm	10-Mar-20	31-Mar-23	Hort Innovation
PER14077 Version 2	Botanical Oil (Eco-Oil) / Lettuce (Greenhouse and hydroponic) / Silverleaf Whitefly (biotype B)	01-Oct-13	30-Sep-23	Hort Innovation
PER83203 Version 2	Fipronil (Regent) / Lettuce (field grown only) / Onion Thrips and Western Flower Thrips	16-Mar-27	31-Mar-22	Hort Innovation
PER89278	Indoxacarb (Avatar) / Leafy Vegetables / Fall Armyworm	13-Mar-20	31-Mar-23	Hort Innovation
PER14318 Version 2	Metalaxyl-M (Ridomil Gold) / Lettuce / Damping Off (<i>Pythium</i> & <i>Phytophthora</i> spp.	23-Dec-13	30-Sep-22	Hort Innovation
PER89293	Methomyl (Lannate) / Head & Leafy Lettuce / Fall Armyworm	10-Apr-20	30-Apr-23	Hort Innovation

Permit No.	Description	Issued Date	Expiry Date	Permit Holder
PER12221 Version 4	Petroleum Oil / Lettuce / Greenhouse Whitefly, Sweet Potato Whitefly, Silverleaf Whitefly	29-Jun-12	30-Nov-22	Hort Innovation
PER81241 Version 2	Phenmedipham (Betanal) / Lettuce (field transplants only-all types) / Weeds as per product label	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	01-Mar-13	31-Mar-23	Hort Innovation
PER12565 Version 3	Pyrimethanil (Scala) / Lettuce (protected only) / Botrytis Grey Mould	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
PER90928	Spinosad (Entrust Organic) / Lettuce / Leafminers (<i>Liriomyza</i> spp.)	23-Apr-21	30-Apr-24	Hort Innovation
PER88640	Spirotetramat (Movento 240 SC) / Lettuce / <i>Liriomyza</i> 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 (field grown) / Bottom Rot (<i>Rhizoctonia solani</i>)	21-Mar-14	30-Jun-22	Hort Innovation

Appendix 5. Head Lettuce Maximum Residue Limits (MRLs)

CODEX commodity groupings of Leafy vegetables:

VL 0053 Leafy vegetables
 VL 0482 Lettuce, head
 Vegetables

Note: Major export markets for Head Lettuce include Singapore, Indonesia, Japan, Fiji and Hong Kong. Available information indicates that in the absence specific limits in legislation the most countries defers 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.

Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Abamectin	VL0053	Leafy vegetables (except lettuce, leaf)	T0.5	-
	VL0482	Lettuce, head	-	0.15
Acibenzolar-S-methyl	VL0482	Lettuce, head	-	0.2
Afidopyropen	VL0053	Leafy vegetables	5	-
Aldrin and Dieldrin	VL0053	Leafy vegetables	-	E0.05
	VL0482	Lettuce, head	E0.1	-
Ametoctradin	VL0053	Leafy vegetables	50	50
Azoxystrobin	VL0482	Lettuce, head	-	3
	VL0053	Leafy vegetables	15	-
Benalaxyl	VL0482	Lettuce, head	*0.01	1
Benfluralin	VL0482	Lettuce, head	T*0.05	-
Bifenazate	VL0482	Lettuce, head	T20	-
Bifenthrin	VL0053	Leafy vegetables {except Chervil; Mizuna; Rucola [rocket]}	*0.01	-
Boscalid	VL0053	Leafy vegetables	30	40
Bromide ion	VL0482	Lettuce, head	-	100
Carbendazim	VL0482	Lettuce, head	-	5
Chlorantraniliprole	VL0482	Lettuce, head	3	-
	VL0053	Leafy vegetables {except radish leaves}	-	20
Chlorothalonil	VL0482	Lettuce, head	T10	-
Chlorpyrifos		Vegetables (some exceptions)	T*0.01	-
Chlorthal-dimethyl	VL0482	Lettuce, head	2	-
Clothianidin	VL0053	Leafy vegetables	0.7	2
Cyantraniliprole	VL0482	Lettuce, head	-	5
Cyazofamid	VL0053	Leafy vegetables {except brassica leafy vegetables}	-	10
Cycloxydim	VL0482	Lettuce, head	-	1.5
Cypermethrin (including alpha- and zeta- cypermethrin)	VL0053	Leafy vegetables	-	0.7
	VL0482	Lettuce, head	2	-
Cyprodinil	VL0053	Leafy vegetables {except brassica leafy vegetables}	10	50

Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Cyromazine	VL0482	Lettuce, head	T8	4
Deltamethrin	VL0053	Leafy vegetables	-	2
Diazinon	VL0482	Lettuce, head	-	0.5
Dichlobenil	VL0053	Leafy vegetables	-	0.3
Dicofol		Vegetables (some exceptions)	5	-
Difenoconazole	VL0482	Lettuce, head	-	2
Dimethoate	VL0482	Lettuce, head	-	0.3
Dimethomorph	VL0482	Lettuce, head	-	10
	VL0053	Leafy vegetables	15	-
Dinotefuran	VL0053	Leafy vegetables	-	6
Diquat		Vegetables (some exceptions)	*0.05	-
Dithiocarbamates (mancozeb, metham, metiram, thiram, zineb and ziram)	VL0053	Leafy vegetables	5	-
	VL0482	Lettuce, head	-	0.5
Emamectin	VL0482	Lettuce, head	0.2	1
Fenamidone	VL0482	Lettuce, head	-	20
Fenhexamid	VL0482	Lettuce, head	T50	30
Fenitrothion	VL0482	Lettuce, head	0.5	-
Fenpyrazamine	VL0482	Lettuce, head	-	1.5
Fipronil	VL0482	Lettuce, head	T0.1	-
Flonicamid	VL0482	Lettuce, head	-	1.5
Fluazifop-p-butyl	VL0482	Lettuce, head	0.05	-
Flubendiamide	VL0482	Lettuce, head	5	5
Fludioxonil	VL0053	Leafy vegetables	15	-
	VL0482	Lettuce, head	-	10
Fluensulfone	VL0482	Lettuce, head	-	0.8
	VL0053	Leafy vegetables	-	1
Fluopicolide	VL0053	Leafy vegetables	30	30
Fluopyram	VL0482	Lettuce, head	15	15
Flupyradifurone	VL0482	Lettuce, head	-	4
Flutriafol	VL0482	Lettuce, head	-	1.5
Fluxapyroxad	VL0482	Lettuce, head	-	4
Forchlorfenuron	VL0053	Leafy vegetables {except Rucola [rocket]; Spinach}	T0.2	-
Folpet	VL0482	Lettuce, head	-	50
Fosetyl Al	VL0053	Leafy vegetables [except Rucola [rocket]; Spinach]	T0.2	-
	VL0482	Lettuce, head	-	200
Glufosinate-Ammonium	VL0482	Lettuce, head	-	0.4
Glyphosate	VL0053	Leafy vegetables	*0.1	-
Haloxyfop	VL0053	Leafy vegetables	T0.5	-
Imidacloprid	VL0482	Lettuce, head	5	2
Indoxacarb	VL0482	Lettuce, head	3	7
Iprodione	VL0482	Lettuce, head	5	10
Isofetamid	VL0482	Lettuce, head	-	5
Maldison	VL0482	Lettuce, head	2	-

Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Mandestrobin	VL0482	Lettuce, head	0.7	-
Mandipropamid	VL0053	Leafy vegetables	30	25
Metaflumizone	VL0482	Lettuce, head	-	7
Metalaxyl	VL0053	Leafy vegetables	0.3	-
	VL0482	Lettuce, head	-	2
Metaldehyde		Vegetables	1	-
Methiocarb	VL0482	Lettuce, head	-	*0.05
Methomyl	VL0482	Lettuce, head	2	0.2
Methoxyfenozide	VL0482	Lettuce, head	T30	15
Myclobutanil	VL0053	Leafy vegetables	-	0.05
Novaluron	VL0053	Leafy vegetables	5	-
Oxadixyl	VL0053	Leafy vegetables	T5	-
Oxathiapiprolin	VL0482	Lettuce, head	2	3
Paraquat	VL0053	Leafy vegetables	-	0.07
Pendimethalin	VL0053	Leafy vegetables	*0.05	-
Penthiopyrad	VL0053	Leafy vegetables {except Brassica leafy vegetables}	-	30
	VL0482	Lettuce, head	10	-
Permethrin	VL0482	Lettuce, head	5	2
Phenmedipham	VL0053	Leafy vegetables {except Chard [silver beet]}	T1	-
Phorate	VL0053	Leafy vegetables	T*0.01	-
Phosphorous acid	VL0053	Leafy vegetables	T150	-
Piperonyl butoxide		Vegetables	8	-
Pirimicarb	VL0053	Leafy vegetables	7	-
	VL0482	Lettuce, head	-	5
Prochloraz	VL0482	Lettuce, head	2	-
Propamocarb	VL0482	Lettuce, head	-	100
	VL0053	Leafy vegetables	70	-
Propargite		Vegetables	3	-
Propineb	VL0482	Lettuce, head	10	-
Propyzamide	VL0482	Lettuce, head	1	-
Pydiflumetofen	VL0053	Leafy vegetables {except Brassica leafy vegetables}	T30	-
Pymetrozine	VL0053	Leafy vegetables	5	-
Pyraclostrobin	VL0482	Lettuce, head	-	40
Pyrethrins		Vegetables	1	-
Pyrimethanil	VL0482	Lettuce, head	20	3
Quinoxifen	VL0482	Lettuce, head	-	8
Quintozene	VL0482	Lettuce, head	0.3	-
Sethoxydim	VL0482	Lettuce, head	0.2	-
Spinetoram	VL0053	Leafy vegetables	0.7	-
	VL0482	Lettuce, head	-	10
Spinosad	VL0053	Leafy vegetables	5	10
Spiromesifen	VL0053	Leafy vegetables	-	15
Spirotetramat	VL0053	Leafy vegetables	-	7
	VL0482	Lettuce, head	7	-
Sulfoxaflor	VL0053	Leafy vegetables	-	6

Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg
	VL0482	Lettuce, head	1	-
Tebuconazole	VL0482	Lettuce, head	0.1	5
Tebufenozide	VL0053	Leafy vegetables	-	10
Thiamethoxam	VL0053	Leafy vegetables	2	3
Tolclofos-Methyl	VL0482	Lettuce, head	*0.01	2
Trichlorfon		Vegetables (some exceptions)	0.1	-
Trifloxystrobin	VL0482	Lettuce, head	15	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. Head Lettuce Agrichemical Regulatory Risk Assessment

Head 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 so as to ensure compliance, as a MRL breach would adversely affect market access.

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

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

Head Lettuce Agrichemical Regulatory Risk Assessment

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

Problem	Active Constituents	Chemical Group	Comment	Activities
INSECT AND MITE PESTS				
Ants	Pyrethrins	3A		
Aphids				
Aphids	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
	Pirimicarb	1A	Codex: JMPR Periodic re-evaluation 2022/23	
	Petroleum oil (PER12221)	-		
Brown sowthistle aphid	Chlorantraniliprole + thiamethoxam	4A + 28	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses Europe: Outdoor uses deregistered ⁱ 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	
Cabbage aphid	Afidopyropen	9D		
	Pyrethrins	3A		
Cotton aphid	Afidopyropen	9D		
	Pymetrozine	9B	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 Europe: 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	
Currant lettuce aphid	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 Europe: 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	
Rose aphid	Pyrethrins	3A		

Problem	Active Constituents	Chemical Group	Comment	Activities
Beetles				
28-spotted potato ladybird	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
Spotted vegetable weevil	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	
Vegetable weevil	Chlorpyrifos	1B		
	Alpha-cypermethrin (PER13301)	3A		
	Carbaryl	1A	Canada: Review recently completed, retained but with a large number of uses deleted Codex: Toxicology review scheduled 2020 Europe: deregistered	
Caterpillars/Lepidoptera				
Armyworm	<i>B thuringiensis</i>	11A		
Cluster caterpillar	Chlorantraniliprole + thiamethoxam	4A + 28	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses Europe: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Emamectin benzoate	6		
	Methomyl	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
	Permethrin	3A	Codex: Re-evaluation scheduled 2021/22. Support uncertain EU: No authorisation	

Problem	Active Constituents	Chemical Group	Comment	Activities
Cucumber moth	Emamectin benzoate	6		
Cutworms	Diazinon	1B	EU: Deregistered Codex: To be reviewed by 2020/21. JMPPR Periodic re-evaluation 2020	
	Trichlorfon	1B	APVMA: nominated for review Codex: No MRLs Europe: deregistered US: No MRLs	
Diamondback (Cabbage) moth	<i>B thuringiensis</i>	11A		
	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
	Pyrethrins	3A		
Fall armyworm	Chlorantraniliprole (PER89259)	28		
	Chlorantraniliprole + thiamethoxam (PER89280)	4A + 28	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses Europe: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Emamectin benzoate (PER89263)	6		
	Indoxacarb (PER89278)	22A	EU: Proposed non-renewal	
	Methomyl (PER89293)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (Authorisation expired 31/8/19)	
	Spinetoram (PER89241)	5		
	Spinosad (PER89870)	5		

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

Problem	Active Constituents	Chemical Group	Comment	Activities
Loopers	<i>B thuringiensis</i>	11A		
	Chlorantraniliprole + thiamethoxam	4A + 28	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses Europe: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Spinetoram	5		
	Spinosad	5		
Lucerne leafroller	Chlorantraniliprole + thiamethoxam	4A + 28	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses Europe: 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
Grasshoppers/Locusts				
Australian plague locust	Fenitrothion	1B	EU: No authorisation in place	
	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
Field crickets	Chlorpyrifos	1B	APVMA: Under review. Potential issues w.r.t. environmental loading and worker exposure. EU: Proposed cancellation of use	
Mole crickets	Chlorpyrifos	1B	Canada: proposed cancellation of most uses. USA: EPA decision to allow continued use	
Migratory locust	Fenitrothion	1B	EU: No authorisation in place	
Small plague locust	Fenitrothion	1B	EU: No authorisation in place	
	Malathion/Maldison (PER11843)	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
Spur-throated locust	Fenitrothion	1B	EU: No authorisation in place	
	Malathion/Maldison (PER11843)	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
Wingless grasshopper	Fenitrothion	1B	EU: No authorisation in place	

Problem	Active Constituents	Chemical Group	Comment	Activities
Jassids/Plant bugs				
Green mirid	Petroleum oil (PER12221)	-		
Green vegetable bug	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
	Petroleum oil (PER12221)	-		
Grey cluster bug	Petroleum oil (PER12221)	-		
Jassids/Leafhoppers	Buprofezin (PER82467)	16	Europe: In the process of deleting MRLs	
	Petroleum oil (PER12221)	-		
	Pyrethrins	3A		
Rutherglen bug	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
	Petroleum oil (PER12221)	-		
	Pyrethrins	3A		
Vegetable leafhopper	Chlorantraniliprole + thiamethoxam	4A + 28	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses Europe: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
Mites				
Mites	Petroleum oil (PER12221)	-		
Blue oat mite	Chlorpyrifos	1B	APVMA: Currently under review. Potential issues w.r.t. environmental loading and worker exposure. EU: Proposed cancellation of use	
Redlegged earth mite	Chlorpyrifos	1B	Canada: proposed cancellation of most uses. USA: EPA decision to allow continued use	
	Alpha-cypermethrin (PER13301)	3A	EU: Proposed restricted authorisation & Candidate for substitution	
	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	

Problem	Active Constituents	Chemical Group	Comment	Activities
Two-spotted (Red spider) mite	Abamectin	6		
	Bifenazate (PER14210)	20D	EU: Proposed non-renewal	
	Pyrethrins	3A		
Thrips				
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		
Western flower thrips	Abamectin	6		
	Chlorantraniliprole + thiamethoxam	4A + 28	Thiamethoxam: APVMA: Under review Canada: Proposal to deregister outdoor uses Europe: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Fipronil (PER83203)	2B	APVMA: Under review Codex: Re-evaluation scheduled for 2021/22 EU: No authorisation in place	
	Spinetoram	5		
	Spinosad	5		
Whitefly				
Greenhouse whitefly	Buprofezin (PER82467)	16	Europe: In the process of deleting MRLs	
	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 Europe: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	ECO-Oil (PER14077)	-		
	Petroleum oil (PER12221)	-		
	Potassium salts (PER13920)	-		
	Pymetrozine	9B	EU: Being phased out Codex: No registrant support	
	Pyriproxyfen	7C	EU: Authorisation renewal process underway	
	Spirotetramat	23	Spirotetramat	
Whitefly	Pyrethrins	3A		
Other				
Earwig	Pyrethrins	3A		
Fungus gnats	<i>B thuringiensis thuringiensis</i> sub sp. israelensis (PER14694)	11A		
Leafminer	Cyromazine (PER81867)	17		
	Spirotetramat (PER88640)	23		

Problem	Active Constituents	Chemical Group	Comment	Activities
DISEASES				
Anthracnose	Azoxystrobin	11		
	Chlorothalonil (PER14964)	M5	APVMA: Nominated for review Canada: Review recently completed; continued use considered acceptable Europe: Deregistered ⁱⁱ .	
	Copper	M1	EU: Candidate for substitution	
	Cyprodinil +fludioxonil	9 + 12	Cyprodinil: Canada: Currently under reviewed EU: Candidate for substitution Fludioxonil: EU: Currently under reviewed Candidate for substitution	
	Dimethomorph	40		
	Mancozeb (PER80538)	M3	APVMA: Nominated for review Canada: Many uses cancelled Codex: To be reviewed 2022/23 EU: Authorisation not renewed	
	Prochloraz (PER81131) (field only)	3	Codex: Periodic re-evaluation scheduled for 2021/22 EU: Candidate for substitution	
	Thiram	M3	APVMA: Nominated for review Canada: Proposed cancelling of all foliar uses Codex: To be reviewed 2022/23 Europe: No authorisation in place	
Bacterial spot	<i>B. amyloliquefaciens</i> (PER87630)	BM02		
	Copper	M1	EU: Candidate for substitution	
Base rot/Bottom rot	Azoxystrobin	11		
	Tolclofos-methyl (PER14431)	14	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	Europe: 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 Europe: No authorisation in place	
Damping off	Metalaxyl-M (PER14318)	4	EU: Metalaxyl-M restricted use approval	
Downy mildew	Copper	M1	EU: Candidate for substitution	
	Dimethomorph	40		
	Fluopicolide +propamocarb HCl	28 + 43		
Downy mildew	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	
	Propineb	M3	APVMA: Nominated for review EU: No authorisation in place Codex: To be reviewed 2022/23	
	Metalaxyl/metalaxyl-M	4	EU: Metalaxyl candidate for substitution Metalaxyl-M restricted use approval	

Problem	Active Constituents	Chemical Group	Comment	Activities
Downy mildew	Mandipropamid	40		
	Oxadixyl +propineb	4 + M3	Oxadixyl EU: No authorisation in place Propineb APVMA: Nominated for review EU: No authorisation in place Codex: To be reviewed 2022/23	
	Oxathiapiprolin	49		
	Phosphorous acid (PER13698)	33		
Dry leaf spot	Copper	M1	EU: Candidate for substitution	
Powdery mildew	Penthiopyrad	7		
	Potassium bicarbonate (PER13695)	M2		
Sclerotinia rot	Azoxystrobin	11		
	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	Europe: Deregistered Canada: Majority of food crop uses deleted Codex: Review scheduled for 2022/23	
	Penthiopyrad	7		
	Tebuconazole	3	APVMA: Nominated for review EU: Candidate for substitution	

Problem	Active Constituents	Chemical Group	Comment	Activities
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 Europe: No authorisation in place	

Problem	Active Constituents	Chemical Group	Comment	Activities
WEEDS				
Broadleaf weeds and grasses	Benfluralin (PER13332)	D	EU: Non-renewal proposed	
	Chloridazon	C	EU: No authorisation in place	
	Chlorthal-dimethyl	D	EU: No authorisation in place	
	Clethodim	A	Codex: MRLs proposed for deletion	
	Fluazifop-P as butyl	A		
	Haloxifop-P (PER14959)	A	EU: Candidate for substitution	
	Pendimethalin (PER81241)	D	EU: Candidate for substitution	
	Phenmedipham	C	EU: Review outcome not positive	
	Propyzamide	D		
Sethoxydim	A	EU: No authorisation in place		
Plant growth regulator				
Post-harvest	1-Methylcyclopropene			

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ⁱ 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.

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