



Okra

Strategic Agrichemical Review Process (SARP)

August 2021

Hort Innovation
Project – VG18004

Hort Innovation Project Number:

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

SARP Service Provider:

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Purpose of the report:

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

Date of report:

August 2021

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**Hort
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Strategic levy investment

**VEGETABLE
FUND**

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

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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;

Assesses the importance of the diseases, insects and weeds (plant pests) that can affect a horticultural industry;

- (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 Okra 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>Pseudoperonospora</i> spp.
Powdery Mildew	<i>Podosphaera xanthii</i>

1.2 Insects and mites

The high priority insect and mite pests are:

Common name	Scientific name
Green Peach Aphid	<i>Myzus persicae</i>
Cotton Bollworm / Corn Earworm	<i>Helicoverpa armigera</i>
Native Budworm	<i>Helicoverpa punctigera</i>
Two-Spotted Mite	<i>Tetranychus urticae</i>

1.3 Weeds

No significant weeds have been identified in the recent survey of the NT Okra growers.

2. The Australian Okra Industry

The Australian Okra industry is a minor horticultural industry.

World okra production is 8.9 million tonnes, of which Australia produces 2,000 tonnes. Most Australian Okra is grown in the Northern Territory. All Northern Territory Okra is sold on the domestic market, mainly to major city markets, including Sydney and Melbourne.

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 Okra 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 Okra 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 Okra 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 Okra 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 Okras 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 Industry¹ which covers Okra 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.

¹ <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 Okra as a minor crop. The crop fits within the APVMA crop group Crop Group 012: Fruiting vegetables, other than Cucurbits.

Therefore, access to minor use permits can be relatively straight forward as long as a reasonable justification is provided in accordance with the APVMA's minor use guidance².

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

² <https://apvma.gov.au/node/10931>

3.3 Methods

The Okra Strategic Agrichemical Review Process (SARP) 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>
MT20007 – Regulatory Support & Co-ordination (AKC)	<p>Okra Agrichemical Regulatory Risk Assessment Document</p> <p>To assist strategic planning, with respect to future pest management options, this document was developed as part of the Hort Innovation funded project MT20007 to highlight the regulatory threats to agrichemicals currently approved for the management of the pests and diseases in Okra as well as current initiatives aimed at addressing identified pest management deficiencies.</p>
VG18004 – Vegetable Strategic Agrichemical Review Process (SARP) Report Updates	<p>SARP updated via a desktop audit:</p> <p>Review list of priorities ranked as high, moderate and low for each plant pest groups (disease, insects and weeds) – provided by VG16060</p> <p>Identify industries pest priority gaps in order of importance</p> <p>Update current pesticides available via label registrations or minor use permits</p> <p>Update available pesticide use patterns, IPM ranking/compatibility, mode of action and chemical group.</p> <p>Identify pesticides at risk (under review and/or limited uses) via MT20007 Regulatory Support & Co-ordination – AKC consulting.</p> <p>Identify any appropriate solutions through the outcomes of the AgChem Forum’s or similar market intelligence and their overall suitability (IPM compatibility, Chemical group to manage resistance, risk profile, existing domestic MRL’s or global MRL’s including any potential trade barriers, efficacy, OH&S, environmental safety and sustainability).</p> <p>Include known pesticide solutions that are currently under development with registrants for new uses in the nominated crops or in current Hort Innovation projects.</p> <p>Update MRL tables to include Australian MRL’s, Codex and any applicable export market MRL’s</p>

3.4 Results and discussions

3.4.1 Detail

Results and discussions are presented in the body of this document.

3.4.2 Appendices

Refer to additional information in the appendices:

Appendix 1. Products available for disease control in okra

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

Appendix 3. Products available for weed control in okra

Appendix 4. Current permits for use in okra

Appendix 5. Okra Maximum Residue Limits (MRLs)

Appendix 6. Okra Agrichemical Regulatory Risk Assessment

4. Diseases, Pests and Weeds of Okra

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 website³.

In chapter 4, information on regulatory risk derived from project MT20007 - Regulatory support and coordination (Appendix 6) has been incorporated.

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

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

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

4.1 Diseases of okra

4.1.1 Disease priorities

Common name	Scientific name
High	
Downy Mildew	<i>Pseudoperonospora</i> spp.
Powdery Mildew	<i>Podosphaera xanthii</i>
Moderate	
Alternaria Leaf Blight	<i>Alternaria</i> spp.
Anthracnose	<i>Colletotrichum orbiculare</i>
Bacterial Spot	<i>Xanthomonas campestris</i>
Damping Off	<i>Pythium</i> spp., <i>Phytophthora</i> spp., <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp.
Grey Mould	<i>Botrytis cinerea</i>
Verticillium Wilt	<i>Verticillium dahliae</i>
Low	
Angular Leaf Spot	<i>Pseudomonas syringae</i>
Cercospora Leaf Spot	<i>Cercospora</i> spp.
Phytophthora Soil Fungus	<i>Phytophthora</i> spp.
Rhizoctonia Ground Rot	<i>Rhizoctonia solani</i>

The most important disease issue based on the feedback received were Downy Mildew and Powdery Mildew. Available and potential products for these diseases are in Section 4.1.2.

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

The key to managing diseases in okra is use of good cultural practices, particularly crop rotation to avoid growing okra or other fruiting vegetables such as eggplant or capsicums in the same field more than once every four years. General farm hygiene and use of disease-free planting material is also important.

Resistance Management

Downy Mildew and Powdery Mildew are both considered to have a high risk of resistance development. In Australia there are confirmed cases of Powdery Mildew resistance to Group 8 Bupirimate, Group 11 Strobilurins and Group 3 Triadimenol.

There are several disease strategies that apply to vegetables on the CropLife website⁴, including Powdery Mildew and Downy Mildew.

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

4.1.2 Available and potential products for priority diseases

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

Availability		Regulatory risk (refer to Appendix 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>Peronospora destructor</i>)							
Priority: High							
Downy Mildew was ranked as a high priority in NT. Characterised by a white downy fungal growth that develops on the underside of the leaf. It is a common disease that is favoured by warm, moist weather. Management options include general farm hygiene, crop rotation, planting space (to allow air movement) and the use of protectant and curative fungicide spray applications when conditions favour disease outbreaks.							
Mancozeb PER14593	M3	Protectant	14 G:14	A	ALL (excl. VIC)	Permitted for use in okra for control of Downy Mildew , Anthracnose and Alternaria. [Max no. of applications and re-treatment interval not specified]	R2
Chlorothalonil (Bravo)	M5	Protectant	1	P-A	QLD & WA	Registered in okra for control of Leaf Disease / Spot. Registered for control of Downy Mildew in cucurbits, onions, peas and grapes.	R3
Copper	M1	Protectant	1	P-A	ALL	Registered in vegetables for control of Rust and Leaf Spot Disease. Registered for control of Downy Mildew in grapes, brassicas, cucurbits, lettuce, onions, ornamentals, red beet, rhubarb, silverbeet and spinach.	-
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.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Azoxystrobin + Oxathiapiprolin (Orondis Flexi) Syngenta	11+49	Protectant & Curative		P		Registered for control of Downy Mildew in bulb vegetables, brassica vegetables, cucurbits, lettuce, endive, leafy vegetables and poppies.	-
Cyazofamid (Ranman) UPL	21	Protectant & Curative		P		Registered for control of Downy Mildew in basil, brassica leafy vegetables, nursery stock and poppy. 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.	-
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered for control of Alternaria Leaf Spot, Black Spot, Brown Rot Nut Scab, Shot Hole and Rust in almond, Brown Rot in cherries and Husk Spot in macadamia. US registration for suppression of Downy Mildew in bulb vegetables, cucurbits and leafy vegetables.	-
Hydrogen Peroxide + Peroxyacetic Acid (Peratec Plus)	M	Protectant		P		Registered for control of Downy Mildew in brassica vegetables, bulb vegetables and grapes.	-
Mandipropamid (Revus) Syngenta	40	Protectant		P		Registered for control of Downy Mildew in grapes, lettuce, leafy vegetables and oilseed poppies.	-
Oxathiapiprolin (Zorvec Enicade) Corteva	49	Protectant		P		Registered for control of Downy Mildew in bulb vegetables, brassica vegetables, cucurbits, leafy vegetables, brassica leafy vegetables and poppies.	-
Phosphorous Acid	33	Curative		P		Registered for control of Downy Mildew in grapes and cucurbits.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Propamocarb Hydrochloride + Fluopicolide (Infito) Bayer	28+43	Protectant		P		Registered for control of Downy Mildew in brassica vegetables, bulb vegetables, cucurbits, leafy vegetables, lettuce and poppies.	-
Powdery Mildew (<i>Erysiphe</i> spp.)							
Priority: High							
Powdery Mildew was ranked as a high priority in NT. Powdery Mildew causes a characteristic white, powdery growth on infected plants. Photosynthetic efficiency is reduced in affected leaves and fruit can be scarred and damaged, causing produce to be downgraded. Severe outbreaks can cause defoliation, exposing fruit to sunburn and predisposing them to secondary rots.							
Penthiopyrad (Fontelis) Corteva	7	Protectant	NR	A	ALL	Registered in fruiting vegetables for control of Early Blight, Grey Mould and Powdery Mildew . [Max. 3 applications per crop, 2 consecutive; re-treatment interval: 7-10 d]	-
<i>Streptomyces lydicus</i> WYEC108 (Actinovate) Novozymes Bioag	BM 02	Biological	NR	A	ALL	Registered in fruiting vegetables for control of Powdery Mildew . [Max no. of applications and re-treatment interval not specified]	-
Sulphur	UN	Protectant	NR	A	ALL	Registered in vegetables for control of Powdery Mildew , Rust and Black Spot. [Max no. of applications and re-treatment interval not specified]	-
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.	-
<i>Bacillus amyloliquefaciens</i> strain QST713 (Serenade Opti) Bayer	BM 02	Biological	NR	P		Permitted for control of Powdery Mildew in eggplant. US registration for control of Powdery Mildew in cucurbits, grapes, pome fruit, stone fruit and strawberries.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
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.	-
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 in bananas for control of Cordana Leaf Spot, Leaf Speckle and Yellow Sigatoka and in grapes for control of Grey Mould and Powdery Mildew . US registration for control of Powdery Mildew in almonds, brassica leafy greens, cucurbits, grapes, hops, dry and succulent beans, stone fruit and sunflowers.	R3
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative		P		Registered for control of Powdery Mildew in apples.	-
Hydrogen Peroxide + Peroxyacetic Acid (Peratec Plus)	M	Protectant		P		Registered for control of Powdery Mildew in grapes, fruiting vegetables, cucurbits and potatoes.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Isofetamid (Kenja) ISK / AgNova	7	Protectant & 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	Protectant & Curative		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.	-
NUL3195 Nufarm	TBC			P		Fungicide in development from Nufarm with activity on Powdery Mildew and <i>Botrytis</i> .	-
Potassium Bicarbonate (EcoCarb)	M2	Protectant		P		Registered for control of Powdery Mildew in strawberries, capsicums, zucchini, glasshouse cucumbers, glasshouse tomatoes, roses and grapevines.	-
Proquinazid (Talendo) Corteva	13	Protectant		P		Registered for control of Powdery Mildew in fruiting vegetables, cucurbits, grapes and pome fruit.	-
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Protectant & Curative		P		Registered for control of Powdery Mildew in strawberries and grapes.	-
Pyriofenone (Kusabi) AgNova	50	Protectant & Curative		P		Registered for control of Powdery Mildew in cucurbits and grapes.	-
Quinoxifen (Legend) Corteva PER11991	13	Protectant		P		Registered for control of Powdery Mildew in grapes.	-
Tea Tree Oil (Timorex)	46	Protectant		P		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
Alternaria Leaf Blight (<i>Alternaria</i> spp.) Priority: Moderate							
Alternaria was ranked as a moderate priority in NT. <i>Alternaria</i> -species produce toxic metabolites during their active growth and causes severe diseases limiting crop productivity. Use of resistant varieties & disease-free or treated seed are recommended. Adequate nitrogen fertiliser generally reduces the rate of infection by <i>Alternaria</i> . Crop rotation, removal and burning of plant debris, if infected, and eradication of weed hosts help reduce the inoculum for subsequent plantings of susceptible crops.							
Chlorothalonil (Bravo)	M5	Protectant	1	A	QLD & WA	Registered in okra for control of Leaf Disease / Spot [Max. no. of applications not specified; re-treatment interval: 7-10 d]	R3
Penthiopyrad (Fontelis) Corteva	7	Protectant	NR	A	ALL	Registered in fruiting vegetables for control of Early Blight (Alternaria spp.), Grey Mould and Powdery Mildew. [Max. 3 applications per crop, 2 consecutive; re-treatment interval: 7-10 d]	-
Mancozeb PER14593	M3	Protectant	14 G:14	A	ALL (excl. VIC)	Permitted for use in okra for control of Downy Mildew, Anthracnose and Alternaria . [Max no. of applications and re-treatment interval not specified]	R2
Copper	M1	Protectant	1	P-A	ALL	Registered in vegetables for control of Rust and Leaf Spot Disease. Registered for control of Alternaria in citrus, olives, passionfruit, carrots, brassica vegetables and potatoes.	-
Azoxystrobin + Difenconazole (Amistar Top) Syngenta	11+3	Protectant & Curative		P		Registered in carrots for control of Alternaria , Cercospora and Powdery Mildew; Alternaria and Phytophthora in potatoes; Alternaria , Phytophthora, Sclerotinia and Powdery mildew in tomatoes.	R3
Azoxystrobin + Oxathiapiprolin (Orondis Flexi) Syngenta	11+49	Protectant & Curative		P		Registered for suppression of Alternaria in brassica vegetables, lettuce, endive and leafy vegetables.	-
<i>Bacillus amyloliquefaciens</i> strain QST713 (Serenade Opti) Bayer	BM 02	Biological	NR	P	ALL	Registered in tomato, capsicum, chilli and several fruits for suppression of Bacterial Spot. Permitted for use in eggplant for control of Alternaria , Botrytis, Powdery Mildew and suppression of Bacterial Spot.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Boscalid (Filan) BASF	7	Protectant		P		Registered for control of Alternaria in potatoes, capsicum, eggplant, peppers and tomatoes.	-
Fluazinam (Shirlan) Syngenta	29	Protectant		P		Registered for control of Club Root in Brassica vegetables. US registration for control of Sclerotinia and Alternaria in carrots.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant		P		Registered in bananas for control of Cordana Leaf Spot, Leaf Speckle and Yellow Sigatoka and in grapes for control of Grey Mould and Powdery Mildew. US registration for control of a variety of diseases including Alternaria Leaf Spot in almond, Brassica leafy vegetables, legume vegetables, melons and various fruit crops.	R3
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative		P		Registered for suppression of Alternaria in apples and control of Alternaria in passionfruit.	-
Florypicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New Mode of Action fungicide being developed for AU with activity on Powdery Mildew, <i>Botrytis</i> spp., <i>Septoria</i> spp., Anthracnose, Alternaria spp., Scab, <i>Monilinia</i> spp. and <i>Mycosphaerella</i> spp. Scheduled for JMPR evaluation in 2023.	-
NUL3446 Nufarm	TBC			P		New active in development from Nufarm with activity on Alternaria spp.	-
Anthracnose (<i>Colletotrichum orbiculare</i>)							
Priority: Moderate							
Anthracnose was ranked as a moderate priority in NT. It requires both pre- and post-harvest treatments. This fungus can be seed-borne and carry over on crop residue in the soil. It is spread in water droplets and is worse in warm, humid weather.							
Mancozeb PER14593	M3	Protectant	14 G:14	A	ALL (excl. VIC)	Permitted for use in okra for control of Downy Mildew, Anthracnose and Alternaria. [Max no. of applications and re-treatment interval not specified]	R2

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
<i>Bacillus amyloliquefaciens</i> Strain QST 713 (Serenade Prime) Bayer	BM 02	Biological	NR	P-A	ALL	Registered in tree crops for application to soil to improve bioavailability of soil resources to horticultural crops. Provides suppression of soil-borne diseases such as Black Scurf in potatoes and Pineapple Disease in sugarcane.	-
Chlorothalonil (Bravo)	M5	Protectant	1	P-A	QLD & WA	Registered in okra for control of Leaf Disease / Spot. Registered for control of Anthracnose in capsicums, peppers, cucurbits and grapes.	R3
Copper	M1	Protectant	1	P-A	ALL	Registered in vegetables for control of Rust and Leaf Spot Disease. Registered for control of Anthracnose in avocados, durians, guavas, macadamias, mangosteens, olives, rambutans, cucurbits and lettuce.	-
<i>Aureobasidium pullulans</i> (Botector) Nufarm	BM 02	Biological	NR	P		Registered for control of Anthracnose in berries.	-
<i>Bacillus amyloliquefaciens</i> strain QST713 (Serenade Opti) Bayer	BM 02	Biological	NR	P		Registered for control of Anthracnose in avocado and mango.	-
<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

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Cyprodinil + Fludioxonil (Switch) Syngenta	9+12	Protectant		P		Registered for control of Anthracnose in lettuce and nursery stock.	-
Dimethomorph (Acrobat) BASF	40	Protectant & Curative		P		Registered for control of Anthracnose in cucurbits and closed head varieties of lettuce.	-
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 in bananas for control of Cordana Leaf Spot, Leaf Speckle and Yellow Sigatoka and in grapes for control of Grey Mould and Powdery Mildew. US registration for control of Anthracnose in almonds, cucurbits and tree nuts.	R3
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative		P		Registered for control of Anthracnose in tropical and sub-tropical fruit.	-
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.	-
Prochloraz (Octave) FMC	3	Protectant & Curative		P		Registered for control of Anthracnose in leafy/open head lettuce.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Protectant & Curative		P		Registered for control of Grey Mould in berries, Grey Mould and Powdery Mildew in strawberries and grapes, Grey Mould and Sclerotinia in lettuce and leafy vegetables, and Grey Mould, Sclerotinia and Early Blight in potato. US registration for control of Anthracnose in berries and tuberous and corm vegetables, suppression of Anthracnose in lemons and limes.	-
Bacterial Spot (<i>Xanthomonas campestris</i>)							
Priority: Moderate							
Bacterial Spot was ranked as a moderate priority in NT. The bacterium may be introduced in seed or in surviving undecomposed crop residue or other host plants. Bacteria spread in water splash during wet, windy weather or by overhead irrigation. It can also disperse on insects, or on people or equipment moving through the crop.							
Copper	M1	Protectant	1	A	ALL	Registered in vegetables for control of Rust and Leaf Spot Disease. [Max no. of applications and re-treatment interval not specified]	-
Acibenzolar-S-Methyl (Actigard Plant Activator) Syngenta	P01	Protectant		P		Registered in tomatoes for the suppression of Bacterial Speck, Bacterial Spot (<i>Xanthomonas campestris</i>), Bacterial Canker and Powdery Mildew. US registration for the suppression of Black Rot (<i>Xanthomonas campestris</i>) in brassica vegetables.	-
<i>Bacillus amyloliquefaciens</i> strain QST713 (Serenade Opti) Bayer	BM 02	Biological	NR	P		Registered for control of <i>Xanthomonas</i> in tomato, capsicum, chilli in field and protected cropping systems.	-
<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 spp.</i> 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
Damping Off (<i>Pythium</i> spp., <i>Phytophthora</i> spp., <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp.) Priority: Moderate							
Damping Off was ranked as a moderate priority in NT. Symptoms of damping-off and root rot consist of poor seed germination, pre-emergence and death of seedlings, post-emergence death of newly emerged seedlings, stunted plants, yellowed lower leaves, general poor growth, wilting, and eventual collapse and death of older plants. Roots of infected plants can appear water-soaked or brown to black in colour. In severe cases, nearly all roots may be girdled or rotted off. While all stages of okra can be infected by root rot organisms, newly emerging plants and young seedlings are very susceptible. Control options are limited and include the use of crop rotation to break the disease cycle.							
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> . For use by professional and registered fumigators only.	-
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.	-
<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.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
<i>Streptomyces lydicus</i> WYEC108 (Actinovate) Novozymes Bioag	BM 02	Biological	NR	P-A	ALL	Registered for control of Powdery Mildew in fruiting vegetables, and as a seed treatment in vegetables for control of Pythium , Fusarium and Rhizoctonia .	-
<i>Bacillus amyloliquefaciens</i> strain MBI 600 (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 Pythium 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 (Rhizoctonia), 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
NUL3163 Nufarm	TBC			P		New active in development from Nufarm with activity on Fusarium, Pythium & 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 Pythium, Phytophthora, Rhizoctonia and <i>Thielaviopsis</i> .	-
Thiram + Thiabendazole (Evershield) UPL	1+M3	Protectant		P		Registered in field & garden peas for control of Black Spot (<i>Mycosphaerella pinodes</i>) & Seedling Root Rots (Fusarium, Pythium & Macrophomina spp.).	R2

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Grey Mould (<i>Botrytis cinerea</i>)							
Priority: Moderate							
Grey Mould was ranked as a moderate priority in NT. Can affect plants at most stages of production. Affected fruit become water-soaked and soft and are rapidly covered with a thick grey mould. Other plant parts such as stems can also be affected. <i>Botrytis</i> also causes secondary rots on fruit and vegetables in storage or transit and in the marketplace.							
<i>Aureobasidium pullulans</i> (Botector) Nufarm	BM 02	Biological	NR	A	ALL	Registered in fruiting vegetables for control of Botrytis Grey Mould and suppression of Sclerotinia. [Max. 5 applications per crop; re-treatment interval: 7-10 d]	-
Penthiopyrad (Fontelis) Corteva	7	Protectant	NR	A	ALL	Registered in fruiting vegetables for control of Early Blight, Grey Mould and Powdery Mildew. [Max. 3 applications per crop, 2 consecutive; re-treatment interval: 7-10 d]	-
Chlorothalonil (Bravo)	M5	Protectant	1	P-A	QLD & WA	Registered in okra for control of Leaf Disease / Spot. Registered for control of Botrytis spp. in artichokes, capsicums, peppers, endive, radish, tomatoes, ornamentals and grapes.	R3
<i>Bacillus amyloliquefaciens</i> strain QST713 (Serenade Opti) Bayer	BM 02	Biological	NR	P		Registered for control of Botrytis in grapevines and strawberries. US registration for control of Botrytis in artichoke, asparagus, berries, bulb vegetables, fruiting vegetables, grapes, cucurbits, grapes, herbs/spices, legume vegetables, root/tuber and corm vegetables, stone fruit and kiwi.	-
<i>Bacillus amyloliquefaciens</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 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.	-
Fenhexamid	17	Protectant & Curative		P		Registered for control of Botrytis Grey Mould in cucumber, grapevines, green peas, lettuce, nursery stock, peppers, <i>Rubus</i> spp. and strawberries.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Fenpyrazamine (Prolectus) Sumitomo	17	Protectant & Curative		P		Registered for Botrytis control in grapes. US registration for control of Botrytis in berries, ginseng, lettuce, pistachio, small fruit vine climbing (except fuzzy kiwifruit) and ornamentals.	-
Florypicoxamid (Adavelt) Corteva	21	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 in bananas for control of Cordana Leaf Spot, Leaf Speckle and Yellow Sigatoka and in grapes for control of Grey Mould and Powdery Mildew. 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
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative		P		Registered for control of Botrytis in almonds and stone fruit. US registration for control of Botrytis in almond, artichoke, berries, brassica vegetables, brassica leafy greens, cherries, dill seed, pome fruit, small vine climbing fruit (except fuzzy kiwifruit), ginseng, herbs, hops, leafy greens, melons, pistachio, tomato, pepper and root vegetables.	-
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered for control of Alternaria Leaf Spot, Black Spot, Brown Rot Nut Scab, Shot Hole and Rust in almond, Brown Rot in cherries and Husk Spot in macadamia. US registration for control Botrytis spp. in bulb vegetables, leafy vegetables, pome fruit, stone fruit, strawberries and tree nuts, and for control of Alternaria Leaf Blight, Powdery Mildew, Anthracnose, Cercospora Leaf Spot, Gummy Stem Blight, Microdochium Blight, Target Leaf Spot and suppression of Downy Mildew in cucurbits.	-
Isofetamid (Kenja) ISK / AgNova	7	Protectant		P		Registered for control of Botrytis in berries.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
NUL3195 Nufarm	TBC			P		Fungicide in development from Nufarm with activity on Powdery Mildew and Botrytis .	-
Pyrimethanil (Scala) Bayer	9	Protectant		P		Registered for control of Botrytis Grey Mould in grapevines, ornamentals and strawberries and permitted for use in lettuce (protected) for control of Botrytis Grey Mould .	-
Verticillium Wilt (<i>Verticillium dahliae</i>)							
Priority: Moderate							
Verticillium Wilt was ranked as a moderate priority in NT. <i>Verticillium dahlia</i> is a fungal plant pathogen which causes leaves to curl and discolour. This disease is spread by contaminated soil, with the fungus entering the plant through the roots to the vascular system. It may cause death in some plants.							
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> . For use by professional and registered fumigators only.	-
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.	-
<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.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Angular Leaf Spot (<i>Pseudomonas syringae</i>)							
Priority: Low							
Angular Leaf Spot was ranked as a low priority in NT. <i>Pseudomonas syringae</i> can be moved by wind, rain, and transportation via nursery material, as well as mechanical equipment and pruning tools. Control measures include general farm hygiene, reducing leaf wetness through irrigation techniques, host resistance and biological control with microbial antagonists.							
Chlorothalonil (Bravo)	M5	Protectant	1	A	QLD & WA	Registered in okra for control of Leaf Disease / Spot [Max. no. of applications not specified; re-treatment interval: 7-10 d]	R3
Copper	M1	Protectant	1	A	ALL	Registered in vegetables for control of Rust and Leaf Spot Disease. [Max no. of applications and re-treatment interval not specified]	-
Acibenzolar-S-Methyl (Actigard Plant Activator) Syngenta	P01	Protectant	NR	P		Registered to reduce symptoms of Bacterial Speck (<i>Pseudomonas syringae</i>) in tomatoes.	-
<i>Bacillus amyloliquefaciens</i> (Serenade Opti) Bayer	BM 02	Biological	NR	P		Permitted for use in lettuce for suppression of Bacterial Blight.	-
<i>Bacillus amyloliquefaciens</i> strain MBI 600 (Serifel) BASF	BM 02	Biological	NR	P		Registered in grapes and strawberries for control of Botrytis. US registration for control of <i>Pseudomonas spp.</i> in berries, fruiting vegetables, leafy vegetables, stone fruit, tobacco and tree nuts.	-
Cercospora Leaf Spot (<i>Cercospora spp</i>)							
Priority: Low							
Cercospora Leaf Spot was ranked as a low priority in NT. This disease is seed borne and can survive in crop trash. The major control measure is ensuring the use of disease-free seeds and transplant material.							
Chlorothalonil (Bravo)	M5	Protectant	1	A	QLD & WA	Registered in okra for control of Leaf Disease / Spot [Max. no. of applications not specified; re-treatment interval: 7-10 d]	R3
Copper	M1	Protectant	1	A	ALL	Registered in vegetables for control of Rust and Leaf Spot Disease. [Max no. of applications and re-treatment interval not specified]	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
<i>Bacillus amyloliquefaciens</i> strain QST713 (Serenade Opti) Bayer	BM 02	Biological		P		Registered for control of various leaf diseases in avocado, fruiting vegetables, grapes, mango and strawberry.	-
<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 Bacterial Leaf Spot, <i>Botrytis</i> , Cercospora , Downy Mildew, Head and Leaf Drop, Pink Rot, Powdery Mildew, White Mould, White Rust, Bottom Rot and Verticillium Wilt in celery.	-
Florypicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New Mode of Action fungicide being developed for AU with activity on Powdery Mildew, <i>Botrytis</i> spp., <i>Septoria</i> spp., Anthracnose, <i>Alternaria</i> spp., Scab, <i>Monilinia</i> spp. and <i>Mycosphaerella</i> spp. Scheduled for JMPR evaluation in 2023.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant		P		Registered in bananas for control of Cordana Leaf Spot, Leaf Speckle and Yellow Sigatoka and in grapes for control of Grey Mould and Powdery Mildew. US registration for control of Cercospora in almond, Brassica leafy vegetables, legume vegetables, melons and various fruit crops.	R3
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative		P		Registered for control of various diseases in almonds, pome fruit, stone fruit and tropical and subtropical fruit (inedible peel). US registration for control of Cercospora in peanuts and sugarbeet.	-
Hydrogen Peroxide + Peroxyacetic Acid (Peratec Plus)	M	Protectant		P		Registered for control of Cercospora Leaf Spot in celery.	-
Mefentrifluconazole (Belanty) BASF	3	Protectant & Curative		P		Registered for control of Black Spot in apples and Powdery Mildew in grapes. US registration for control of Cercospora in corn, legume vegetables, peanuts, sorghum, millet, soybean and sugar beet.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Protectant & Curative		P		Registered for control of Grey Mould in berries, Grey Mould and Powdery Mildew in strawberries and grapes, Grey Mould and Sclerotinia in lettuce and leafy vegetables, and Grey Mould, Sclerotinia and Early Blight in potato. US registration for control of <i>Cercospora spp.</i> in brassica vegetables, carrot, cucurbits, specific leaf petioles, root and tuber vegetables, mustard greens and watercress.	-
Tebuconazole + Azoxystrobin (Veritas) Adama	3+11	Protectant		P		Registered for control of Cercospora Leaf Spot in faba beans and broad beans.	R3
Phytophthora Soil Fungus (<i>Phytophthora spp.</i>)							
Priority: Low							
Phytophthora Soil Fungus was ranked as a low priority in NT. A soil-borne disease that is widespread in most regions. It enters through the roots and the leaves of affected plants show yellowing, curling and eventually wither and decay because of the compromised root system. Cultural controls recommended including crop rotation, improving drainage and the use of resistant varieties.							
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> . For use by professional and registered fumigators only.	-
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.	-
<i>Streptomyces lydicus</i> (Actinovate) Novozymes Bioag	BM 02	Biological	NR	P-A	ALL	Registered for control of Powdery Mildew in fruiting vegetables. 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 <i>Rhizoctonia</i> .	-
Azoxystrobin + Difenconazole (Amistar Top) Syngenta	11+3	Protectant & Curative		P		Registered for control of Phytophthora in potatoes and tomatoes.	R3
<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 the management of Phytophthora spp. in asparagus, brassica leafy vegetables, citrus, cucurbits, corn, fruiting vegetables, legume vegetables, soybeans, strawberries, tobacco and root and tuber vegetables.	-
Mandipropamid (Revus) Syngenta	40	Protectant		P		Registered for control of Downy Mildew in grapes, lettuce, leafy vegetables and oilseed poppies. US registration for Phytophthora spp. in various crops, including as a foliar application for protection of citrus from Phytophthora Root Rot.	-
Oxathiopiprolin (Zorvec Enicade) Corteva	49	Protectant & Curative		P		Registered for control of Downy Mildew in bulb vegetables, brassicas, cucurbits, leafy vegetables and poppies. US registration for control of Phytophthora spp. in citrus.	-
Phosphorous Acid	33	Curative		P		Registered for control of Phytophthora spp. in avocado.	-
Thiophanate-Methyl + Etridiazole (Banrot)	1+14	Systemic		P		Registered in container grown ornamentals and in ground bedding plants as a post plant soil drench for control of <i>Pythium</i> , Phytophthora , <i>Rhizoctonia</i> and <i>Thielaviopsis</i> .	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Rhizoctonia Ground Rot (<i>Rhizoctonia solani</i>)							
Priority: Low							
Rhizoctonia Ground Rot was ranked as a low priority in NT. A soil-borne disease that does not generally warrant control measures.							
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> . For use by professional and registered fumigators only.	-
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.	-
<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>Streptomyces lydicus</i> WYEC108 (Actinovate) Novozymes Bioag	BM 02	Biological	NR	P-A	ALL	Registered for control of Powdery Mildew in fruiting vegetables, and as a seed treatment in vegetables for control of <i>Pythium</i> , <i>Fusarium</i> and Rhizoctonia .	-

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		P		Registered for control of <i>Botrytis</i> in grapes and strawberries. US registration for control of <i>Rhizoctonia spp.</i> in artichoke, asparagus, brassica leafy vegetables, bulb vegetables, cucurbits, corn, fruiting vegetables, leafy vegetables, legume vegetables, soybean, strawberry, sugar beet, tobacco and root and tuber vegetables.	-
Cyprodinil + Fludioxonil (Switch) Syngenta	9+12	Protectant		P		Registered for control of <i>Rhizoctonia spp.</i> in nursery stock.	-
Fludioxonil + Sedaxane (Vibrance Premium) Syngenta	7+12	Protective Seed Treatment		P		Registered in potatoes for control of black scurf (<i>Rhizoctonia</i>), Silver Surf, Black Rot, Gangrene and Fusarium Dry Rot and suppression of Scab. ST17000 is generating data to support a registration for control of <i>Rhizoctonia</i> in beetroot.	R3
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> , <i>Rhizoctonia</i> and <i>Thielaviopsis</i> .	-
Tolclofos-Methyl (Rizolex) Sumitomo	13	Protectant		P		Registered for control of <i>Rhizoctonia spp.</i> as an in-furrow application in beetroot, cotton and potato.	-

4.2 Insect and mite pests of Okra

4.2.1 Insect and mite pest priorities

Common name	Scientific name
High	
Green Peach Aphid	<i>Myzus persicae</i>
Cotton Bollworm / Corn Earworm	<i>Helicoverpa armigera</i>
Native Budworm	<i>Helicoverpa punctigera</i>
Two-Spotted Mite	<i>Tetranychus urticae</i>
Moderate	
Root Knot Nematode	<i>Meloidogyne</i> spp.
Western Flower Thrips	<i>Frankliniella occidentalis</i>
Onion Thrips	<i>Thrips tabaci</i>
Tomato Thrips	<i>Frankliniella schultzei</i>
Plague Thrips	<i>Thrips imaginis</i>
Silverleaf Whitefly	<i>Bemisia tabaci</i>
Greenhouse Whitefly	<i>Trialeurodes vaporariorum</i>
Low	
Green Vegetable Bug	<i>Nezara viridula</i>
Jassids & Leafhoppers	Cicadellidae
Mealybug	Pseudococcidae
Wingless Grasshopper	<i>Phaulacridium vittatum</i>

New incursions of an exotic pest which poses a potential threat and other non-ranked pests.

New Pest to Australia (unknown priority)	
Fall Armyworm	<i>Spodoptera frugiperda</i>
Vegetable Leafminer	<i>Liriomyza sativae</i>
Pea Leaf Miner / Serpentine Leafminer	<i>Liriomyza huidobrensis</i>
American Serpentine Leafminer	<i>Liriomyza trifolii</i>
Tomato Potato Psyllid	<i>Bactericera cockerelli</i>

High priority insect pests identified by the survey are Aphids, Helicoverpa and Two-Spotted Mites. Available and potential products for these pests are listed in Section 4.2.2.

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

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

Resistance Management

There are several insecticide management strategies that apply to cucurbits on the CropLife website⁵, including Silverleaf Whitefly, Mites, Thrips and Aphids.

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

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

4.2.2 Available and potential products for high 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 NT. Nymphs and adults suck on sap, causing loss of vigour, and in some cases yellowing, stunting or distortion of plant parts. Honeydew secreted by the nymphs and adults can cause sooty mould to develop on leaves.								
Afidopyropen (Versys) BASF	9D	Ingestion	1	A	ALL	Registered in fruiting vegetables including okra for control of Green Peach Aphid , Cabbage Aphid, Currant Lettuce Aphid and Cotton/Melon Aphids and 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	NR	A	ALL	Registered in fruiting vegetables for control of Cotton Bollworm, Native Budworm, Cluster Caterpillar, Green Peach Aphid , Silverleaf Whitefly, Greenhouse Whitefly, Western Flower Thrips and Tomato Thrips. [Max. 1 application per crop]	M Bee:VH	R2
Cyantraniliprole (Benevia) FMC	28	Ingestion	1 NG	A	ALL	Registered in fruiting vegetables for control of Cotton Bollworm, Native Budworm, Tomato Leafminer, Silverleaf Whitefly and suppression of Green Peach Aphid , Tomato Thrips and Western Flower Thrips. [Max. 2 applications per crop; re-treatment interval 7-10 d]	M Bee:VH	-
Cyantraniliprole + Diafenthiuron (Minecto Forte) Syngenta	28+12A	Contact & Ingestion	1	A	ALL	Registered in fruiting vegetables for control of Helicoverpa, Potato Moth, Cluster Caterpillar, Silverleaf Whitefly, Green Peach Aphid , Two-Spotted Spider Mites and suppression of Western Flower Thrips, Tomato Thrips and Plague Thrips. Field use only with ground-based spraying. [Max. 2 applications per crop; re-treatment interval 28 d]	M Bee:VH	-
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. [Max. no. of applications not specified]	VH Bee:H	-
Pirimicarb (Aphidex)	1A	Contact & Ingestion	2	A	ALL	Registered in okra for control of Aphids . [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	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	1	A	ALL	Registered in okra for control of Green Peach Aphid , Greenhouse Whitefly, Rutherglen Bug and Tomato Potato Psyllid. Do not use if honeybees are foraging. [Max. no. of applications not specified; re-treatment interval 7-10 d]	M Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on Beneficials	Regulatory risk
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	-
Flupyradifurone (Sivanto Prime) 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	-
Pymetrozine (Chess) Syngenta	9B	Ingestion		P		Registered for control of Green Peach Aphid in brassica vegetables, tomato, eggplant, capsicum, lettuce, leafy vegetables, cucurbits, potatoes, stone fruit, almonds, pistachios, beetroot, cut flowers and nursery stock.	L Bee:VL	-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered for control of Green Peach Aphid in beans, peas, brassica vegetables, brassica leafy vegetables, celery, rhubarb, cucurbits, eggplant, peppers, tomatoes, herbs, leafy vegetables, lettuce, chicory, endive, radicchio, potatoes and sweet potatoes.	M Bee:VL	-

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 Helicoverpa was ranked as a high priority NT. <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.								
<i>Bacillus thuringiensis subsp. Kurstaki</i> (DiPel)	11A	Biological	NR	A	ALL	Registered in vegetables for control of Caterpillars, including Helicoverpa . [Apply a minimum of 2 sprays; re-treatment interval 3-5 d]	VL Bee:L	-
Chlorantraniliprole (Coragen) FMC	28	Ingestion	3	A	ALL	Registered in fruiting vegetables excluding cucurbits for control of Cotton Bollworm, Native Budworm , Tomato Leafminer and Eggfruit Caterpillar. [Max. 3 applications per crop, 2 consecutive; min. re-treatment interval 7 d]	L Bee:VL	-
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta	28+4A	Contact & Ingestion	NR	A	ALL	Registered in fruiting vegetables for control of Cotton Bollworm, Native Budworm , Cluster Caterpillar, Green Peach Aphid, Silverleaf Whitefly, Greenhouse Whitefly, Western Flower Thrips and Tomato Thrips. [Max. 1 application per crop]	M Bee:VH	R2
Cyantraniliprole (Benevia) FMC	28	Ingestion	1 NG	A	ALL	Registered in fruiting vegetables for control of Cotton Bollworm, Native Budworm , Tomato Leafminer, Silverleaf Whitefly and suppression of Green Peach Aphid, Tomato Thrips and Western Flower Thrips. [Max. 2 applications per crop; re-treatment interval 7-10 d]	M Bee:VH	-
Cyantraniliprole + Diafenthiuron (Minecto Forte) Syngenta	28+12A	Contact & Ingestion	1	A	ALL	Registered in fruiting vegetables for control of Helicoverpa , Potato Moth, Cluster Caterpillar, Silverleaf Whitefly, Green Peach Aphid, Two-Spotted Spider Mites and suppression of Western Flower Thrips, Tomato Thrips and Plague Thrips. Field use only with ground-based spraying. [Max. 2 applications per crop; re-treatment interval 28 d]	M Bee:VH	-

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 fruiting vegetables for control of Cluster Caterpillar and Helicoverpa . [Max 4 applications per crop; re-treatment interval min. 7 days]	M Bee:H	-
Flubendiamide (Belt) Bayer	28	Ingestion	1	A	ALL	Registered in fruiting vegetables excluding cucurbits for control of Helicoverpa and Tomato Leafminer. [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 fruiting vegetables for control of Helicoverpa spp. Effective on larvae of <7 mm. [Max no. of applications not specified; re-treatment interval 2-3 d]	VL Bee:L	-
Methomyl (Lannate) PER82428	1A	Contact	3	A	ALL	Permitted in okra (field) for control of Helicoverpa spp. , Cucumber Moth, Cluster Caterpillar, Loopers, Webworm, Rutherglen Bug and Thrips including Western Flower Thrips. [Max. 6 applications per crop; re-treatment interval 7 d]	H Bee:H	R2
Methoxyfenozide (Prodigy) Corteva	18	Ingestion	NR	A	ALL	Registered in okra for control of Native Budworm , Tomato Grub and Cluster Caterpillar. Apply to brown eggs or at egg hatch. [Max. no. of applications not specified; re-treatment interval 7 d]	VL Bee:VL	-
Spinetoram (Success Neo) Corteva	5	Ingestion	1	A	ALL	Registered in okra for the control of Helicoverpa , Tomato Leafminer, Western Flower Thrips and Tomato Potato Psyllid. [Max 4 applications per crop; re-treatment interval: 7-14 d]	M Bee:H	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	3 G:14	A	ALL	Registered in fruiting vegetables including okra for control of Helicoverpa , Tomato Leafminer and Western Flower Thrips. [Max. 4 applications per season; re-treatment interval 7-14 d]	L Bee:L	-
Isocycloseram (Plinazolin) Syngenta	30	Ingestion		P		SYNFOI21 is not registered but the first global application is proposed for 2023 for Thrips, Bugs, Mites and Caterpillars. Registration submitted May 2021 for isocycloseram to control Mites, Thrips and Helicoverpa in fruiting vegetables	-	-

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 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	-
Indoxacarb (Avatar eVo) FMC	22A	Ingestion		P		Registered for control of <i>Helicoverpa spp.</i> in brassica vegetables, leafy vegetables, Chinese leafy vegetables, capsicum, eggplant, peppers, tomato, celery, cucurbits, sweet corn and pome fruit.	L Bee:H	R3

Two-Spotted Mite (*Tetranychus urticae*)

Priority: High

Two Spotted Mite was ranked as a high priority in NT. Mites are spread from other crops and weeds and are generally worse in dry, warm weather. Farm hygiene is important, and the use of predatory mites (*Phytoseiulus persimilis*) are suitable for crops releases.

Abamectin	6	Contact & Ingestion	3 NG	A	ALL	Registered in fruiting vegetables other than cucurbits for control of Two Spotted Mite , Tomato Red Spider Mite, Tomato Russet Mite, Tomato Potato Psyllid and Tobacco Leafminer / Potato Moth. [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	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on Beneficials	Regulatory risk
Cyantraniliprole + Diafenthiuron (Minecto Forte) Syngenta	28+12A	Contact & Ingestion	1	A	ALL	Registered in fruiting vegetables for control of Helicoverpa, Potato Moth, Cluster Caterpillar, Silverleaf Whitefly, Green Peach Aphid, Two-Spotted Spider Mites and suppression of Western Flower Thrips, Tomato Thrips and Plague Thrips. Field use only with ground-based spraying. [Max. 2 applications per crop; re-treatment interval 28 d]	M Bee:VH	-
Potassium Salts of Fatty Acids (Natrasoap)	-	Contact	NR	A	ALL	Registered in vegetables for control of Aphids, Thrips, Mealybug, Two Spotted Mites , Spider Mite and Whitefly. Apply when temperatures are cooler. [Max no. of applications not specified; re-treatment interval 5-7 d]	L Bee:L	-
Propargite (Omite)	12C	Contact	7	A	ALL	Registered in vegetables for control of Two Spotted Mites . Apply at first appearance and repeat as necessary. [Max no. of applications per crop and re-treatment interval not specified]	M Bee:L	R3
Sulphur	UN	Contact	NR	A	ALL	Registered in vegetables for control of Mites . [Max. no. of applications not specified; re-treatment interval 14-21 d]	L Bee:L	-
Isocycloseram (Plinazolin) Syngenta	30	Ingestion		P		SYNFOI21 is not registered but the first global application is proposed for 2023 for Thrips, Bugs, Mites and Caterpillars. Registration submitted May 2021 for isocycloseram to control Mites , Thrips and Helicoverpa in fruiting vegetables	-	-
Spiromesifen (Oberon) Bayer	23	Ingestion		P		Australian Registration pending for control of Mites . Hort Innovation project ST19020 is generating data to support a new registration for control of Two-Spotted Mite, Tomato Russet Mite, European Red Mite and Rust Mite in fruiting vegetables (other than cucurbits).	M Bee:VL	-
Acequinocyl (Kanemite) UPL	20B	Contact & Ingestion		P		Registered for control of Two-Spotted Mite in pome and stone fruit.	L Bee:L	-
Bifenazate (Acramite) UPL	20D	Contact & Ingestion		P		Registered for control of Two-Spotted Mite in almond, peppers, cucurbits, paw paw, strawberry and tomato.	L Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on Beneficials	Regulatory risk
Cyflumetofen (Danisaraba) BASF	25A	Contact		P		BASF is seeking registration in Australia for the control of Spider Mites in various crops.	L Bee:L	-
Root Knot Nematode (<i>Meloidogyne</i> spp.)								
Priority: Moderate								
Root Knot Nematode was ranked as a moderate priority in NT. Management practices include soil fumigation and use of nematode free transplants.								
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Fumigant	NR	A	ALL	Registered in vegetables for control of Plant Parasitic Nematodes , Symphylans, Wireworms, soil borne diseases. Leave soil undisturbed for 14 d after treatment. For use by professional and registered fumigators only.	-	-
Fluensulfone (Nimitz) Adama	-	Contact	NR	A	ALL	Registered in okra for control of Root-Knot Nematode . Apply a minimum of 7 d before transplanting.	L Bee:L	-
Metham Sodium	-	Fumigant	NR	A	ALL	Registered as a soil fumigant for plant parasitic Nematodes , weed seeds, and various fungal diseases as a pre-plant treatment only.	-	-
Abamectin (Tervigo) Syngenta	6	Contact		P		Registered for control of Root-Knot Nematode in peppers, chilli, cucurbits, eggplant and tomato.	M Bee:H	-
Fluazaindolizine (Reklamel, Salibro) Corteva	New			P		Development underway in AU, to be launched globally in 2021. New MOA nematicide from Corteva. Registration expected for use in fruiting vegetables, as per APVMA public release summary July 2021.	-	-
Fluopyram (Velum) Bayer	7			P		Planned for registration as a nematicide in various crops. Registered in US for control of Nematodes in a range of vegetables.	L Bee:L	-
NUL3145 Nufarm	TBC			P		New product in development from Nufarm with activity on Scale, Nematodes , Mealybug and Whitefly.		-
SYNSTN1 Syngenta	TBC			P		Nematicide in development from Syngenta.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on Beneficials	Regulatory risk
Western Flower Thrips (<i>Frankliniella occidentalis</i>) Onion Thrips (<i>Thrips tabaci</i>) Tomato Thrips (<i>Frankliniella schultzei</i>) Plague Thrips (<i>Thrips imaginis</i>) Priority: Moderate								
Western Flower Thrips and other thrips species were ranked as a moderate priority in NT. It can be difficult to distinguish between thrips species in the field. Thrips cause direct feeding damage to foliage by piercing and rasping leaves. Western Flower Thrips develop resistance more easily than other thrips species. MT16009 IPM Project Recommends: The use of predatory thrips, mites & bug releases, control flowering weeds, mulch and use of certified seed.								
<i>Beauveria bassiana</i> (Velifer) BASF	UNF	Biological	NR	A	ALL	Registered in protected vegetables and ornamentals for suppression of various pests including Western Flower Thrips, Onion Thrips , Greenhouse Whitefly, Silverleaf Whitefly, Sweet Potato Whitefly, Green Peach Aphid & Two-Spotted Spider Mites. [Max. 3 application per crop; re-treatment interval 3-14 d]	L Bee:L	-
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta	28+4A	Contact & Ingestion	NR	A	ALL	Registered in fruiting vegetables for control of Cotton Bollworm, Native Budworm, Cluster Caterpillar, Green Peach Aphid, Silverleaf Whitefly, Greenhouse Whitefly, Western Flower Thrips and Tomato Thrips . [Max. 1 application per crop]	M Bee:VH	R2
Cyantraniliprole (Benevia) FMC	28	Ingestion	1 NG	A	ALL	Registered in fruiting vegetables for control of Cotton Bollworm, Native Budworm, Tomato Leafminer, Silverleaf Whitefly and suppression of Green Peach Aphid, Tomato Thrips and Western Flower Thrips . [Max. 2 applications per crop; re-treatment interval 7-10 d]	M Bee:VH	-
Cyantraniliprole + Diafenthiuron (Minecto Forte) Syngenta	28+12A	Contact & Ingestion	1	A	ALL	Registered in fruiting vegetables for control of Helicoverpa, Potato Moth, Cluster Caterpillar, Silverleaf Whitefly, Green Peach Aphid, Two-Spotted Spider Mites and suppression of Western Flower Thrips, Tomato Thrips and Plague Thrips . Field use only with ground-based spraying. [Max. 2 applications per crop; re-treatment interval 28 d]	M Bee:VH	-

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. [Max. no. of applications not specified]	VH Bee:H	-
Methomyl (Lannate) PER82428	1A	Contact	3	A	ALL	Permitted in okra (field) for control of <i>Helicoverpa</i> spp., Cucumber Moth, Cluster Caterpillar, Loopers, Webworm, Rutherglen Bug and Thrips including Western Flower Thrips . [Max. 6 applications per crop; re-treatment interval 7 d]	H Bee:H	R2
Potassium Salts of Fatty Acids (Natrasoap)	-	Contact	NR	A	ALL	Registered in vegetables for control of Aphids, Thrips , Mealybug, Two Spotted Mites, Spider Mite and Whitefly. Apply when temperatures are cooler. [Max no. of applications not specified; re-treatment interval 5-7 d]	L Bee:L	-
Spinetoram (Success Neo) Corteva	5	Ingestion	1	A	ALL	Registered in okra for the control of <i>Helicoverpa</i> , Tomato Leafminer, Western Flower Thrips and Tomato Potato Psyllid. [Max 4 applications per crop; re-treatment interval: 7-14 d]	M Bee:H	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	3 G:14	A	ALL	Registered in fruiting vegetables including okra for control of <i>Helicoverpa</i> , Tomato Leafminer and Western Flower Thrips . [Max. 4 applications per season; re-treatment interval 7-14 d]	L Bee:L	-
Dimpropridaz (Axalion) BASF	TBC			P		BASF has applied for registration to control Whitefly, Aphids and Thrips in leafy vegetables, brassica vegetables and fruiting vegetables, including cucurbits. Pending regulatory approvals, first market introduction in Australia is expected early 2023.	-	-
Isocycloseram (Plinazolin) Syngenta	30	Ingestion		P		SYNFOI21 is not registered but the first global application is proposed for 2023 for Thrips , Bugs, Mites and Caterpillars. Registration submitted May 2021 for isocycloseram to control Mites, Thrips and Helicoverpa in fruiting vegetables	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on Beneficials	Regulatory risk
Flonicamid (Mainman) ISK/UPL	29	Ingestion		P		Registered in cucurbits for control of Aphids and Silverleaf White Fly; Aphids in potatoes; Aphids and Mealybugs in apples and pears; Aphids and Mirids in Cotton. US registration for control of Aphids, Plant Bugs, Tomato Psyllids and Greenhouse Whitefly in fruiting vegetables, including eggplant. ST17000 is generating data to support a minor use permit for Thrips control in bulb vegetables.	M Bee:L	-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered for control of various thrips species in green beans, celery, rhubarb, eggplant, peppers, tomatoes, herbs, lettuce, onions, bulb vegetables, citrus and grapes.	M Bee:VL	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion		P		Registered in macadamia for control of Macadamia Lace Bug, Banana Spotting Bug, Fruit Spotting Bug and suppression of Scirtothrips. Label extension submitted October 2020 for control of Whitefly in cucurbits, eggplant, peppers, green beans, potatoes and sweet potatoes, and Aphids in cucurbits and potatoes.	L Bee:L	-
<p>Silverleaf Whitefly (<i>Bemisia tabaci</i>) Greenhouse Whitefly (<i>Trialeurodes vaporariorum</i>) Priority: Moderate</p> <p>Whiteflies were ranked as a moderate priority in NT. High reproduction rates and short generation time can lead to rapid population increases. Adults and nymphs feed on the sap and create honeydew which can impact on yield and produce quality.</p>								
Afidopyropen (Versys) BASF	9D	Ingestion	1	A	ALL	Registered in fruiting vegetables including okra for control of Green Peach Aphid, Cabbage Aphid, Currant Lettuce Aphid and Cotton/Melon Aphids and 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	NR	A	ALL	Registered in fruiting vegetables for control of Cotton Bollworm, Native Budworm, Cluster Caterpillar, Green Peach Aphid, Silverleaf Whitefly , Greenhouse Whitefly , Western Flower Thrips and Tomato Thrips. [Max. 1 application per crop]	M Bee:VH	R2
Cyantraniliprole (Benevia) FMC	28	Ingestion	1 NG	A	ALL	Registered in fruiting vegetables for control of Cotton Bollworm, Native Budworm, Tomato Leafminer, Silverleaf Whitefly and suppression of Green Peach Aphid, Tomato Thrips and Western Flower Thrips. [Max. 2 applications per crop; re-treatment interval 7-10 d]	M Bee:VH	-
Cyantraniliprole + Diafenthiuron (Minecto Forte) Syngenta	28+12A	Contact & Ingestion	1	A	ALL	Registered in fruiting vegetables for control of Helicoverpa, Potato Moth, Cluster Caterpillar, Silverleaf Whitefly , Green Peach Aphid, Two-Spotted Spider Mites and suppression of Western Flower Thrips, Tomato Thrips and Plague Thrips. Field use only with ground-based spraying. [Max. 2 applications per crop; re-treatment interval 28 d]	M Bee:VH	-
Emulsifiable Botanical Oils (Eco-Oil)	-	Contact	NR	A	ALL	Registered in vegetables for control of Greenhouse Whitefly . [Max. 3 applications per crop; re-treatment interval 27-56 d]	L Bee:L	-
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in vegetables for control of Ants, Aphids, Caterpillars, Earwigs, Whitefly , Thrips and Leafhoppers. Suitable for organic growers. Apply as a cover spray and re-apply as necessary every 2-3 weeks. [Max. no. of applications not specified]	VH Bee:H	-
Imidacloprid PER12351	4A	Contact & Ingestion	NR NG	A	ALL	Permitted for use in okra for control of Silverleaf Whitefly . Use as furrow soil drench (at least 5 days prior to planting) or plant hole drench (within 2 days of planting). Treated soil to be 100 mm below soil surface. [Max. 1 application per crop]	M Bee:M	R2
Petroleum Oil PER12221	UN	Contact	1	A	ALL (excl. VIC)	Permitted in okra for control of Greenhouse Whitefly and Silverleaf Whitefly . [Max. no. of applications and re-treatment intervals not specified]	VL Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on Beneficials	Regulatory risk
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	-
Pyriproxyfen (Admiral Advance) Sumitomo	7C	Ingestion	1 NG	A	ALL	Registered in fruiting vegetables for control of Silverleaf Whitefly and Greenhouse Whitefly . [Max. 2 applications per season; re-treatment interval 14 d]	VL Bee:L	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	1	A	ALL	Registered in okra for control of Green Peach Aphid, Greenhouse Whitefly , Rutherglen Bug and Tomato Potato Psyllid. Do not use if honeybees are foraging. [Max. no. of applications not specified; re-treatment interval 7-10 d]	M Bee:VH	-
<i>Clitoria ternatea</i> Extract (Sero-X) Growth Agriculture	UN	Biological	NR	P		Registered for control of <i>Helicoverpa</i> spp., Green Mirids and Silverleaf Whitefly in cotton and Diamondback Moth in brassicas. Innovate Ag applied in January 2021 to the APVMA seeking to add new uses against Silverleaf Whitefly and Thrips in brassicas and cucurbits to its Sero-X Insecticide label.	L L-Bees	-
Buprofezin (Applaud) Corteva	16	Contact & Ingestion		P		Registered for control of Silverleaf Whitefly in cotton and control of Silverleaf Whitefly and Greenhouse Whitefly in tomato.	L Bee:L	-
Dimpropridaz (Axalion) BASF	TBC			P		BASF has applied for registration to control Whitefly , Aphids and Thrips in leafy vegetables, brassica vegetables and fruiting vegetables, including cucurbits. Pending regulatory approvals, first market introduction in Australia is expected early 2023.	-	-
Flonicamid (Mainman) UPL/ISK	29	Ingestion		P		Registered in cucurbits for control of Aphids and Silverleaf Whitefly ; Aphids in potatoes; Aphids and Mealybugs in apples and pears; Aphids and Mirids in cotton.	M Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on Beneficials	Regulatory risk
Flupyradifurone (Sivanto) Bayer	4D	Contact & Ingestion		P		Registered in macadamia for control of Macadamia Lace Bug, Banana Spotting Bug, Fruit Spotting Bug and suppression of Scirtothrips. US registration for control of Leafhoppers, Aphids and Whiteflies in brassica vegetables. Label extension submitted October 2020 for control of Whitefly in cucurbits, eggplant, peppers, green beans, potatoes and sweet potatoes, and Aphids in cucurbits and potatoes.	L Bee:VL	-
NUL3145 Nufarm	TBC			P		New product from Nufarm with Whitefly activity.	-	-
Pymetrozine (Chess) Syngenta	9B	Ingestion		P		Registered for suppression of Silverleaf Whitefly in brassica vegetables, tomatoes, eggplant, capsicums and lettuce, and control of Silverleaf Whitefly and Greenhouse Whitefly in cucurbits, cut flowers and nursery stock.	L Bee:VL	R3
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered for control of Silverleaf Whitefly in green beans, green peas, brassica vegetables, brassica leafy vegetables, cucurbits, eggplant, peppers, tomatoes, potatoes, sweet potatoes and cotton.	M Bee:VL	-
Green Vegetable Bug (<i>Nezara viridula</i>)								
Priority: Low								
Green Vegetable Bug was ranked as a low priority in NT. 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.								
Trichlorfon (Lepidex)	1B	Contact	2	A	ALL	Registered in vegetables for control of Cabbage White Butterfly, Cabbage Moth, Green Vegetable Bug and Rutherglen Bug. [Max. no. applications not specified; re-treatment interval 7-10 d]	H Bee:VH	R2
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	1	P-A	ALL	Registered in okra for control of Green Peach Aphid, Greenhouse Whitefly, Rutherglen Bug and Tomato Potato Psyllid.	M Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on Beneficials	Regulatory risk
Isocycloseram (Plinazolin) Syngenta	30	Ingestion		P		SYNFOI21 is not registered but the first global application is proposed for 2023 for Thrips, Bugs , Mites and Caterpillars. Registration submitted May 2021 for isocycloseram to control Mites, Thrips and Helicoverpa in fruiting vegetables	-	-
Flupyradifurone (Sivanto Prime) 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 Aphid, Leafhoppers and Whiteflies in sweet corn.	L Bee:L	-
Jassids and Leafhoppers (Cicadellidae)								
Priority: Low								
Jassids and Leafhoppers were ranked as a low priority in NT. Adult and nymph leafhoppers suck sap and inject toxins into the plant.								
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. [Max. no. of applications not specified]	VH Bee:H	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	1	P-A	ALL	Registered in okra for control of Green Peach Aphid, Greenhouse Whitefly, Rutherglen Bug and Tomato Potato Psyllid. US registration for control of Leafhoppers in berries, root and tuber vegetables, pome fruit and small fruit vine climbing (except fuzzy kiwifruit).	M Bee:VH	-
Isocycloseram (Plinazolin) Syngenta	30	Ingestion		P		SYNFOI21 is not registered but the first global application is proposed for 2023 for Thrips, Bugs , Mites and Caterpillars. Registration submitted May 2021 for isocycloseram to control Mites, Thrips and Helicoverpa in fruiting vegetables	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on Beneficials	Regulatory risk
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion		P		Registered 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 leafy vegetables, cucurbits, fruiting vegetables, leafy vegetables, legume vegetables, peanuts, pome fruit, root vegetables, small fruit vine climbing (except fuzzy kiwifruit), taro, tuberous and corm vegetables and turnip greens.	L Bee:VL	-
Mealybug (Pseudococcidae)								
Priority: Low								
Mealybugs were ranked as a low priority in NT. They are an infrequent pest but can be difficult to control when present.								
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	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	1	P-A	ALL	Registered in okra for control of Green Peach Aphid, Greenhouse Whitefly, Rutherglen Bug and Tomato Potato Psyllid. Registered for control of Mealybug in citrus, grapes and pome fruit.	M Bee:VH	-
Isocycloseram (Plinazolin) Syngenta	30	Ingestion		P		SYNFOI21 is not registered but the first global application is proposed for 2023 for Thrips, Bugs, Mites and Caterpillars. Registration submitted May 2021 for isocycloseram to control Mites, Thrips and Helicoverpa in fruiting vegetables	-	-
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Contact & Ingestion		P		Registered for control of Mealybugs in grapes and macadamia.	VL Bee:L	R2
Buprofezin (Applaud) Corteva	16	Contact & Ingestion		P		Registered for control of Mealybugs in custard apple, grapes, citrus, passion fruit, pear and persimmons.	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on Beneficials	Regulatory risk
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion		P		US registration for control of Mealybugs in citrus and small fruit vine climbing (except fuzzy kiwifruit). Bayer label extension submitted in October 2020 to include control of whitefly in cucurbits, eggplant, peppers, green beans, potatoes, sweet potatoes, and aphids in cucurbits, potatoes.	L Bee:VL	-
NUL3145 Nufarm	TBC			P		New product in development from Nufarm with activity on Scale, Nematodes, Mealybug and Whitefly.		-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered for control of Mealybug in cotton, citrus, grapes, mango, passionfruit, pome fruit and stone fruit.	M Bee:VL	-
Wingless Grasshopper (<i>Phaulacridium vittatum</i>) Priority: Low								
Wingless Grasshopper was ranked as a low priority in NT. Infrequent pest that rarely warrants control measures.								
Fenitrothion	1B	Contact		P		Registered for the control of a range of Grasshoppers & Locusts in pastures and cereal crops.	H Bee:H	-
Fall Armyworm (<i>Spodoptera frugiperda</i>) Priority: Unknown								
Fall Armyworm was not ranked as a pest in Okra. 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 various crops including fruiting vegetables 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	42	A	ALL (excl. VIC)	Permitted for use in fruiting vegetables excluding cucurbits for control of Fall Armyworm . Do not transplant seedlings treated by seedling drench into hydroponic production systems. [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 various crops including fruiting vegetables for control of Fall Armyworm . [Max. 4 applications per crop; re-treatment interval 7-14 d]	M Bee:H	-
Methomyl (Lannate) PER89293	1A	Contact	14	A	ALL	Permitted for use in various crops including fruiting vegetables (field grown only) 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 fruiting vegetables including okra 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 various crops including fruiting vegetables 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 in various crops including fruiting vegetables for control of Fall Armyworm . [Max 10 applications per crop; Min. re-treatment interval: 3 d]	VL Bee:L	-
Isocycloseram (Plinazolin) Syngenta	30	Ingestion		P		SYNFOI21 is not registered but the first global application is proposed for 2023 for Thrips, Bugs, Mites and Caterpillars . Registration submitted May 2021 for isocycloseram to control Mites, Thrips and Helicoverpa in fruiting vegetables	-	-
Amorphous Silica (Abrade)	-	Contact		P		Permitted for control of Fall Armyworm in sweet corn.	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on Beneficials	Regulatory risk
Broflanilide (Vedira) BASF	30	Contact & Ingestion		P		Registration submitted concurrently in Australia, Canada, USA, and Mexico as a soil application and seed treatment against chewing insects such as ants, cockroaches and Spodoptera spp. BASF are seeking registrations in amenity turf initially, then potential horticultural crops thereafter.	H Bee:VH	-
Indoxacarb (Avatar eVo) FMC	22A	Ingestion		P		Permitted for control of Fall Armyworm in sweet corn, brassica vegetables, celery, capsicum, eggplant, peppers, tomato, leafy vegetables, Chinese leafy vegetables, pome fruit, stone fruit, grapes, berries and macadamia nuts.	L Bee:H	R3

Leafminers (*Liriomyza* spp.)

Priority: Unknown

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

Abamectin PER81876	6	Contact & Ingestion	1	A	ALL (excl. VIC)	Permitted for use in okra for control of Vegetable Leafminer . [Max. 2 application per crop; re-treatment interval 7-14 d]	M Bee:H	-
Cyantraniliprole (Benevia) FMC PER90387	28	Ingestion	1 NG	A	ALL (excl. VIC)	Permitted for use in fruiting vegetables for control of Liriomyza spp. including Vegetable Leafminer & Serpentine Leafminer . [Max. 2 applications per crop; re-treatment interval 7 d]	M Bee:VH	-
Cyromazine (Diptex 150 WP) PER81867	17	Insect Growth Regulator	7 NG	A	ALL	Permitted for use in fruiting vegetables for control of Liriomyza spp. including Vegetable Leafminer (<i>Liriomyza sativa</i>) and Serpentine Leafminer (<i>Liriomyza huidobrensis</i>). [Max. 6 applications per crop; re-treatment interval 7 d]	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on Beneficials	Regulatory risk
Spinetoram (Success Neo) Corteva PER91155	5	Ingestion	1	A	ALL (excl. VIC)	Permitted for use in fruiting vegetables including okra for control of Liriomyza Leafminers , 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 7-14 d]	M Bee:H	-
Spinosad (Entrust Organic) Corteva PER90928	5	Ingestion	3 G:14	A	ALL (excl. VIC)	Permitted for use in fruiting vegetables including okra for control of Liriomyza Leafminers , 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	-
Chlorantraniliprole (Coragen) FMC	28	Ingestion	3	P-A	ALL	Registered in fruiting vegetables excluding cucurbits for control of Cotton Bollworm, Native Budworm, Tomato Leafminer and Eggfruit Caterpillar. 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 fruiting vegetables for control of Cluster Caterpillar and Helicoverpa. Permitted for control of Liriomyza Leafminers in brassica vegetables.	M Bee:H	-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Permitted for control of Liriomyza Leafminers in snow peas, sugar snap peas, lettuce, parsley, eggplant, capsicums, chilies, tomatoes, green beans, celery and rhubarb.	M Bee:VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on Beneficials	Regulatory risk
Tomato Potato Psyllid (<i>Bactericera cockerelli</i>)								
Priority: Unknown								
Tomato Potato Psyllid was not ranked as a pest in okra. 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.								
Abamectin	6	Contact & Ingestion	3 NG	A	ALL	Registered in fruiting vegetables other than cucurbits for control of Two Spotted Mite, Tomato Red Spider Mite, Tomato Russet Mite, Tomato Potato Psyllid and Tobacco Leafminer / Potato Moth. [Max 2 applications per crop; re-treatment interval 28 d.]	M Bee:H	-
Cyantraniliprole (Benevia) FMC PER84805	28	Ingestion	1	A	ALL (excl. VIC)	Permitted to use in fruiting vegetables for control of Tomato Potato Psyllid . [Max. 2 application per crop; re-treatment interval 7-10 d]	M Bee:VH	-
Spinetoram (Success Neo) Corteva	5	Ingestion	1	A	ALL (excl. VIC)	Registered in okra for control of Helicoverpa, Tomato Leafminer, Western Flower Thrips and Tomato Potato Psyllid . [Max. 4 application per crop; re-treatment interval 7-14 d]	M Bee:H	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	1	A	ALL	Registered in okra for control of Green Peach Aphid, Greenhouse Whitefly, Rutherglen Bug and Tomato Potato Psyllid . Do not use if honeybees are foraging. [Max. no. of applications not specified; re-treatment interval 7-10 d]	M Bee:VH	-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered for control of various species of Aphids, Thrips and Whitefly in various vegetables crops. Permitted for control of Tomato Potato Psyllid in potato, sweet potato, tomato, capsicum, chilli, pepper and eggplant.	M Bee:VL	-

4.3 Weeds in Okra

4.3.1 Weed priorities

No significant weeds have been identified in the recent survey of the NT Okra growers. Okra is grown during the dry season in the NT and is normally seeded using plastic mulch and tape irrigation to aid managing weed pressure. NT Okra growers do not use pre-emergent herbicides but use general knockdown herbicides before seeding or transplanting.

Herbicides are being used to control grass weeds near plastic mulch and in between rows. Growers with an IPM approach, leave grass weeds in between rows as a reservoir habitat for beneficial insects.

In general growers commented weeds not being a major issue.

Managing weeds would be possible using herbicides mentioned in Appendix 3 or by various management practices such as soil fumigation, pre-crop spraying, spot spraying, or using mechanical devices. Most weeds can be controlled with currently available herbicides.

Resistance management

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

Specific resistance management strategies for high resistance risk (A and B) and moderate resistance risk (C, D, F, G, I, J, K, L, M, N, Q and Z) herbicide modes of action are available on the CropLife Australia webpage⁶.

⁶ <https://www.croplife.org.au/resources/programs/resistance-management/herbicide-resistance-management-strategies-2/>

4.3.2 Available and potential products for weed control

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

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

Active ingredient (Trade Name)	Chemical Group	Crop / Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Grass and Broadleaf Weeds							
Priority: unknown							
No weeds were identified by the Okra growers during the recent survey. Okra is grown during the dry season in the NT and is normally seeded using plastic mulch and tape irrigation to aid managing weed pressure. The following general knockdown herbicides can be used for broadleaf weeds.							
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Vegetables / Soil Fumigant	Registered in various crops including vegetables for control of plant parasitic nematodes, symphylans, wireworms, soil borne diseases and suppression of weeds. Do not plant for 7 d after soil treatment. For use by professional and registered fumigators only.	NR	A	ALL	-
Glyphosate (Roundup)	M**	General Knockdown / Pre-Crop Spray	Registered for control of grass and broadleaf weeds as a pre-crop spray or fallow spray.	NR	A	ALL	R3
Paraquat + Diquat (SpraySeed)	L***	General Knockdown / Pre-Crop Spray	Registered as a pre-plant knockdown application for control of grass and broadleaf weeds.	NR	A	ALL	R3

5. References

5.1 Information:

AgChem Access Priority Access Forum	https://www.agrifutures.com.au/national-rural-issues/agvet-chemicals/
Australian Pesticide and Veterinary Medicines Authority	www.apvma.gov.au
APVMA Chemical review	https://apvma.gov.au/chemicals-and-products/chemical-review/listing
APVMA MRLs	www.legislation.gov.au/Details/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, nematicides, rodenticides, etc.).
Plant pests	Diseases, insects, nematodes, rodents, viruses, weeds, etc.
SARP	Strategic Agrichemical Review Process
TBC	To be confirmed
WHP	Withholding Period

5.3 Acknowledgements:

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

6. Appendices:

Appendix 1. Products available for disease control in okra

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

Appendix 3. Products available for weed control in okra

Appendix 4. Current permits for use in okra

Appendix 5. Okra Maximum Residue Limits (MRLs)

Appendix 6. Okra Agrichemical Regulatory Risk Assessment

Appendix 1. Products available for disease control in okra

Active Ingredient (Trade Name)	Chemical group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	General fumigant	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	-
<i>Aureobasidium pullulans</i> (Botector) Nufarm	BM 02	Fruiting Vegetables	Botrytis Grey Mould Suppression of Sclerotinia	ALL	NR	-
<i>Bacillus amyloliquefaciens</i> Strain QST 713 (Serenade Prime Soil Ameliorant and Biofungicide) Bayer	BM 02	Vegetables	Registered in vegetables for application to soil to improve bioavailability of soil resources to horticultural crops.	ALL	NR	-
Chloropicrin (Agrocelhone NE Soil Fumigant)	8	General fumigant	Soil-Borne Diseases, including <i>Fusarium</i> , <i>Verticillium</i> wilts, <i>Rhizoctonia</i> and <i>Pythium</i> .	ALL	NR	-
Chlorothalonil (Bravo)	M5	Okra	Leaf Disease/Spot	QLD & WA	1	R3
Copper	M1	Vegetables	Rust and Leaf Spot Diseases	ALL	1	-
Dazomet (Basamid)	8F	Vegetables	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.	ALL	NR	-
Mancozeb PER14593	M3	Okra (field)	Downy Mildew, Anthracnose, & Alternaria	ALL (excl. VIC)	14 G:14	R2

Active Ingredient (Trade Name)	Chemical group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Metham Sodium	-	Food crops / Pre-plant fumigant	Fungus diseases including <i>Rhizoctonia</i> , <i>Pythium</i> , <i>Fusarium</i> , <i>Phytophthora</i> , <i>Verticillium</i> , <i>Sclerotinia</i> and Club Root of crucifers	ALL	NR	-
Penthiopyrad (Fontelis) Corteva	7	Fruiting Vegetables	Early Blight (<i>Alternaria solani</i>) Grey Mould (<i>Botrytis cinerea</i>) Powdery Mildew (<i>Leveillula taurica</i>)	ALL	NR	-
<i>Streptomyces lydicus</i> WYEC108 (Actinovate) Novozymes Bioag	BM 02	Fruiting Vegetables	Powdery Mildew	ALL	NR	-
Sulphur	UN	Vegetables	Powdery Mildew, Rust, Black Spot, Mites	ALL	NR	-

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

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP	Regulatory risk
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	General fumigant	Plant parasitic Nematodes, Symphylans, Wireworms, soil borne diseases (including <i>Fusarium</i> and <i>Verticillium</i> wilts, <i>Rhizoctonia</i> , <i>Pythium</i>) and suppression of weeds. <i>For use by professional and registered fumigators only.</i>	ALL	NR	-
Abamectin	6	Fruiting Vegetables, other than cucurbits	Two Spotted Mite, Tomato Red Spider Mite, Tomato Russet Mite, Tomato Potato Psyllid, Tobacco Leafminer / Potato Moth	ALL	3 NG	-
Abamectin PER81876	6	Okra	Vegetable Leafminer	ALL (excl. VIC)	1	-
Afidpyropen (Versys) BASF	9D	Fruiting Vegetables, excluding cucurbits	Green Peach Aphid, Cabbage Aphid, Currant Lettuce Aphid, Melon Aphid, Corn Aphid and suppression of Silverleaf Whitefly	ALL	1	-
Alpha-Cypermethrin PER80099	3A	Fruiting Vegetables, except cucurbits	Mediterranean Fruit Fly Queensland Fruit Fly	ALL (excl. VIC)	1	-
<i>Bacillus thuringiensis subsp. Kurstaki</i> (DiPel)	11A	Vegetables	Caterpillars, including <i>Helicoverpa</i>	ALL	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	-
Chlorantraniliprole (Coragen) FMC	28	Fruiting vegetables excluding cucurbits	Cotton Bollworm, Native Budworm, Tomato Leafminer and Eggfruit Caterpillar.	ALL	3	-
Chlorantraniliprole (Coragen) FMC PER89259	28	Fruiting vegetables	Fall Armyworm	ALL (excl. VIC)	1	-

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP	Regulatory risk
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta	28+4A	Fruiting vegetables	Cotton Bollworm, Native Budworm, Cluster Caterpillar, Green Peach Aphid, Silverleaf Whitefly, Greenhouse Whitefly, Western Flower Thrips and Tomato Thrips.	ALL	NR	R2
Chlorantraniliprole + Thiamethoxam (Durivo) Syngenta PER89280	28+4A	Fruiting vegetables (excluding cucurbits)	Fall Armyworm	ALL (excl. VIC)	42	R2
Clothianidin (Samurai) PER80100	4A	Fruiting Vegetables, excluding cucurbits	Mediterranean Fruit Fly Queensland Fruit Fly	ALL	7 NG	R2
Cyantraniliprole (Benevia) FMC	28	Fruiting vegetables	Cotton Bollworm, Native Budworm, Tomato Leafminer, Silverleaf Whitefly and suppression of Green Peach Aphid, Tomato Thrips and Western Flower Thrips	ALL	1 NG	-
Cyantraniliprole (Benevia) FMC PER84805	28	Fruiting vegetables	Tomato Potato Psyllid	ALL (excl. VIC)	1	-
Cyantraniliprole (Benevia) FMC PER90387		Fruiting vegetables	<i>Liriomyza</i> spp. including Vegetable Leafminer & Serpentine Leafminer	ALL (excl. VIC)	1 NG	-
Cyantraniliprole + Diafenthiuron (Minecto Forte) Syngenta	28+12A	Fruiting vegetables (field only)	Helicoverpa, Potato Moth, Cluster Caterpillar, Silverleaf Whitefly, Green Peach Aphid, Two-Spotted Spider Mites and suppression of Western Flower Thrips, Tomato Thrips & Plague Thrips	ALL	1	-
Cyromazine (Diptex 150 WP) PER81867	17	Fruiting Vegetables	<i>Liriomyza</i> species, including Vegetable Leafminer (<i>Liriomyza sativa</i>) and Serpentine Leafminer (<i>Liriomyza huidobrensis</i>)	ALL	7 NG	-

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP	Regulatory risk
Emamectin (Proclaim Opti) Syngenta	6	Fruiting vegetables	Cluster Caterpillar & Helicoverpa	ALL	3	
Emamectin (Proclaim Opti) Syngenta PER89263	6	Fruiting vegetables	Fall Armyworm	ALL (excl. VIC)	3 NG	-
Emulsifiable Botanical Oils (Eco-Oil)	-	Vegetables	Greenhouse Whitefly	ALL	NR	-
Fluensulfone (Nimitz) Adama	-	Okra	Root-Knot Nematode	ALL	NR	-
Flubendiamide (Belt) Bayer	28	Fruiting Vegetables, excluding cucurbits	Helicoverpa Tomato Leafminer	ALL	1	-
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	Fruiting Vegetables	Corn Earworm, Native Budworm	ALL	-	-
Imidacloprid PER12351	4A	Okra (field)	Silverleaf Whitefly	ALL	NR NG	R2
Metham Sodium	-	Soil fumigant	Nematodes, weed seeds, and various fungal diseases, including <i>Rhizoctonia</i> , <i>Pythium</i> , <i>Fusarium</i> , <i>Phytophthora</i> , <i>Verticillium</i> , <i>Sclerotinia</i> and Club Root of crucifers	ALL	NR	-
Methomyl (Lannate) PER82428	1A	Okra (field)	<i>Helicoverpa</i> spp., Cucumber Moth, Cluster Caterpillar, Loopers, Webworm, Rutherglen Bug, Thrips including Western Flower Thrips	ALL	3	R2
Methomyl (Lannate) PER89293	1A	Fruiting vegetables, excluding cucurbits (field)	Fall Armyworm	ALL	14	R2

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP	Regulatory risk
Methoxyfenozide (Prodigy) Corteva	18	Okra	Native Budworm, Tomato Grub, Cluster Caterpillar	ALL	NR	-
Petroleum Oil	UN	Okra	Silverleaf Whitefly	QLD	1	-
Petroleum Oil PER12221	UN	Okra	Greenhouse Whitefly & Silverleaf Whitefly	ALL (excl. VIC)	1	-
Pirimicarb (Aphidex)	1A	Okra	Aphids	ALL	2	R3
Potassium Salts of Fatty Acids (Natrasoap)	-	Vegetables	Aphids, Thrips, Mealybug, Two Spotted Mites, Spider Mite and White Fly	ALL	NR	-
Propargite (Omite)	12C	Vegetables	Two-Spotted Mites	ALL	7	R3
			Spider Mite	QLD & WA		
Pyrethrins (Pyganic)	3A	Vegetables	Clean up spray prior to harvest to control Fruit Fly, Rutherglen Bug, Spiders	ALL	1	-
Pyriproxyfen (Admiral Advance) Sumitomo	7C	Fruiting Vegetables	Silverleaf Whitefly Greenhouse Whitefly	ALL	1 NG	-
Spinetoram (Success Neo) Corteva	5	Okra	<i>Helicoverpa</i> , Tomato Leafminer, Western Flower Thrips and Tomato Potato Psyllid	ALL	1	-
Spinetoram (Success Neo) Corteva PER89241	5	Fruiting vegetables	Fall armyworm	ALL (excl. VIC)	3	-
Spinetoram (Success Neo) Corteva PER84757	5	Fruiting vegetables, except cucurbits	Tomato Potato Psyllid	ALL (excl. VIC)	1	-

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP	Regulatory risk
Spinetoram (Success Neo) Corteva PER91155	5	Fruiting vegetables including Okra	Liriomyza Leafminers, 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	-
Spinosad (Entrust Organic) Corteva	5	Okra	<i>Helicoverpa</i> , Tomato Leafminer and Western Flower Thrips	ALL	3 G:14	-
Spinosad (Entrust Organic) Corteva PER89870	5	Fruiting vegetables	Fall Armyworm (<i>Spodoptera frugiperda</i>)	ALL	3 G:14	-
Spinosad (Entrust Organic) Corteva PER90928	5	Fruiting vegetables	<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)	3 G:14	-
<i>Spodoptera frugiperda</i> Multiple Nucleopolyhedrovirus (Fawligen) AgBiTech PER90820	31	Fruiting Vegetables	Fall Armyworm	ALL	NR	-
Sulfoxaflor (Transform) Corteva	4C	Okra	Green Peach Aphid, Greenhouse Whitefly, Rutherglen Bug and Tomato Potato Psyllid	ALL	1	-
Sulfoxaflor (Transform) Corteva PER84743	4C	Fruiting vegetables, other than cucurbits	Tomato Potato Psyllid	ALL (excl. VIC)	1	-
Sulphur	UN	Vegetables	Mites	ALL	NR	-
Trichlorfon (Lepidex)	1B	Vegetables	Cabbage White Butterfly, Cabbage Moth, Green Vegetable Bug and Rutherglen Bug	ALL	2	R2

Appendix 3. Products available for weed control in okra

Active ingredient (Trade Name)	Chemical Group	Situation	Comment / Use / Weed	WHP (days)	States	Regulatory risk
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	General Fumigant	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	-
Glyphosate (Roundup)	M**	General Knockdown / Pre-Crop Spray	Grass and Broadleaf Weeds as a pre-crop spray	NR	ALL	R3
Paraquat + Diquat (SpraySeed)	L***	General Knockdown / Pre-Crop Spray	Grass and Broadleaf Weeds as a pre-crop spray.	NR	ALL	R3

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

Appendix 4. Current permits for use in okra

Permit No.	Description	Issued Date	Expiry Date	Permit Holder
PER80099 Version 3	Alpha-Cypermethrin / Fruiting Vegetables, except cucurbits / Fruit Fly	26-Feb-15	31-Mar-25	Hort Innovation
PER81876 Version 4	Abamectin / Fruiting vegetables, other than cucurbits / Liriomyza Leafminers	24-Jun-16	30-Apr-24	Hort Innovation
PER89259	Chlorantraniliprole (Coragen) / Fruiting vegetables / Fall Armyworm	06-Mar-20	31-Mar-23	Hort Innovation
PER89280	Chlorantraniliprole + Thiamethoxam (Durivo) / Fruiting vegetables excluding cucurbits / Fall Armyworm (field)	12-Mar-20	31-Mar-23	Hort Innovation
PER80100 Version 3	Clothianidin (Samurai) / Fruiting Vegetables, excluding cucurbits / Fruit Fly	10-Nov-15	30-Sep-23	Hort Innovation
PER84805	Cyantraniliprole (Benevia) / Fruiting vegetables / Tomato Potato Psyllid	06-Dec-17	31-Dec-22	Hort Innovation
PER90387	Cyantraniliprole (Benevia) / Fruiting vegetables / Liriomyza Leafminers	03-Dec-20	31-Dec-23	Hort Innovation
PER81867 Version 2	Cyromazine (Diptex 150 WP) / Fruiting vegetables / Liriomyza Leafminers	2-Dec-19	30-Nov-23	Hort Innovation
PER89263 Version 2	Emamectin (Proclaim Opti) / Fruiting vegetables / Fall Armyworm	10-Mar-20	31-Mar-23	Hort Innovation
PER12351 Version 3	Imidacloprid / Various crops including Okra / Silverleaf Whitefly (field)	30-Mar-15	31-Apr-25	Hort Innovation
PER14593 Version 3	Mancozeb / Specified fruiting vegetables including Okra / Downy Mildew, Anthracnose (<i>Colletotrichum</i> spp.) & Alternaria	10-Jul-14	31-Apr-25	Hort Innovation
PER82428 Version 4	Methomyl (Lannate) / Various crops including Okra / <i>Helicoverpa</i> spp., Cucumber Moth, Cluster Caterpillar, Loopers, Webworm, Rutherglen Bug, Thrips including Western Flower Thrips (field)	22-Apr-16	31-Mar-24	Hort Innovation
PER89293	Methomyl (Lannate) / Fruiting vegetables, excluding cucurbits / Fall Armyworm (field)	10-Apr-20	30-Apr-23	Hort Innovation

Permit No.	Description	Issued Date	Expiry Date	Permit Holder
PER12221 Version 4	Petroleum Oil / Specified vegetable crops including Okra / Greenhouse Whitefly & Silverleaf Whitefly	29-Jun-12	30-Nov-22	Hort Innovation
PER89241	Spinetoram (Success Neo) / Fruiting vegetables / Fall Armyworm	06-Mar-20	31-Mar-23	Hort Innovation
PER84757 Version 2	Spinetoram (Success Neo) / Fruiting vegetables, except cucurbits / Tomato Potato Psyllid	28-Nov-17	31-Aug-25	Hort Innovation
PER91155	Spinetoram (Success Neo) / Fruiting vegetables including Okra / Liriomyza Leafminers	09-Jun-21	30-Jun-24	Hort Innovation
PER89870	Spinosad (Entrust Organic) / Various Crops including fruiting vegetables / Fall Armyworm	21-Jul-20	31-Jul-23	Hort Innovation
PER90928	Spinosad (Entrust Organic) / Fruiting vegetables including Okra / Liriomyza Leafminers	23-Apr-21	30-Apr-24	Hort Innovation
PER90820 Version 3	<i>Spodoptera frugiperda</i> Multiple Nucleopolyhedrovirus (Fawligen) / Various including Fruiting Vegetables, other than cucurbits / Fall Armyworm	30-Mar-21	31-Mar-24	AgBiTech
PER84743	Sulfoxaflor (Transform) /Fruiting vegetables / Tomato Potato Psyllid	24-Oct-17	31-Oct-22	Hort Innovation

Appendix 5. Okra Maximum Residue Limits (MRLs)

CODEX commodity grouping of Fruiting vegetables other than cucurbits (012):

VO 0050	Fruiting vegetables other than cucurbits
VO 0442	Okra
-	Vegetables

Note: Currently production of all Okra is for the Australian market and no exports are recorded. Available information indicates that in the absence specific limits in legislation the most countries defer to Codex, followed by EU MRL standards or apply 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
2,2-DPA		Vegetables	*0.1	
Abamectin	VO0050	Fruiting vegetables other than cucurbits	0.1	-
Acetamiprid	VO0050	Fruiting vegetables other than cucurbits	-	0.2
Afidopyropen	VO0050	Fruiting vegetables other than cucurbits	0.2	
Ametoctradin	VO0050	Fruiting vegetables other than cucurbits	-	1.5
Azoxystrobin	VO0050	Fruiting vegetables other than cucurbits	-	3
	VO0442	Okra	T2	-
Benzovindiflupyr	VO0050	Fruiting vegetables other than cucurbits		0.9
Bifenazate	VO0050	Fruiting vegetables other than cucurbits	1	-
Bifenthrin	VO0050	Fruiting vegetables other than cucurbits	0.5	-
Boscalid	VO0050	Fruiting vegetables other than cucurbits	1	3
Bromide Ion	VO0442	Okra		200
Buprofezin	VO0050	Fruiting vegetables other than cucurbits	T2	-
Chlorantraniliprole	VO0050	Fruiting vegetables other than cucurbits	0.3	0.6
Chlordane	-	Vegetables (some exceptions)	E0.02	-
Chlorothalonil	-	Vegetables (some exceptions)	T7	-
Chlorpyrifos	-	Vegetables (some exceptions)	T*0.01	
Chlorthal-dimethyl	-	Vegetables (except lettuce)	5	-
Clothianidin	VO0050	Fruiting vegetables other than cucurbits	T0.7	0.05
Cyantraniliprole	VO0050	Fruiting vegetables other than cucurbits	2	0.5
Cyhalothrin (includes lambda-cyhalothrin)	VO0050	Fruiting vegetables other than cucurbits	-	0.3
Cypermethrins (including alpha- and zeta- cypermethrin)	VO0050	Fruiting vegetables other than cucurbits	T1	-
	VO0442	Okra		0.5
Cyprodinil	VO0050	Fruiting vegetables other than cucurbits	-	2
Cyromazine	VO0050	Fruiting vegetables other than cucurbits	T1	1
DDT		Vegetables	E1	-
Deltamethrin	VO0050	Fruiting vegetables other than cucurbits	0.1	-
Diafenthiuron	VO0050	Fruiting vegetables other than cucurbits	0.5	-
Diazinon	-	Vegetables	0.7	-
Dichlobenil	VO0050	Fruiting vegetables other than cucurbits	-	*0.01
Dicofol	-	Vegetables (some exceptions)	5	-
Difenoconazole	VO0050	Fruiting vegetables other than cucurbits	-	0.6
Dimethomorph	VO0050	Fruiting vegetables other than cucurbits	-	1.5
Dinotefuran	VO0050	Fruiting vegetables other than cucurbits	-	0.5

Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Diquat	VO0050	Fruiting vegetables other than cucurbits	-	*0.01
	-	Vegetables (some exceptions)	*0.05	-
Dithiocarbamates	VO0050	Fruiting vegetables other than cucurbits	3	-
Emamectin benzoate	VO0050	Fruiting vegetables other than cucurbits	0.1	0.02
EPTC	-	Vegetables	*0.04	-
Etoxazole	VO0050	Fruiting vegetables other than cucurbits	0.05	-
Fenamidone	VO0050	Fruiting vegetables other than cucurbits	-	1.5
Flonicamid	VO0050	Fruiting vegetables other than cucurbits	T0.5	0.4
Fluazaindolizine	VO0050	Fruiting vegetables other than cucurbits	0.2	-
Flubendiamide	VO0050	Fruiting vegetables other than cucurbits	2	-
Fluensulfone	VO0050	Fruiting vegetables other than cucurbits	1	0.7
Flumioxazin	VO0050	Fruiting vegetables other than cucurbits	-	*0.02
Fluopicolide	VO0050	Fruiting vegetables other than cucurbits	-	1
Fluxapyroxad	VO 0050	Fruiting vegetables other than cucurbits	-	0.6
Forchlorfenuron	VO0050	Fruiting vegetables other than cucurbits	T0.02	-
Glyphosate	VO0050	Fruiting vegetables other than cucurbits	*0.1	-
Hexythiazox	VO0050	Fruiting vegetables other than cucurbits	T1	-
Imidacloprid	VO0050	Fruiting vegetables other than cucurbits	0.5	-
Inorganic bromide	-	Vegetables (except peppers)	20	-
Lindane	-	Vegetables	E2	-
Linuron	-	Vegetables (some exceptions)	*0.05	-
Maldison	VO0050	Fruiting vegetables other than cucurbits	3	-
Mesotrione	VO0442	Okra	-	*0.01
Metalaxyl	-	Vegetables (some exceptions)	T0.1	-
Metaldehyde	-	Vegetables	1	-
Methiocarb	-	Vegetables	0.1	-
Methomyl	VO0050	Fruiting vegetables other than cucurbits	1	-
Methoxyfenozide	VO0050	Fruiting vegetables other than cucurbits	3	-
Methyl bromide	-	Vegetables (some exceptions)	T*0.05	-
Milbemectin	VO0050	Fruiting vegetables other than cucurbits	0.02	-
Novaluron	VO0050	Fruiting vegetables other than cucurbits	0.2	0.7
Omethoate				-
Oxathiapiprolin	VO0050	Fruiting vegetables other than cucurbits		0.4
Paclobutrazol	VO0050	Fruiting vegetables other than cucurbits	T*0.01	
Paraquat	VO0050	Fruiting vegetables other than cucurbits	-	0.05
	-	Vegetables (some exceptions)	*0.05	-
Penthiopyrad	VO0050	Fruiting vegetables other than cucurbits	5	2
Phosphorous acid	VO0050	Fruiting vegetables other than cucurbits	T100	-
Piperonyl butoxide	-	Vegetables	8	-
Pirimicarb	VO0050	Fruiting vegetables other than cucurbits	-	0.5
	-	Vegetables	1	-
Prometryn	-	Vegetables	*0.1	-
Propamocarb	VO0050	Fruiting vegetables other than cucurbits	T0.3	-
Propargite	-	Vegetables	3	-
Propazine	-	Vegetables	*0.1	-
Pydiflumetofen	VO0050	Fruiting vegetables other than cucurbits	T0.7	
Pymetrozine	VO0050	Fruiting vegetables other than cucurbits	0.5	-
Pyraclostrobin	VO0050	Fruiting vegetables other than cucurbits	0.3	-
Pyrethrins	-	Vegetables	1	-

Chemical	Codex	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Pyriproxyfen	VO0050	Fruiting vegetables other than cucurbits	1	-
Spinetoram	VO0050	Fruiting vegetables other than cucurbits	0.1	-
Spinosad	VO0050	Fruiting vegetables other than cucurbits	0.2	-
Spiromesifen	VO0442	Okra		0.5
Spirotetramat	VO0050	Fruiting vegetables other than cucurbits	7	1
Sulfoxaflor	VO0050	Fruiting vegetables other than cucurbits	1	1.5
Thiamethoxam	VO0050	Fruiting vegetables other than cucurbits	T0.5	0.7
Trichlorfon	-	Vegetables	0.1	-
Triadimefon	VO0050	Fruiting vegetables other than cucurbits	0.2	1
Triadimenol	VO0050	Fruiting vegetables other than cucurbits	1	1
Trifluralin	-	Vegetables (some exceptions)	0.05	-

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: Okra Agrichemical Regulatory Risk Assessment

Okra Agrichemical Regulatory Risk Assessment

August 2021

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 with changed data requirements. A consequence of which can be that many agrichemicals are not meeting contemporary risk assessment standards as the necessary data is unavailable, or where data is available, the refined 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 the growing of okra, as well as current initiatives aimed at addressing identified pest management deficiencies.

Okra 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				
Red imported fire ants	Pyriproxyfen (PER85163 Qld only)	7C	EU: Authorisation renewal process underway	
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 EU: Candidate for substitution	
Cabbage aphid	Afidopyropen	9D		
Cotton aphid	Afidopyropen	9D		
Currant and lettuce aphid	Afidopyropen	9D		
Green peach aphid	Afidopyropen	9D		
	Chlorantraniliprole +thiamethoxam	28 + 4A	Thiamethoxam APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered ⁱ USA: Re-registration with new risk mitigation measures	
	Cyantraniliprole	28		
	Cyantraniliprole + diafenthiuron	28 + 12A	Diafenthiuron Codex: No MRLs EU: No authorisation in place	
	Sulfoxaflor	4C	USA: Pollinator concerns	

Problem	Active Constituents	Chemical Group	Comment	Activities
Caterpillars/Lepidoptera				
Helicoverpa species Native Budworm (<i>H. punctigera</i>) Corn earworm/Cotton bollworm (<i>H. armigera</i>)	Chlorantraniliprole	28		
	Chlorantraniliprole +thiamethoxam	28 + 4A	Thiamethoxam APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Cyantraniliprole	28		
	Cyantraniliprole + diafenthiuron	28 + 12A	Diafenthiuron Codex: No MRLs EU: No authorisation in place	
	Emamectin benzoate	6		
	Flubendiamide	28		
	Helicoverpa NPV	31		
	Methomyl (PER82428)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
	Methoxyfenozide	18	EU: Proposed restricted authorisation & Candidate for substitution	
	Spinetoram	5		
Spinosad	5			

Problem	Active Constituents	Chemical Group	Comment	Activities
Cluster caterpillar	Chlorantraniliprole +thiamethoxam	28 + 4A	Thiamethoxam APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Cyantraniliprole + diafenthiuron	28 + 12A	Diafenthiuron Codex: No MRLs EU: No authorisation in place	
	Emamectin benzoate	6	EU: Candidate for substitution	
	Methomyl (PER82428)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
	Methoxyfenozide	18	EU: Proposed restricted authorisation & Candidate for substitution	
Cucumber moth	Methomyl (PER82428)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
Eggfruit caterpillar	Chlorantraniliprole	28		
Fall armyworm	Chlorantraniliprole (PER89259)	28		
	Chlorantraniliprole + thiamethoxam (PER89280)	28 + 4A	Thiamethoxam APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Emamectin benzoate (PER89263)	6	EU: Candidate for substitution	
	Methomyl (PER89293)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	

Problem	Active Constituents	Chemical Group	Comment	Activities
Fall armyworm	<i>Spodoptera frugiperda</i> NPV (PER90820)	31		
	Spinetoram (PER89241)	5		
	Spinosad (PER89870)	5		
Loopers	Malathion/Maldison	1B	APVMA: Under review: chemistry Codex: Re-evaluation scheduled for 2022/23	
	Methomyl (PER82428)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
Potato moth	Abamectin	6		
	Chlorantraniliprole	28		
	Chlorantraniliprole +thiamethoxam	28 + 4A	Thiamethoxam APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Cyantraniliprole	28		
	Cyantraniliprole + diafenthiuron	28 + 12A	Diafenthiuron Codex: No MRLs EU: No authorisation in place	
	Flubendiamide	28		
	Spinetoram	5		
Tomato grub	Methoxyfenozide	18	EU: Proposed restricted authorisation & Candidate for substitution	
	Spinetoram	5		
Webworms	Methomyl (PER82428)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	

Problem	Active Constituents	Chemical Group	Comment	Activities
Fruit fly				
Queensland fruit fly	Alpha-cypermethrin (PER80099)	3A	EU: Proposed restricted authorisation & Candidate for substitution	
	Clothianidin (PER80100)	4A	APVMA: Under review Canada: Proposal to cancel foliar use in orchards strawberries and turf EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures ⁱⁱ	
	Spinetoram (PER91070) SA Biosecurity	5		
Mediterranean fruit fly	Alpha-cypermethrin (PER80099)	3A	EU: Proposed restricted authorisation & Candidate for substitution	
	Clothianidin (PER80100)	4A	APVMA: Under review Canada: Proposal to cancel foliar use in orchards strawberries and turf EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Spinetoram (PER91070) SA Biosecurity	5		
Jassids/Plant bugs				
Rutherglen bug	Methomyl (PER82428)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
Tomato/ potato psyllid	Abamectin	6		
	Cyantraniliprole (PER84805)	28		
	Spinetoram (PER84757)	5		
	Sulfoxaflor (PER84743)	4C	USA: Pollinator concerns	

Problem	Active Constituents	Chemical Group	Comment	Activities
Mites				
Broad mite	Hexythiazox (PER14765)	10A	Codex: No MRLs	ST19020 – AgVet Grant contracted 24-Jun-2020 for new label registration of Spiromesifen (Oberon) for control of Two-Spotted Mite, Tomato Russet Mite, European Red Mite and Rust Mite.
Bryobia mite	Bifenazate	20D	EU: Proposed non-renewal	
Tomato Red spider mite	Abamectin	6		
	Hexythiazox (PER14765)	10A	Codex: No MRLs	
Tomato russet mite	Abamectin	6		
	Hexythiazox (PER14765)	10A	Codex: No MRLs	
	Sulphur	M2		
Two-spotted (Red spider) mite	Abamectin	6		
	Bifenazate	20D	EU: Proposed non-renewal	
	Cyantraniliprole + diafenthiuron	28 + 12A	Diafenthiuron Codex: No MRLs EU: No authorisation in place	
	Hexythiazox (PER14765)	10A	Codex: No MRLs	
	Sulphur	M2		
Thrips				
Thrips	Methomyl (PER82428)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (expired 31/8/19)	
Tomato thrips	Chlorantraniliprole + thiamethoxam	28 + 4A	Thiamethoxam APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Cyantraniliprole	28		
	Cyantraniliprole + diafenthiuron	28 + 12A	Diafenthiuron Codex: No MRLs EU: No authorisation in place	

Problem	Active Constituents	Chemical Group	Comment	Activities
Western flower thrips	Chlorantraniliprole +thiamethoxam	28 + 4A	Thiamethoxam APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Cyantraniliprole	28		
	Cyantraniliprole + diafenthiuron	28 + 12A	Diafenthiuron Codex: No MRLs EU: No authorisation in place	
	Methomyl (PER82428)	1A	APVMA: nominated for review Canada: Majority of uses cancelled EU: No authorisations (Authorisation expired 31/8/19)	
	Spinetoram	5		
	Spinosad	5		
Whitefly				
Greenhouse whitefly	Chlorantraniliprole +thiamethoxam	28 + 4A	Thiamethoxam APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Petroleum oil (PER12221)	-		
	Pyriproxyfen	7C		
	Sulfoxaflor	4C	USA: Pollinator concerns	

Problem	Active Constituents	Chemical Group	Comment	Activities
Silverleaf (Poinsettia) whitefly	Afidopyropen	9D		
	Chlorantraniliprole +thiamethoxam	28 + 4A	Thiamethoxam APVMA: Under review Canada: Proposal to deregister outdoor uses EU: Outdoor uses deregistered USA: Re-registration with new risk mitigation measures	
	Cyantraniliprole	28		
	Cyantraniliprole + diafenthiuron	28 + 12A	Diafenthiuron Codex: No MRLs EU: No authorisation in place	
	Imidacloprid (PER12351)	4A	APVMA: Under review Canada: Under review EU: Removal of all field uses USA: Re-registration with new risk mitigation measures	
	Petroleum oil (PER12221)	-		
	Pyriproxyfen	7C		
Other				
Vegetable leafminer	Abamectin (PER81876)	6		
	Cyantraniliprole (PER90387)	28		
	Cyromazine (PER81867)	17	EU: No authorisation in place	
	Spinetoram (PER91155)	5		
	Spinosad (PER90928)	5		
Post-harvest disinfestation				
	Methyl bromide (PER80718)	8A		
Nematodes				
Root-knot nematodes	Fluensulfone	-		

Problem	Active Constituents	Chemical Group	Comment	Activities
DISEASES				
Bactericide (Po) ⁷	Hydrogen peroxide + peroxyacetic acid	M		
	Iodine	M		
Grey mould	Penthiopyrad	7		
Leaf diseases/spots	Chlorothalonil	M5	APVMA: Nominated for review Canada: Review recently completed; continued use considered acceptable EU: No authorisation in place ⁱⁱⁱ	
Powdery mildew	Penthiopyrad	7		
	<i>Streptomyces lydicus</i>	BM02		
	Sulfur	M2		
Target leafspot	Penthiopyrad	7		
WEEDS				
Broadleaf weeds and grasses	Diquat	L	APVMA: Currently under review EU: No authorisation in place	
	Paraquat	L	APVMA: Currently under review EU: No authorisation in place Rotterdam Convention: nomination	
Plant growth regulators				
Compactness	Paclobutrazol (PER85896 seedlings/nursery)			

MT20007: Regulatory support and coordination. This multi-industry project has been funded by Hort Innovation using industry research and development levies and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

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

ⁱⁱⁱ 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>

⁷ Post-harvest