Strawberry

Strategic Agrichemical Review Process (SARP)

October 2020

Hort Innovation
Project – MT19008

Hort Innovation Project Number:
MT19008 – Strategic Agrichemical Review Process (SARP) - Updates

SARP Service Provider:
AGK Services

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

Date of report:
October 2020

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Hort Innovation Strategic levy investment | STRAWBERRY FUND

This project has been funded by Hort Innovation using the strawberry 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 Strategic Agrichemical Review Process (SARP) - Updates (MT19008) is part of the Hort Innovation Strawberry Fund. A Strategic Agrichemical Review Process (SARP), through the process of a desktop audit and industry liaison;

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

(ii) Evaluates the availability and effectiveness of fungicides, insecticides and herbicides (pesticides) to control the plant pests;

(iii) Determines any gaps in the pest control strategy and

(iv) Identifies suitable new or alternatives pesticides to address the gaps.

Alternative pesticides should ideally be selected for benefits of:

- Integrated Pest Management (IPM) compatibility
- Improved scope for resistance management
- Sound biological profile
- Residue and trade acceptance domestically and for export

The results of this process will provide the strawberry 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
Powdery Mildew	*Podosphaera aphanis*
Grey Mould	*Botrytis cinerea*
Charcoal Crown Rot	*Macrophomina phaseolina*
Leaf Blotch / Stem-End Rot	*Gnomoniopsis fructicola*
Leather Rot / Phytophthora Fruit Rot	*Phytophthora* spp.

1.2 Insects, mites, nematodes and other pests

The high priority insects, mites, nematodes and other pests are:

Common name	Scientific name
Two Spotted Mite	*Fusarium oxysporum f.s.p. fragariae - Fof*
Western Flower Thrips	*Frankliniella occidentalis*

1.3 Weeds

There are no weeds that have been identified as a high priority, however Wireweed is rated as a moderate priority:

Common Name	Scientific Name
Wireweed	*Polygonum aviculare*

2. The Australian Strawberry Industry

Strawberries are grown in most states in Australia, although the major producing areas are Queensland (Sunshine Coast / Wide Bay) and Victoria (Yarra Valley). Year-round availability is made possible through the different regions.

For the year ending June 2019, 76,604 t was produced with 7% sent for processing and 5% going to the fresh export market. The value of production was $392.4 million while the wholesale value of fresh supply was $434.2 million. Fresh exports go to several destinations, with 78% of exports in 2018/19 spread between the following 5 countries: Thailand, Singapore, New Zealand, Hong Kong and UAE.

Strawberries are purchased by 72% of Australian households, and with fresh production available year-round they are an everyday part of many Australian diets.

Fresh Strawberry Seasonality by State[1]

State	18/19 Tonnes	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Victoria	27,195												
Queensland	32,174												
Western Australia	8,043												
South Australia	5,362												
Tasmania	3,064												
New South Wales	766												
Availability Legend			High			Medium			Low			None	

Most strawberries are grown in open fields, but there has been a move in recent years to more intensive production systems such as greenhouses and open tunnels. Techniques are utilised to promote earliness of harvest in order to meet market demands during the switch between winter and summer production areas. Strawberry runner production is an important part if this, with plants transplanted as runners in the early part of the season.

The strawberry industry is very intensive and requires significant labour inputs, particularly for planting and harvesting operations. Strawberry runners are produced by specialised growers. Runners enable fruit growers to use transplants and reduce the time to produce the first harvest. The use of crop protection products in runner crops can impact on resistance strategies for the strawberry industry. Communication between runner growers and fruit growers is important to ensure that appropriate product rotation is used.

[1] Hort Innovation (2020). Australian Horticulture Statistics Handbook 2018/19. [online] Available at: https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/australian-horticulture-statistics-handbook/

3. Introduction

3.1 Background

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

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

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

In combination with cultural practices, pesticides are important tools in Strawberry 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 strawberry industry regarding pesticide access, Hort Innovation undertook a review of the pesticide requirements via a Strategic Agrichemical Review Process (SARP) in 2016. 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 Strawberry 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 strawberry 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 strawberry 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 strawberry industry in consultation with industry, government and scientists. The Biosecurity Plan outlines key threats to the industry, risk mitigation plans, identification and categorisation of exotic pests and contingency plans. High priority exotic pests have been assessed based on their potential to enter, establish, and spread in Australia (e.g. environmental factors, host range, vectors) and the cost to industry of control measures. For more information visit: https://www.planthealthaustralia.com.au/industries/strawberries/

3.2 Minor use permits and registration

From a pesticide access perspective, the APVMA classifies strawberries as a major crop. The crop fits within the APVMA crop group Crop Group 004: Berries and Other Small Fruits, within the Subgroup 004E, Low Growing Berries. Therefore, access to minor use permits can be relatively difficult. Possible justification for future permit applications could be based on:

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

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

3.3 Methods

The current update of the strawberry Strategic Agrichemical Review Process (SARP), which was last updated in 2016, was conducted by desktop audit and included an online industry survey. The process included gathering, collating and confirming information. The steps in the process were:

Process of Review	Activity / Date
Industry survey	Preparation and circulation of online industry survey to update priority pests and identify priority control gaps. Survey released: 14 January 2020 Survey closed: 31 March 2020
SARP data updated via a desktop audit	Updated registrations and permits Updated MRL tables Updated available and potential pesticides against low, moderate and high priority pests, including an assessment of their suitability Included information on regulatory risks from MT17019
Captured industry input	Collated and analysed survey results Consolidated and incorporated industry needs and insights

3.4 Results and discussions

3.4.1 Detail

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

3.4.2 Appendices

Refer to additional information in the appendices:

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

4. Diseases, pests and weeds of strawberries

Resistance management: To manage the risk of resistance development, integrated disease/pest/weed management (IDM/IPM/IWM) strategies should be adopted. The general principle is to integrate diverse chemical and non-chemical strategies; maximise efficacy; not rely on singular tools and rotate between different modes of action. It is always essential to follow all the label instructions. Specific resistance management strategies may apply. These can be found, along with other useful information, on the CropLife Australia website. This includes programs used in runner production, which should be considered in conjunction with strategies employed in fruit-producing crops.
https://www.croplife.org.au/resources/programs/resistance-management/

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

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

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

4.1 Diseases of strawberry

4.1.1 Disease priorities

Common name	Scientific name
High	
Powdery Mildew	*Podosphaera aphanis*
Grey Mould	*Botrytis cinerea*
Charcoal Crown Rot	*Macrophomina phaseolina*
Leaf Blotch / Stem-End Rot	*Gnomoniopsis fructicola*
Leather Rot / Phytophthora Fruit Rot	*Phytophthora* spp.
Moderate	
Fusarium Crown Rot	*Fusarium oxysporum f.s.p. fragariae - Fof*
Root and Crown Rot	*Phytophthora* spp.
Crown Rot	*Colletotrichum gloeosporioides*
Fusarium Wilt	*Fusarium oxysporum*
Black Root Rot	*Pythium* spp., *Fusarium* spp., *Rhizoctonia* spp.
Black Spot / Anthracnose	*Colletotrichum acutatum*
Leaf Blight	*Phomopsis obscurans*
Leaf Spot / Eye Spot	*Mycosphaerella fragariae*
Transit Rot	*Rhizopus stolonifer*
Low	
Wilt Disease	*Verticillium* spp.
Rhizopus Soft Rot	*Rhizopus* spp.
Lethal Yellows	*Candidatus Phytoplasma australiense*
Sclerotinia Fruit Rot	*Sclerotinia* spp.
Leaf Scorch	*Diplocarpon earlianum*

The major disease priorities remain unchanged from the last SARP in 2016. The key diseases are Powdery Mildew, Grey Mould, Charcoal Coal Rot, Leaf Blotch and Leather Rot. Root and Crown Rot has become more significant since the last SARP report, moving from a low priority to a moderate priority.

Disease control in strawberries faces several challenges. The length of the season and the continuous threat of major diseases, particularly Powdery Mildew, requires availability of a large range of fungicides with different modes of action. Product rotation is critical to ensure that fungicide groups are not overused to protect against the development of fungicide resistance. Strawberries need protection against Powdery Mildew for the whole crop cycle which is up to 6 and 7 months in some regions. Continuous fruiting and harvest of the crop presents an additional issue because fungicides need to have a 1 day withholding period or less. Crops grown under protected cropping are also more prone to disease infections. Some

protected cropping systems allow for covers to be removed during the season to enable more effective pest and disease management.

The need for disease protection extends to the runner production nurseries as well. An integrated approach is recommended across the industry to ensure that disease-free runners are planted, and that appropriate fungicide rotation is practiced across the whole production system. More information about the use of an integrated approach to the control of foliar diseases in strawberries is available in the final report[2] for Hort Innovation project BS13004.

A planned, regular fungicide program will provide protection from common in-crop diseases, and post-harvest treatment is critical to ensure that fruit retains its quality during transport to market. Growers should be vigilant about monitoring their crops for unusual plant symptoms and suspected exotic disease outbreaks should be reported to Biosecurity Agencies immediately.

In controlling fungal and bacterial diseases, the industry should be mindful of resistance management. CropLife Australia has a resistance management strategy and users must refer to it before using any product:
http://www.croplife.org.au/industry-stewardship/resistance-management

Specific strawberry resistance management strategies are in place for:

Powdery Mildew in strawberry runner production
www.croplife.org.au/resources/programs/resistance-management/strawberry-runner-production-powdery-mildew-podosphaera-aphanus/

Powdery Mildew
www.croplife.org.au/resources/programs/resistance-management/strawberry-powdery-mildew-2/

Grey Mould / Botrytis
www.croplife.org.au/resources/programs/resistance-management/strawberry-grey-mould-botrytis-2/

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

https://www.croplife.org.au/resources/programs/resistance-management/fungicide-resistance-management-strategies1/fungicide-resistance-management-strategies1-draft/

[2] www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/bs13004/

4.1.2 Available and potential products for priority diseases

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

Availability		**Regulatory risk (refer to Appendix 6)**	
A	Available via either registration or permit approval	R1	Short-term: Critical concern over retaining access
P	Potential - a possible candidate to pursue for registration or permit	R2	Medium-term: Maintaining access of significant concern
P-A	Potential, already approved in the crop for another use	R3	Long-term: Potential issues associated with use - Monitoring required

Withholding Period (WHP) – Number of days from last treatment to harvest (H) or Grazing (G)			
Harvest	H	Not Required when used as directed	NR
Grazing	G	No Grazing Permitted	NG

Disease / Active Ingredient (Trade Name)	**Chemical group**	**Activity**	**WHP, days**	**Availability**	**States**	**Comments**	**Regulatory risk**
Powdery Mildew (*Podosphaera aphanis*) **Priority: High**							
Rated as a high priority in all regions except VIC, where it is rated as a moderate priority. Powdery Mildew control requires the use of a season-long protectant fungicide program. The length of the growing season presents challenges in having enough alternate modes of action to provide a sustainable fungicide program for the entire season.							
Bupirimate (Nimrod) Adama	8	Curative & Protectant / **Strawberry runner production only**	NG	A	QLD, SA	Registered in strawberry runners for control of **Powdery Mildew**. Apply a maximum of 4 foliar applications per season of bupirimate or other Group 8 fungicides with a minimum re-treatment interval of 7 days. Do not apply consecutively. Do not apply to fruit producing strawberry plants.	-
Cyflufenamid (Flute) AgNova	U6	Curative & Protectant / Field Grown & Protected Crops	NR	A	ALL	Registered in strawberries and strawberry runners for control of **Powdery Mildew**. Apply before first signs of disease or when conditions are conducive to disease development. Apply at 7-10 day intervals. Do not apply as consecutive sprays or apply more than 2 sprays per crop in fruiting crops. Apply a maximum of 2 treatments per season in strawberry runners, with at least 2 treatments from different Mode of Action groups between them. In addition, a minimum of 2 sprays from different Mode of Action Groups should be made between the last Flute application and digging.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Myclobutanil (Systhane) Corteva	3	Protectant & Curative	NR	A	ALL	Registered in strawberries for control of **Powdery Mildew**. Commence spraying before disease appears and apply at 7-10 day intervals. Do not apply more than 2 successive Group 3 fungicides. Treatments per season not limited.	R3
Penthiopyrad (Fontelis) Corteva	7	Protectant	NR	A	ALL	Registered in strawberries for control of Grey Mould and **Powdery Mildew**. Begin applications prior to disease development and continue on 7-10 day spray intervals. DO NOT apply more than 2 sequential applications of Group 7 fungicides and do not use more than 5.25 L/ha (3 sprays) in total for the season.	-
Potassium Bicarbonate (EcoCarb)	M2	Curative	NR	A	ALL	Registered in strawberries for control of **Powdery Mildew**. Begin application at first sign of disease and repeat application at 7-10 day intervals. Potassium Bicarbonate is a contact fungicide so complete and thorough coverage of all plant surfaces must be achieved to ensure effective disease control. Treatments per season not limited.	-
Quinoxyfen (Legend) Corteva PER14577	13	Protectant **Strawberry runner production only**	NR	A	ALL (excl. VIC)	Permitted in strawberries for control of **Powdery Mildew**. Apply as a foliar spray after transplanting. DO NOT apply more than 2 consecutive applications with the second application at an interval of 7-10 days. DO NOT apply to fruit producing strawberry plants.	-
Streptomyces lydicus (Actinovate)	BM 02	Protectant	NR	A	ALL	Registered in strawberries for the suppression of **Powdery Mildew** and Phytophthora. Application prior to onset of disease season. Apply as part of a program alternating with other products.	-
Sulphur (Thiovit Jet) Syngenta	M2	Protectant	NR	A	NSW, WA	Registered in strawberries for control of **Powdery Mildew**. Apply when the disease is first noted, then at 10-14 day intervals during humid weather. DO NOT spray when temperature exceeds 24 deg C. DO NOT apply 21 days before or after an oil spray and do not mix with oil sprays. Treatments per season not limited.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Sulphur (Thiovit Jet) Syngenta PER83325	M2	Protectant	NR	A	QLD & TAS	Permitted in strawberries for control of **Powdery Mildew**. Apply when the disease is first noted, then at 10-14 day intervals during humid weather. DO NOT spray when temperature exceeds 24 deg C. DO NOT apply 21 days before or after an oil spray and do not mix with oil sprays. Treatments per season not limited.	-
Trifloxystrobin (Flint) Bayer	11	Protectant & Curative	1	A	ALL	Registered in strawberries for control of **Powdery Mildew**. Apply as part of a program when conditions favour disease development from early flowering onwards. DO NOT apply consecutive treatments, including from 1 season to the next. DO NOT allow sprays intervals to exceed 10 days and DO NOT apply more than 3 applications per season.	-
Isofetamid (Kenja) ISK / AgNova	7	Protectant & Curative	NR	P-A	ALL	Registered in strawberries for control of Botrytis Grey Mould. US registration for control of Grey Mould, **Powdery Mildew** and Anthracnose in low-growing berries.	-
BLAD (Problad Plus)	BM 01	Biological	NR	P		Registered in stone fruit for suppression of Brown Rot. Registered in the US for control of Anthracnose, Grey Mould and **Powdery Mildew**. No MRLs required for biological product.	**-**
Florylpicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New Mode of Action fungicide being developed in AU. Corteva claim activity on **Powdery Mildew**. No MRL's for AU or Codex. Scheduled for JMPR evaluation in 2023.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Registration work underway through Hort Innovation project ST17000 for control of Grey Mould and Stem End Rot in strawberries (field and protected cropping). Fluopyram – AU MRL 1.5 mg/kg; Codex MRL 0.4 mg/kg Tebuconazole – AU MRL 0.05 mg/kg, No Codex MRL.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered in almonds, cherries and macadamia for control of various leaf diseases. US registration for control of Leaf Spot, **Powdery Mildew**, Anthracnose and Grey Mould in strawberries. Fluxapyroxad – AU MRL 7 mg/kg. No Codex MRL. Pyraclostrobin – AU MRL 0.05 mg/kg. Codex MRL 1.5 mg/kg.	-
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Curative / Protectant		P		Registration pending in Australia for control of Botrytis, Alternaria, **Powdery Mildew** & Anthracnose in berries. Registered in the US for control of Grey Mould, **Powdery Mildew** and Anthracnose in strawberries. Pydiflumetofen: No MRLs for AU or Codex. Fludioxonil: AU MRL 5 mg/kg. Codex MRL 3 mg/kg.	R3
Pyriofenone (Kusabi) ISK	50			P		Registered for control of **Powdery Mildew** in cucurbits and grapes. Registered in the US for control of **Powdery Mildew** in berry fruit on the US label. AU MRL 0.05 mg/kg; No Codex MRL	-
ADM1700F Adama	TBC			P		Fungicide in development from Adama with **Powdery Mildew** activity	-
NUL3195 Nufarm	TBC			P		Fungicide in development from Nufarm with activity on **Powdery Mildew** and Botrytis.	-
Grey Mould (*Botrytis cinerea*) **Priority: High**							
Rated as a high priority in all regions except VIC, where it is rated as a moderate priority. Botrytis infection is favoured by warm, moist conditions. Infection occurs in crop, but the disease symptoms may not appear until after harvest. Botrytis infection in transit can lead to rejection of fruit at market. In-crop and post-harvest fungicides are key to controlling the disease and cultural controls such as removal of dead plant material, preventing fruit contact with the soil and use of drip rather than spray irrigation are useful management tools.							
Alpha Amylase (from *Bacillus amyloliquifaciens*) (Serifel) BASF	BM 02	Protectant / Biological	NR	A	ALL	Registered in strawberries for control of **Grey Mould**. Apply preventatively prior to an infection and continue applications on a 3-14 day interval as required. Key application timing commences at or before flowering. DO NOT use more than 10 applications per season.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Aureobasidium pullulans (Botector) Nufarm	-	Protectant / Biological	NR	A	ALL	Registered in strawberries for control of **Botrytis Blight & Fruit Rot / Grey Mould** and suppression of Anthracnose Fruit Rot, Phomopsis Fruit Rot and Rhizopus Fruit Rot. Apply as a preventative treatment from beginning of bloom until harvest. Up to 6 applications can be used at 5-7 day intervals.	-
Bacillus amyloliquefaciens (Serenade Opti) Bayer	BM 02	Protectant / Biological	NR	A	ALL	Registered in strawberries for control of **Botrytis**. Apply every 5-10 days commencing at early flowering stage. As part of a preventative Botrytis program rotate applications with other registered Botryticides. Treatments per season not limited.	-
Captan	M4	Protectant & Curative	1	A	ALL	Registered in strawberries for control of **Grey Mould**, Gloeosporium Fruit Rot, Phytophthora Root Rot, Black Spot / Anthracnose, Scorch and Leaf Blight. Apply every 10 days commencing at blossom stage. Apply no more than 5 applications per season.	-
Copper (Cu) present as copper ammonium complex	M1	Protectant	1	A	VIC, SA, TAS & WA	Registered in strawberries for control of Leaf Spot and **Grey Mould.** Spray when plants are established and repeat every 7-10 days throughout the season. Discontinue application if signs of phytotoxicity appear. Treatments per season not limited.	-
Copper (Cu) present as copper hydroxide	M1	Protectant	1	A	VIC, TAS, SA & WA	Registered in strawberries for control of Leaf Spot and **Grey Mould.** Spray when plants are established and repeat every 7-10 days throughout the season. Discontinue application if signs of phytotoxicity appear. Treatments per season not limited.	-
Copper (Cu) present as cuprous oxide	M1	Protectant	1	A	VIC, TAS, SA & WA	Registered in strawberries for control of Leaf Spot and **Grey Mould.** Spray when plants are established and repeat every 7-10 days throughout the season. Discontinue application if signs of phytotoxicity appear. Treatments per season not limited.	-
Fenhexamid (Teldor) Bayer	17	Protectant & Curative	NR	A	ALL	Registered in strawberries for control of **Grey Mould**. Apply at 7-10 day intervals when conditions favour the disease. DO NOT apply more than 2 successive sprays before switching to a fungicide of a different group. Treatments per season not limited.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Iprodione (Rovral)	2	Protectant & Curative	1	A	ALL	Registered in strawberries for control of **Grey Mould**. Apply during flowering if conditions favour disease. DO NOT apply more than 2 successive Group 2 fungicides. Treatments per season not limited.	R2
Isofetamid (Kenja) ISK / AgNova	7	Protectant & Curative	NR	A	ALL	Registered in strawberries for control of **Grey Mould**. Apply before first sign of disease or when conditions are conducive to disease development. Do not apply more than 2 treatments per crop, using a 7-10 day retreatment interval.	-
Penthiopyrad (Fontelis) Corteva	7	Protectant & Curative	NR	A	ALL	Registered in strawberries for control of **Grey Mould** and Powdery Mildew. Begin applications prior to disease development and continue on 7-10 day interval. DO NOT apply more than 2 sequential applications of Group 7 fungicides before switching to a fungicide with a different mode of action. Maximum seasonal use rate is 5.25 L/ha (3 applications).	**-**
Pyrimethanil (Scala) Bayer	9	Protectant & Curative	1	A	ALL	Registered in strawberries for control of **Grey Mould**. Apply during flowering when conditions favour disease development. Repeat at 7-10 day intervals alternating with a fungicide of a different chemical group. DO NOT apply more than 2 successive Group 9 fungicides, including from the end of one season to the next. Use a maximum of the following for Group 9: 1 application of 3 or less Grey Mould fungicides, 2 applications of 4-6 Grey Mould fungicides, 3 applications of 7 or more Grey Mould fungicides.	**-**
Thiram	M3	Protectant	2	A	QLD, VIC, SA, TAS & WA	Registered in strawberries for control of Black Spot and **Grey Mould**. Apply as a protective spray at flowering and then at 10-14 day intervals as necessary. Treatments per season not limited.	R2
BLAD (Problad Plus)	BM 01	Biological	NR	P		Registered in stone fruit for suppression of Brown Rot. Registered in the US for control of Anthracnose, **Grey Mould** and Powdery Mildew. No MRLs required for biological product.	**-**
DC-126 Bayer	TBC			P		New product from Bayer with **Botrytis** activity. Strawberries in scope.	**-**

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Fenpyrazamine (Prolectus) Sumitomo	17	Protectant & Curative		P		Registered for control of **Botrytis** in grapes and has US registration for berries. No AU MRL. Codex MRL 3 mg/kg.	-
Florylpicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New Mode of Action fungicide being developed in AU. Corteva claim activity on **Grey Mould**. No MRL's for AU or Codex. Scheduled for JMPR evaluation in 2023.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Registration work underway through Hort Innovation project ST17000 for control of **Grey Mould** and Stem End Rot in strawberries (field and protected cropping). Fluopyram – AU MRL 1.5 mg/kg; Codex MRL 0.4 mg/kg Tebuconazole – AU MRL 0.05 mg/kg, No Codex MRL.	R3
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered in almonds, cherries and macadamia for control of various leaf diseases. US registration for control of Leaf Spot, Powdery Mildew, Anthracnose and **Grey Mould** in strawberries. Fluxapyroxad – AU MRL 7 mg/kg. No Codex MRL. Pyraclostrobin – AU MRL 0.05 mg/kg. Codex MRL 1.5 mg/kg.	-
NUL3195 Nufarm	TBC			P		Fungicide in development from Nufarm with activity on Powdery Mildew and **Botrytis**.	-
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Protectant & Curative		P		Registration pending in Australia for control of **Botrytis**, Alternaria, Powdery Mildew & Anthracnose in berries. Registered in the US for control of **Grey Mould**, Powdery Mildew and Anthracnose in strawberries. Pydiflumetofen: No MRLs for AU or Codex. Fludioxonil: AU MRL 5 mg/kg. Codex MRL 3 mg/kg.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Charcoal Crown Rot (*Macrophomina phaseolina*) **Priority: High**							
Rated as a high priority in all regions except TAS and VIC, where it is rated as a moderate priority. Charcoal Crown Rot is a soil-borne disease and symptoms appear when plants are subjected to stress from weather, soil condition or heavy fruit load. Fumigation is the only chemical control available and cultural controls such as disease tolerant cultivars, crop rotation and reducing stress in the plant can play an important part of managing the disease.							
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil Borne Diseases including Fusarium and Verticillium Wilts, Rhizoctonia and Pythium. ***For use by professional and registered fumigators only.***	-
Chloropicrin (Agrocelhone NE Soil Fumigant)	-	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil-Borne Fungus Diseases and Bacteria. ***For use by professional and registered fumigators only.***	-
Ethanedinitrile (EDN Fumigas)	-	Fumigant	NR	A	ALL	Registered in strawberries and **strawberry runners** for pre-planting control of Soil Borne Pathogens (*Bipolaris sorokiniana, Fusarium acuminatum, Fusarium oxysporum, Phytophthora cactorum, Phytophthora cryptogea, Pythium sulcatum, Pythium ultimum, Rhizoctonia fragariae, Rhizoctonia solani, Sclerotium rolfsii,* ***Macrophomina phaseolina***), nematodes and weeds. ***For use by licensed fumigators or approved persons only.***	-
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime Soil Ameliorant and Biofungicide) Bayer	BM 02	Biological Soil Ameliorant	NR	P-A	ALL	Available in berries for application to soil to improve bioavailability of soil resources to horticultural crops. No MRLs required for biological product.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Leaf Blotch / Stem-End Rot (*Gnomoniopsis fructicola*) **Priority: High**							
Rated as a high priority in QLD, moderate priority in all other regions except VIC, where it is rated as a low priority. Crop hygiene is critical for managing Leaf Blotch. Fungicide control can be unreliable, particularly if sources of infection (previous crop residues) have not been removed from fields prior to planting.							
Fluazinam (Gem) Adama PER83871	29	Protectant **Strawberry runner production only**	NR	A	QLD	Permitted in strawberry runners for control of **Leaf Blotch**. Apply after transplanting when conditions favour disease development. Apply a maximum of 4 foliar applications per season, with a minimum re-treatment interval of 7 – 10 days. DO NOT use more than 2 consecutive applications. DO NOT apply to fruit producing strawberry plants. For use in strawberry runner crops only.	-
Bacillus amyloliquefaciens strain QST 713 (Serenade Opti) Bayer	BM 02	Biological / Protectant		P-A		Registered in strawberries for control of Botrytis, and for suppression of **Stem End Rot** in avocados and mangoes.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Registration work underway through Hort Innovation project ST17000 for control of Grey Mould and **Stem End Rot** in strawberries (field and protected cropping). Fluopyram – AU MRL 1.5 mg/kg; Codex MRL 0.4 mg/kg Tebuconazole – AU MRL 0.05 mg/kg, No Codex MRL.	R3
Leather Rot / Phytophthora Fruit Rot (*Phytophthora* spp.) **Priority: High**							
Rated as a high priority in QLD, moderate priority in WA, and a low priority in TAS and VIC. Phytophthora commonly causes root and crown rot, but it can also impact the above-ground parts of the plant in warm, moist conditions. Strategies to control PRR will assist in protecting against leather rot. Pre-plant fumigation, removal of dead plant residues and maintaining adequate drainage are the best control measures. No fungicides are available specifically for leather rot.							
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil Borne Diseases including Fusarium and Verticillium Wilts, Rhizoctonia and Pythium. ***For use by professional and registered fumigators only.***	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Chloropicrin (Agrocelhone NE Soil Fumigant)	-	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil-Borne Fungus Diseases and Bacteria. ***For use by professional and registered fumigators only.***	**-**
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime Soil Ameliorant and Biofungicide) Bayer	BM 02	Biological Soil Ameliorant	NR	P-A	ALL	Available in berries for application to soil to improve bioavailability of soil resources to horticultural crops. No MRLs required for biological product.	-
Mancozeb + Metalaxyl-M (Ridomil Gold MZ) Syngenta	M3+4	Protectant / Non-Fruiting Strawberries Only	7	P-A	ALL	Registered in strawberry runners for control of Eye Spot, Leaf Blight, Root Rot and Scorch.	R2
Metalaxyl-M (Ridomil Gold) Syngenta & Phosphorous Acid PER13697	4	Protectant / Strawberry Runners	NR	P-A	QLD	Permitted in strawberry runners for control of Root & Crown Rot. Metalaxyl-M is registered for control of Phytophthora in asparagus and pineapples.	**-**
Phosphorous Acid PER80064	33	Curative	NR	P-A	ALL (excl. VIC)	Permitted in strawberries for control of Crown Rot. Registered in various crops for control of ***Phytophthora* spp.**	**-**
Fusarium Crown Rot (*Fusarium oxysporum f.s.p. fargariae – Fof*) **Priority: Moderate**							
Rated as a moderate priority in QLD and VIC, a high priority in WA and a low priority in TAS. Fumigation is the only chemical control available and cultural controls are limited. There is some variation in susceptibility between cultivars and general hygiene and irrigation practices will assist in managing the disease.							
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil Borne Diseases including **Fusarium** and Verticillium Wilts, Rhizoctonia and Pythium. ***For use by professional and registered fumigators only.***	**-**

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Chloropicrin (Agrocelhone NE Soil Fumigant)	-	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil-Borne Fungus Diseases and Bacteria. ***For use by professional and registered fumigators only.***	**-**
Ethanedinitrile (EDN Fumigas)	-	Fumigant	NR	A	ALL	Registered in strawberries and **strawberry runners** for pre-planting control of Soil Borne Pathogens (*Bipolaris soroikiniana, Fusarium acuminatum,* ***Fusarium oxysporum****, Phytophthora cactorum, Phytophthora cryptogea, Pythium sulcatum, Pythium ultimum, Rhizoctonia fragariae, Rhizoctonia solani, Schlerotium rolfsi, Macrophomina phaseolina*), nematodes and weeds. ***For use by licensed fumigators or approved persons only.***	**-**
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime Soil Ameliorant and Biofungicide) Bayer	BM 02	Biological Soil Ameliorant	NR	P-A	ALL	Available in berries for application to soil to improve bioavailability of soil resources to horticultural crops. No MRLs required for biological product.	-
NUL3163 Nufarm	TBC			P		Fungicide in development from Nufarm with activity on ***Fusarium*** **spp.**	-
Root and Crown Rot (*Phytophthora* spp.) **Priority: Moderate**							
Phytophthora nicotianae (Pn) is rated as a high priority in QLD and is not known to occur in other states. *Phytophthora cactorum* is the more common recording in other states. It is rated as a moderate priority in QLD and VIC, a high priority in WA and a low priority in TAS. Phytophthora infections can occur when plants are waterlogged, particularly in warm weather. Ensuring good drainage in the field and the use of clean planting material is critical.							
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil Borne Diseases including Fusarium and Verticillium Wilts, Rhizoctonia and Pythium. ***For use by professional and registered fumigators only.***	**-**

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Captan	M4	Protectant & Curative	1	A	ALL	Registered in strawberries for control of Grey Mould, Gloeosporium Fruit Rot, **Phytophthora Root Rot**, Black Spot / Anthracnose, Scorch and Leaf Blight. Apply every 10 days commencing at blossom stage. Apply no more than 5 applications per season.	-
Chloropicrin (Agrocelhone NE Soil Fumigant)		Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil-Borne Fungus Diseases and Bacteria. ***For use by professional and registered fumigators only.***	-
Ethanedinitrile (EDN Fumigas)	-	Fumigant	NR	A	ALL	Registered in strawberries and **strawberry runners** for pre-planting control of Soil Borne Pathogens (*Bipolaris sorokiniana, Fusarium acuminatum, Fusarium oxysporum, Phytophthora cactorum, Phytophthora cryptogea, Pythium sulcatum, Pythium ultimum, Rhizoctonia fragariae, Rhizoctonia solani, Sclerotium rolfsii, Macrophomina phaseolina*), nematodes and weeds. ***For use by licensed fumigators or approved persons only.***	-
Mancozeb + Metalaxyl-M (Ridomil Gold MZ) Syngenta	M3+4	Protectant **Strawberry runner production only**	7	A	ALL	Registered in non-fruiting strawberries for control of Eye Spot, Leaf Blight, **Root Rot** and Scorch. Apply as a combined dip for runners after digging. Use only in Strawberry Runner Approval Schemes.	R2
Metalaxyl-M (Ridomil Gold) Syngenta & Phosphorous Acid PER13697	4+33	Protectant **Strawberry runner production only**	NR	A	QLD	Permitted in strawberry runners for control of **Root & Crown Rot**. Before planted, runners are dipped in a phosphorous acid solution for 15-30 minutes. Four and eight weeks after establishment apply foliar applications of phosphorous acid. At 'pre-runner digging', three applications of phosphorous acid are applied at 7 day intervals with the final spray being as close to digging as possible The first application of Metalaxyl-M is applied during or immediately after planting. The second application is applied through trickle irrigation, or over the top of the plants after establishment. One further application of Metalaxyl-M can be made through the season following extended wet weather through trickle irrigation, or over the top of the plants.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Phosphorous Acid PER80064	33	Curative	NR	A	ALL (excl. VIC)	Permitted in strawberries for control of **Crown Rot**. Apply as a foliar spray after establishment and at weekly intervals for 2-3 weeks. Apply a maximum of 4 sprays only. DO NOT use on strawberry runner beds. DO NOT apply to moisture stressed plants. DO NOT apply in high temperatures particularly if humidity is low.	**-**
Streptomyces lydicus (Actinovate)	BM 02	Protectant	NR	A	ALL	Registered in strawberries for the suppression of Powdery Mildew and **Phytophthora**. Application prior to onset of disease season. Apply as part of a program alternating with other products.	-
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime Soil Ameliorant and Biofungicide) Bayer	BM 02	Biological Soil Ameliorant	NR	P-A	ALL	Available in berries for application to soil to improve bioavailability of soil resources to horticultural crops. No MRLs required for biological product.	-
Mandipropamid (Revus) Syngenta	40	Protectant & Curative		P		Current AU registration for control of Downy Mildew in grapes, lettuce, leafy vegetables, and oilseed poppies. Registered in the US for Phytophthora in various crops, including as a foliar application for protection of citrus from Phytophthora Root Rot. No MRLs in place for AU or Codex.	-
Oxathiopiprolin (Zorvec Enicade) Corteva	49	Protectant & Curative		P		Current AU registrations for control of Downy Mildew in bulb vegetables, brassicas, cucurbits, leafy vegetables and poppies. Registered in the US for control of Phytophthora Canker and Brown Rot in citrus. No MRLs in place for AU or Codex.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Crown Rot (*Colletotrichum gloeosporioides*) **Priority: Moderate**							
Rated as a high priority in WA, a moderate priority in QLD and a low priority in TAS and VIC. The pathogen prefers warmer temperatures so its incidence can vary with the seasonal conditions. Some weed species are known to be hosts and potential sources of infection. Therefore, it is important to ensure that disease and weed-free transplants are used.							
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil Borne Diseases including Fusarium and Verticillium Wilts, Rhizoctonia and Pythium. ***For use by professional and registered fumigators only.***	-
Chloropicrin (Agrocelhone NE Soil Fumigant)	-	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil-Borne Fungus Diseases and Bacteria. ***For use by professional and registered fumigators only.***	-
Fludioxonil + Cyprodinil (Switch) Syngenta	12+9	Protectant & Curative	3	A	ALL	Registered in strawberries for control of **Crown & Petiole Rots**. Apply prior to the onset of disease. Repeat applications at 7-14 day intervals. DO NOT apply more than 3 applications per crop.	R3
Prochloraz (Octave)	3	Protectant & Curative **Strawberry runner production only**	NR	A	QLD, WA	Registered in **strawberry runners** for control of **Colletotrichum Crown Rot / Stolon Rot**. Apply as a foliar spray on a 7-14 day interval. DO NOT apply to strawberries grown for fruit production. Treatments per season not limited.	-
Pyraclostrobin (Cabrio) PER14483	11	Protectant & Curative **Strawberry runner production only**	NR	A	QLD, TAS & VIC	Permitted in **strawberry runners** for control of **Crown or Petiole Rot**. For use in the tissue culture (TC) and foundation nurseries only. For the TC nursery, spraying should begin 1 month after establishment. For the foundation nurseries, application should begin when the plants have 2-3 new leaves. Apply no more than 2 consecutive sprays of Cabrio at 10-14 day intervals. DO NOT apply more than 5 applications per crop.	-
Aureobasidium pullulans (Botector) Nufarm	-	Biological / Protectant	NR	P-A	ALL	Registered in strawberries for control of Botrytis Blight & Fruit Rot / Grey Mould and suppression of Anthracnose Fruit Rot, Phomopsis Fruit Rot and Rhizopus Fruit Rot.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Bacillus amyloliquefaciens (Serenade Opti) Bayer	BM 02	Protectant / Biological	NR	P-A	ALL	Registered in strawberries for control of Botrytis. Registered for control of ***Colletotrichum* spp.** in avocado and mango.	**-**
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime Soil Ameliorant and Biofungicide) Bayer	BM 02	Biological Soil Ameliorant	NR	P-A	ALL	Available in berries for application to soil to improve bioavailability of soil resources to horticultural crops. No MRLs required for biological product.	-
Isofetamid (Kenja) ISK / AgNova	7	Protectant & Curative	NR	P-A	ALL	Registered in strawberries for control of Botrytis Grey Mould. US registration for control of Grey Mould, Powdery Mildew and **Anthracnose** in low-growing berries.	-
BLAD (Problad Plus)	BM 01	Biological		P		Registered in stone fruit for suppression of Brown Rot. Registered in the US for control of **Anthracnose**, Grey Mould and Powdery Mildew. No MRLs required for biological product.	**-**
Florylpicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New Mode of Action fungicide being developed in AU. Corteva claim activity on **Anthracnose**. No MRL's for AU or Codex. Scheduled for JMPR evaluation in 2023.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Registration work underway through Hort Innovation project ST17000 for control of **Grey Mould** and Stem End Rot in strawberries (field and protected cropping). US registration for control of Anthracnose in almonds, cucurbits and tree nuts. Fluopyram – AU MRL 1.5 mg/kg; Codex MRL 0.4 mg/kg Tebuconazole – AU MRL 0.05 mg/kg, No Codex MRL.	R3
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered in almonds for control of ***Colletotrichum* spp.** US registration for control of Leaf Spot, Powdery Mildew, **Anthracnose** and Grey Mould in strawberries. Fluxapyroxad – AU MRL 7 mg/kg. No Codex MRL. Pyraclostrobin – AU MRL 0.05 mg/kg. Codex MRL 1.5 mg/kg.	**-**

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Curative / Protectant		P		Registration pending in Australia for control of Botrytis, Alternaria, Powdery Mildew & **Anthracnose** in berries. Registered in the US for control of Grey Mould, Powdery Mildew and **Anthracnose** in strawberries. Pydiflumetofen: No MRLs for AU or Codex. Fludioxonil: AU MRL 5 mg/kg. Codex MRL 3 mg/kg.	R3
Fusarium Wilt (*Fusarium oxysporum*) **Priority: Moderate**							
Rated as a moderate priority in all regions except WA, where it is rated as a high priority and QLD where it is rated as a low priority. Symptoms appear after the crop is established at which time control is not possible. Pre-Plant fumigation is important in reducing infection. Cultivars with disease tolerance are available and crop rotation can help to reduce the incidence of spores in the soil.							
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil Borne Diseases including **Fusarium** and Verticillium Wilts, Rhizoctonia and Pythium. ***For use by professional and registered fumigators only.***	-
Chloropicrin (Agrocelhone NE Soil Fumigant)	-	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil-Borne Fungus Diseases and Bacteria. ***For use by professional and registered fumigators only.***	-
Ethanedinitrile (EDN Fumigas)	-	Fumigant	NR	A	ALL	Registered in strawberries and **strawberry runners** for pre-planting control of Soil Borne Pathogens (*Bipolaris sorokiniana, Fusarium acuminatum, **Fusarium oxysporum**, Phytophthora cactorum, Phytophthora cryptogea, Pythium sulcatum, Pythium ultimum, Rhizoctonia fragariae, Rhizoctonia solani, Sclerotium rolfsii, Macrophomina phaseolina*), nematodes and weeds. ***For use by licensed fumigators or approved persons only.***	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime Soil Ameliorant and Biofungicide) Bayer	BM 02	Biological Soil Ameliorant	NR	P-A	ALL	Available in berries for application to soil to improve bioavailability of soil resources to horticultural crops. No MRLs required for biological product.	-
Black Root Rot (*Pythium* spp.*, Fusarium* spp.*, Rhizoctonia* spp.) **Priority: Moderate**							
Rated as a moderate priority in all regions except QLD, where it is rated as a low priority. Black Root Rot is caused by a complex of pathogens. The relative abundance of these may vary in any one location. The disease is favoured by a lack of crop rotation leading to build up of the pathogen in the soil over several seasons. Fumigation is effective in reducing the incidence of Black Root Rot.							
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of including **Fusarium** and Verticillium Wilts, **Rhizoctonia** and **Pythium**. Apply as either a broadacre or a row treatment and place at least 20cm below the soil surface. Allow at least 14 days after application before planting. ***For use by professional and registered fumigators only.***	**-**
Chloropicrin (Agrocelhone NE Soil Fumigant)	-	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil-Borne Fungus Diseases and Bacteria. ***For use by professional and registered fumigators only.***	**-**
Ethanedinitrile (EDN Fumigas)	-	Fumigant	NR	A	ALL	Registered in strawberries and **strawberry runners** for pre-planting control of Soil Borne Pathogens (*Bipolaris soroikiniana,* ***Fusarium acuminatum****,* ***Fusarium oxysporum****,* *Phytophthora cactorum, Phytophthora cryptogea,* ***Pythium sulcatum****,* ***Pythium ultimum****,* ***Rhizoctonia fragariae****,* ***Rhizoctonia solani****, Schlerotium rolfsi, Macrophomina phaseolina*), nematodes and weeds. ***For use by licensed fumigators or approved persons only.***	**-**

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime Soil Ameliorant and Biofungicide) Bayer	BM 02	Biological Soil Ameliorant	NR	P-A	ALL	Available in berries for application to soil to improve bioavailability of soil resources to horticultural crops. No MRLs required for biological product.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Registration work underway through Hort Innovation project ST17000 for control of Grey Mould and Stem End Rot in strawberries (field and protected cropping). US registration for suppression of ***Rhizoctonia* spp.** in brassica leafy vegetables. Fluopyram – AU MRL 1.5 mg/kg; Codex MRL 0.4 mg/kg Tebuconazole – AU MRL 0.05 mg/kg, No Codex MRL.	R3
Black Spot / Anthracnose (*Colletotrichum acutatum*) **Priority: Moderate**							
Rated as a moderate priority in QLD and WA, and a low priority in all other regions. Black Spot can be a problem in wet seasons, potentially impacting fruit quality. It is spread from infected plants by rain splash, overhead irrigation and by fruit pickers. Control measures include the use of disease-free planting material, protective fungicides, avoiding overhead irrigation and refrigerating fruit after harvest.							
Aureobasidium pullulans (Botector) Nufarm	-	Biological / Protectant	NR	A	ALL	Registered in strawberries for control of Botrytis Blight & Fruit Rot / Grey Mould and suppression of **Anthracnose Fruit Rot**, Phomopsis Fruit Rot and Rhizopus Fruit Rot. Apply as a preventative foliar treatment from beginning of bloom until harvest. Use up to 6 applications at 5-7 day intervals.	**-**
Captan	M4	Protectant	1	A	ALL	Registered in strawberries for control of Grey Mould, Gloeosporium Fruit Rot, Phytophthora Root Rot, **Black Spot / Anthracnose**, Scorch and Leaf Blight. Apply every 10 days commencing at blossom stage. Apply no more than 5 applications per season.	**-**
Thiram	M3	Protectant	2	A	QLD, VIC, SA, TAS & WA	Registered in strawberries for control of **Black Spot** and Grey Mould. Apply as a protective spray at flowering and then at 10-14 day intervals as necessary. Treatments per season not limited.	R2

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Bacillus amyloliquefaciens strain QST 713 (Serenade Opti) Bayer	BM 02	Biological / Protectant		P-A		Registered in strawberries for control of Botrytis, and for control of **Anthracnose** in avocados and mangoes.	**-**
Isofetamid (Kenja) ISK / AgNova	7	Protectant & Curative	NR	P-A	ALL	Registered in strawberries for control of Botrytis Grey Mould. US registration for control of Grey Mould, Powdery Mildew and **Anthracnose** in low-growing berries.	-
BLAD (Problad Plus)	BM 01	Biological	NR	P		Registered in stone fruit for suppression of Brown Rot. Registered in the US for control of **Anthracnose**, Grey Mould and Powdery Mildew. No MRLs required for biological product.	**-**
Florylpicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New Mode of Action fungicide being developed in AU. Corteva claim activity on **Anthracnose**. No MRL's for AU or Codex. Scheduled for JMPR evaluation in 2023.	-
Fludioxonil (Scholar) Syngenta	12	Post-Harvest Treatment		P		Registered as a post-harvest dip in mangoes for Anthracnose. AU MRL 5 mg/kg. Codex MRL 3 mg/kg	**-**
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered in almonds for control of ***Colletotrichum* spp.** US registration for control of Leaf Spot, Powdery Mildew, **Anthracnose** and Grey Mould in strawberries. Fluxapyroxad – AU MRL 7 mg/kg. No Codex MRL. Pyraclostrobin – AU MRL 0.05 mg/kg. Codex MRL 1.5 mg/kg.	**-**
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Curative & Protectant		P		Registration pending in Australia for control of Botrytis, Alternaria, Powdery Mildew & **Anthracnose** in berries. Registered in the US for control of Grey Mould, Powdery Mildew and **Anthracnose** in strawberries. Pydiflumetofen: No MRLs for AU or Codex. Fludioxonil: AU MRL 5 mg/kg. Codex MRL 3 mg/kg.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Leaf Blight (*Phomopsis obscurans*) **Priority: Moderate**							
Rated as a moderate priority in QLD and WA, and a low priority in all other regions. Control measures include good cultural practices and protectant fungicide programs that are in place for other leaf diseases.							
Captan	M4	Protectant	1	A	ALL	Registered in strawberries for control of Grey Mould, Gloeosporium Fruit Rot, Phytophthora Root Rot, Black Spot / Anthracnose, Scorch and **Leaf Blight**. Apply every 10 days commencing at blossom stage. Apply no more than 5 applications per season.	-
Mancozeb + Metalaxyl-M (Ridomil Gold MZ) Syngenta	M3+4	Protectant / Non-Fruiting Strawberries only	7	A	ALL	Registered in strawberry runners for control of Eye Spot, **Leaf Blight**, Root Rot and Scorch. Apply as a combined dip for runners after digging. Use only in Strawberry Runner Approval Schemes.	R2
Zineb	M3	Protectant	7	A	QLD, WA	Registered in strawberries for control of **Leaf Blight** and Scorch. Apply when disease threatens and as required. Treatments per season not limited.	R2
Aureobasidium pullulans (Botector) Nufarm	-	Biological / Protectant	NR	P-A	ALL	Registered in strawberries for control of Botrytis Blight & Fruit Rot / Grey Mould and suppression of Anthracnose Fruit Rot, **Phomopsis** Fruit Rot and Rhizopus Fruit Rot.	-
Leaf Spot / Eye Spot (*Mycosphaerella fragariae*) **Priority: Moderate**							
Rated as a moderate priority in QLD and WA, and a low priority in all other regions. Will be controlled by good cultural practices and the use of regular protectant fungicides.							
Copper (Cu) present as copper ammonium complex	M1	Protectant	1	A	VIC, SA, TAS & WA	Registered in strawberries for control of **Leaf Spot** and Grey Mould. Spray when plants are established and repeat every 7-10 days. Discontinue application if signs of phytotoxicity occur (reddening of leaf veins or new growth inhibition). Treatments per season not limited.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Copper (Cu) present as copper hydroxide	M1	Protectant	1	A	VIC, TAS, SA & WA	Registered in strawberries for control of **Leaf Spot** and Grey Mould. Spray when plants are established and repeat every 7-10 days. Discontinue application if signs of phytotoxicity occur (reddening of leaf veins or new growth inhibition). Treatments per season not limited.	-
Copper (Cu) present as copper oxychloride	M1	Protectant	1	A	ALL	Registered in strawberries for control of Leaf Scorch and **Leaf Spots**. Apply at 10-14 day intervals in wet weather. Treatments per season not limited.	-
Copper (Cu) present as cuprous oxide	M1	Protectant	1	A	VIC, TAS, SA & WA	Registered in strawberries for control of **Leaf Spot** and Grey Mould. Spray when plants are established and repeat every 7-10 days. Discontinue application if signs of phytotoxicity occur (reddening of leaf veins or new growth inhibition). Treatments per season not limited.	-
Mancozeb + Metalaxyl-M (Ridomil Gold MZ) Syngenta	M3+4	Protectant / Non-Fruiting Strawberries only	7	A	ALL	Registered in strawberry runners for control of **Eye Spot**, Leaf Blight, Root Rot and Scorch. Apply as a combined dip for runners after digging. Use only in Strawberry Runner Approval Schemes.	R2
Florylpicoxamid (Adavelt) Corteva	21	Protectant & Curative		P		New Mode of Action fungicide being developed in AU. Corteva claim activity on ***Mycosphaerella* spp**. No MRL's for AU or Codex. Scheduled for JMPR evaluation in 2023.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Protectant & Curative		P		Registration work underway through Hort Innovation project ST17000 for control of Grey Mould and Stem End Rot in strawberries (field and protected cropping). Registered for control of Yellow Sigatoka and Leaf Speckle (***Mycosphaerella* spp.**) in bananas. Fluopyram – AU MRL 1.5 mg/kg; Codex MRL 0.4 mg/kg Tebuconazole – AU MRL 0.05 mg/kg, No Codex MRL.	R3
Fluxapyroxad + Pyraclostrobin (Merivon) BASF	7+11	Protectant & Curative		P		Registered in almonds, cherries and macadamias for control of various leaf diseases**.** US registration for control of **Leaf Spot**, Powdery Mildew, Anthracnose and Grey Mould in strawberries. Fluxapyroxad – AU MRL 7 mg/kg. No Codex MRL. Pyraclostrobin – AU MRL 0.05 mg/kg. Codex MRL 1.5 mg/kg.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Transit Rot (*Rhizopus stolonifer*) **Priority: Moderate**							
Rated as a moderate priority in all regions except TAS, where it is rated as a low priority. Rhizopus can lead to post-harvest spoilage of strawberries. Infections can enter the fruit through wounds and is predominant in warm, moist conditions. Limited options are available for controlling the disease. Post-Harvest hygiene is a key strategy in reducing infections.							
Aureobasidium pullulans (Botector) Nufarm	-	Biological / Protectant	NR	A	ALL	Registered in strawberries for control of Botrytis Blight & Fruit Rot / Grey Mould and suppression of Anthracnose Fruit Rot, Phomopsis Fruit Rot and **Rhizopus Fruit Rot**. Apply as a preventative foliar treatment from beginning of bloom until harvest. Use up to 6 applications at 5-7 day intervals.	-
Bromo Chloro Dimethyl Hydantoin (BCDMH)	-	Sanitiser	NR	A	ALL	Registered in fruit & vegetables for control of bacteria and fungi by post-harvest surface sterilisation of fruit using spray or dip. Minimum contact 60 seconds.	-
Chlorine	M	Sanitiser	NR	A	ALL	Registered in fruit & vegetables for control of bacteria and fungi as a post-harvest spray. Minimum contact 30 seconds.	-
Fludioxonil (Scholar) Syngenta	12	Post-Harvest Treatment		P		Registered as a post-harvest dip in stone fruit for ***Rhizopus stolonifera***. AU MRL 5 mg/kg. Codex MRL 3 mg/kg	R3
Wilt Disease (*Verticillium* spp.) **Priority: Low**							
Rated as a low priority in all regions except WA, where it is rated as a moderate priority. Good farm hygiene is critical to reduce infections. Soil fumigation is the only chemical option available.							
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil Borne Diseases including Fusarium and **Verticillium Wilts**, Rhizoctonia and Pythium. Apply as either a broadacre or a row treatment and place at least 20cm below the soil surface. Allow at least 14 days after application before planting. ***For use by professional and registered fumigators only.***	-
Chloropicrin (Agrocelhone NE Soil Fumigant)	-	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil-Borne Fungus Diseases and Bacteria. Do not plant for at least 10 days after the end of treatment or if gas odour is still present. ***For use by professional and registered fumigators only.***	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime Soil Ameliorant and Biofungicide) Bayer	BM 02	Biological Soil Ameliorant	NR	P-A	ALL	Available in berries for application to soil to improve bioavailability of soil resources to horticultural crops. No MRLs required for biological product.	-
Rhizopus Soft Rot (*Rhizopus* spp.) **Priority: Low**							
Rated as a low priority in all regions except TAS, where it is rated as a moderate priority. Rhizopus can lead to post-harvest spoilage of strawberries. Infections can enter the fruit through wounds and is predominant in warm, moist conditions. Limited options are available for controlling the disease. Post-Harvest hygiene is a key strategy in reducing infections.							
Aureobasidium pullulans (Botector) Nufarm	-	Biological / Protectant	NR	A	ALL	Registered in strawberries for control of Botrytis Blight & Fruit Rot / Grey Mould and suppression of Anthracnose Fruit Rot, Phomopsis Fruit Rot and **Rhizopus Fruit Rot**. Apply as a preventative foliar treatment from beginning of bloom until harvest. Use up to 6 applications at 5-7 day intervals.	**-**
Bromo Chloro Dimethyl Hydantoin (BCDMH)	-	Sanitiser	NR	A	ALL	Registered in fruit & vegetables for control of bacteria and fungi by post-harvest surface sterilisation of fruit using spray or dip. Minimum contact 60 seconds.	**-**
Chlorine	M	Sanitiser	NR	A	ALL	Registered in fruit & vegetables for control of bacteria and fungi as a post-harvest spray. Minimum contact 30 seconds.	**-**
Fludioxonil (Scholar) Syngenta	12	Post-Harvest Treatment		P		Registered as a post-harvest dip in stone fruit for ***Rhizopus stolonifera***. AU MRL 5 mg/kg. Codex MRL 3 mg/kg	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Lethal Yellows (*Candidatus Phytoplasm australiense*) **Priority: Low**							
Rated as a low priority in all regions except WA, where it is rated as a high priority. Leafhoppers transmit the disease to strawberries from alternate hosts. Symptoms appear up to 8 weeks after infection. Strawberry runners may carry the infection into fruit production blocks without exhibiting symptoms at the time of transplanting. Infected plants should be manually removed, weeds should be controlled around strawberry fields to reduce potential hosts and leafhoppers should be controlled in runner production areas to reduce spread of the disease.							
No Control Options Available							
Sclerotinia Fruit Rot (*Sclerotinia* spp.) **Priority: Low**							
Rated as a low priority in all regions. Practice good farm hygiene, particularly removing or destroying residues from prior crops. Fumigation is effective in removing the pathogen prior to planting.							
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil Borne Diseases including Fusarium and **Verticillium Wilts**, Rhizoctonia and Pythium. Apply as either a broadacre or a row treatment and place at least 20cm below the soil surface. Allow at least 14 days after application before planting. ***For use by professional and registered fumigators only.***	-
Chloropicrin (Agrocelhone NE Soil Fumigant)	-	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil-Borne Fungus Diseases and Bacteria. ***For use by professional and registered fumigators only.***	-
NUL3446	TBC			P		Fungicide in development from Nufarm with activity on ***Sclerotinia* spp.**	-
Leaf Scorch (*Diplocarpon earlianum*) **Priority: Low**							
Rated as a low priority in all regions. Leaf Scorch generally affects older leaves at the end of the season. It is of minor importance and should be kept in check by good cultural practices and regular protectant fungicides.							
Captan	M4	Protectant	1	A	ALL	Registered in strawberries for control of Grey Mould, Gloeosporium Fruit Rot, Phytophthora Root Rot, Black Spot / Anthracnose, **Scorch** and Leaf Blight. Apply every 10 days commencing at blossom stage. Apply no more than 5 applications per season.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Copper (Cu) present as copper oxychloride	M1	Protectant	1	A	ALL	Registered in strawberries for control of **Leaf Scorch** and Leaf Spots. Apply at 10-14 day intervals in wet weather. Treatments per season not limited.	-
Mancozeb + Metalaxyl-M (Ridomil Gold MZ) Syngenta	M3+4	Protectant / Non-Fruiting Strawberries only	7	A	ALL	Registered in strawberry runners for control of Eye Spot, Leaf Blight, Root Rot and **Scorch**. Apply as a combined dip for runners after digging. Use only in Strawberry Runner Approval Schemes.	R2
Zineb	M3	Protectant	7	A	QLD, WA	Registered in strawberries for control of Leaf Blight and **Scorch**. Apply when disease threatens and as required. Treatments per season not limited.	R2

4.2 Insect, mite, nematode and other pests of strawberries

4.2.1 Insect, mite, nematode and other pest priorities

Common name	Scientific name
High	
Two Spotted Mite	*Tetranychus urticae*
Western Flower Thrips	*Frankliniella occidentalis*
Moderate	
Rutherglen Bug	*Nysius vinitor*
Strawberry Aphid	*Chaetosiphon fragaefolii*
Green Peach Aphid	*Myzus persicae*
Queensland Fruit Fly	*Bactrocera tryoni*
Cyclamen Mite	*Phytonemus pallidus*
Snails & Slugs	*Helix aspersa, Cernuella virgata*
Green Mirid	*Creontiades dilutus*
Brown Mirid	*Creontiades pacificus*
Crop Mirid	*Sidnia kinbergi*
Greenhouse Whitefly	*Trialeurodes vaporariorum*
Plague Thrips	*Thrips imaginis*
Low	
Root-Knot Nematode	*Meloidogyne* spp.
Root-Lesion Nematode	*Pratylenchus* spp.
Leaf and Bud Nematode	*Aphelenchoides ritzemabosi*
Lygaeid Bugs	Lygaeidae
Onion Thrips	*Thrips tabaci*
Light Brown Apple Moth	*Epiphyas postvittana*
Cluster Caterpillar	*Spodoptera litura*
Cotton Bollworm / Corn Earworm	*Helicoverpa armigera*
Native Budworm	*Helicoverpa punctigera*
Loopers	*Chrysodeixis* spp.
Mediterranean Fruit Fly	*Ceratitis capitata*
Silver Leaf Whitefly	*Bemisia tabaci*
Spiralling Whitefly	*Aleurodicus dispersus*

Common name	Scientific name
Garden Weevil	*Phlyctinus callosus*
Green Vegetable Bug	*Nezara viridula*
Strawberry Bug	*Euander lacertosus*
Broken Backed Bug	*Taylorilygus apicalis*
Apple Dimpling Bug	*Campylomma liebknechti*
Broad Mite	*Polyphagotarsonemus latus*
European Earwig	*Forficula auricularia*
Scarab Beetle	Scarabaeidae

Exotic pests and new incursions which could be potential threats are listed below:

Common Name	Scientific name
Fall Armyworm	*Spodoptera frugiperda*

The pests rated as a high priority in this report were also high priority in the 2016 Strawberry SARP. Feedback from the industry clearly indicates that Two Spotted Mite and Western Flower Thrips are the key pests in all regions.

It is important to take an Integrated Pest Management (IPM) approach to pest control in strawberries. The diversity of insects that will attack the crop means that a planned, strategic approach is required. A range of control measures should be used, including cultural controls, biological controls and insecticides. Beneficial insects such as predators, parasitoids and pollinators should be encouraged and can be introduced artificially if required. Insecticide choice should be made according to economic spray thresholds, as well as considering the preservation of beneficial insects that play an important role in the crop.

Bees also play an important role as pollinators of strawberries. Extra care should be taken with insect control measures used at flowering time, to avoid impacting on pollinators. Always refer to the pesticide label for guidance about preserving bee health.

The diverse range of invertebrate pests in strawberries necessitates careful planning with resistance management. There are several pest strategies that apply to berries on the CropLife website[3], including Aphids, Two Spotted Mite, Fall Armyworm and Western Flower Thrips.

[3] www.croplife.org.au/resources/programs/resistance-management/

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

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

Availability		**Regulatory risk (refer to Appendix 6)**	
A	Available via either registration or permit approval	R1	Short-term: Critical concern over retaining access
P	Potential - a possible candidate to pursue for registration or permit	R2	Medium-term: Maintaining access of significant concern
P-A	Potential, already approved in the crop for another use	R3	Long-term: Potential issues associated with use - Monitoring required

Withholding Period (WHP) – Number of days from last treatment to harvest (H) or Grazing (G)			
Harvest	H	Not Required when used as directed	NR
Grazing	G	No Grazing Permitted	NG

IPM – indicative overall impact on beneficials (based on the Cotton Pest Management Guide 2018-19 and cotton use patterns)
VL – Very low; L – Low; M – Moderate; H – High; VH – Very High; - not specified

Pest / Active Ingredient (Trade Name)	**Chemical group**	**Activity**	**WHP, days**	**Availability**	**States**	**Comments**	**Impact on beneficials**	**Regulatory risk**
Two Spotted Mite (*Tetranychus urticae*) **Priority: High**								
Rated as a high priority in all regions except QLD and VIC, where it is rated as a moderate priority. Two Spotted Mites have many alternate hosts. Heavy infestations will cause poor plant health and can lead to large yield reductions.								
Abamectin	6	Ingestion	3	A	ALL	Registered in strawberries for control of **Two-Spotted Mite** and Western Flower Thrips. Apply on first appearance of mites. When applied early, one application may be sufficient to give effective control however if mite numbers exceed 3-5 mitres per leaflet, apply 2 applications at 7-10 day interval. DO NOT apply more than 2 applications per season.	M Bee H	-
Bifenazate (Acramite) UPL	20D	Contact & Ingestion	1	A	ALL	Registered in strawberries for control of **Two-Spotted Mite** and Bryobia Mite. Do not apply more than 2 applications per growing season. Do not reapply within 21 days of the previous application. A different acaricide should be used between applications.	L Bee H	-
Botanical Oil (Eco-Oil)	-	Contact	NR	A	ALL	Registered in strawberries for control of **Two Spotted Mite**, Aphids and Sooty Mould. Spray when pest first appears. Apply 2 sprays 3-5 days apart. Repeat at signs of reinfestation. DO NOT apply more than 3 sprays to plants within a 4-8 week period.	L Bee L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Dimethoate	1B	Contact **Strawberry runner production only**	NR	A	ALL	Registered in strawberry runners for control of Aphids, Thrips, Jassids, **Spider Mites**, Strawberry Bug and Rutherglen Bug. Apply when pests first appear and repeat at 3 weekly intervals or as necessary. DO NOT apply to the whole field area. Apply to the bed, planted area or area covered by plants only, not areas such as walkways. Treatments per season not limited.	H Bee H	R1
Fenbutatin Oxide (Torque) BASF	12B	Contact	1	A	QLD, NSW, VIC, SA, WA & NT	Registered in strawberries for control of **Two Spotted Mite.** Apply at first sign of mite activity. Repeat as required, subject to resistance management. Treatments per season not limited.	L Bee L	R3
Hexythiazox (Calibre) Nufarm	10A	IGR / Contact	1	A	ALL	Registered in strawberries for control of **Two Spotted Mite.** Apply when mites are evident but before the infestation reaches a level where economic damage is imminent. Do not use more than 1 application per season.	L Bee L	-
Milbemectin (Milbeknock) Sipcam	6	Ingestion	1	A	ALL	Registered in strawberries for control of **Two Spotted Mite.** Apply on first appearance of mites. When applied early, one application may be sufficient to give effective control however if mite numbers exceed local thresholds a second application may be required. DO NOT apply more than 2 consecutive applications within or between season without an unrelated chemical being used in between.	M Bee VH	-
Petroleum / Paraffinic Oil	-	Contact	1	A	NSW, ACT, SA, WA & TAS	Registered in strawberries for control of Aphids and **Mites**. Spray no more than 4 times during growing season with 2 weeks minimum application interval. Do not spray stressed plants and avoid spraying open blooms.	L Bee L	-
Propargite (Omite)	12C	Contact	3	A	VIC, TAS, NSW, ACT, WA & QLD	Registered in strawberries for control of **Two Spotted Mite.** Spray when pests first appear. A maximum of 3 sprays applied over 3-4 weeks may be necessary. DO NOT mix with other pesticides or foliar nutrients and do not spray when temperature exceeds 27 deg C.	M Bee L	R3
Acequinocyl (Kanemite) UPL	20B	Contact & Ingestion		P		Not registered in Australia. US registration in strawberry for control of various spider mites, including Two Spotted Mites. No MRLs for AU or Codex.	L Bee L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Beauvaria bassiana (Velifer) BASF	UN	Biological	NR	P		Registered for suppression of Onion Thrips and Western Flower Thrips in protected vegetables and ornamentals and has activity on Thrips, Aphids, Whitefly and Mites. No MRLs required for a biological product.	L Bee L	-
Cyflumetofen (Danisaraba) BASF	25A	Contact		P		BASF is seeking registration in Australia for the control of Spider Mites in various crops, including strawberries.	L Bee L	-
Spiromesifen (Oberon) Bayer	23	Ingestion		P		Hort Innovation project ST19020 to generate residue, efficacy and crop safety data to obtain a label registration for control of **Two Spotted Mite** in strawberries (field & protected cropping). US registration in berries for control of **Two Spotted Mite** and Whiteflies. AU MRL 1 mg/kg. No Codex MRL.	M Bee VL	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-
Western Flower Thrips (*Frankliniella occidentalis*) **Priority: High**								
Rated as a high priority in all regions except QLD and VIC, where it is rated as a moderate priority. Thrips are most active in crops during spring. They can cause substantial damage by rasping the surface of the fruit with their mouthparts. Western Flower Thrips are a difficult pest to control with insecticides. Options are limited and products often give only partial control. Biological agents are commonly used to support chemical controls.								
Abamectin	6	Contact and Ingestion	3	A	ALL	Registered in strawberries for control of Two-Spotted Mite and **Western Flower Thrips**. Use a single application if applied early on a low mite population. If numbers exceed 3-5 mites per leaflet, apply 2 applications at 7-10 day interval. Do not exceed 2 applications total per season.	M Bee H	-
Cyantraniliprole (Benevia) FMC	28	Ingestion	1	A	ALL	Registered in strawberries for control of Cluster Caterpillar, Cotton Bollworm, Light Brown Apple Moth, Native Budworm, Green Peach Aphid, Melon Aphid, Strawberry Aphid and suppression of Onion Thrips, Plague Thrips and **Western Flower Thrips**. More active on nymphs than adults, it should be applied to a newly developing infestation. To maximise efficacy apply sequential treatments. A maximum of 2 applications to be used per season. Apply on a 7-10 day spray interval.	L-M Bee VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Dimethoate	1B	Contact **Strawberry runner production only**	NR	A	ALL	Registered in **strawberry runners** for control of Aphids, **Thrips**, Jassids, Spider Mites, Strawberry Bug and Rutherglen Bug. Apply when pest first appears and repeat at 3 weekly intervals or as necessary. DO NOT apply to the whole field area. Apply to the bed, planted area or area covered by plants only, not areas such as walkways. Treatments per season not limited.	H Bee H	R1
Ethyl Formate	-	Contact / Post-Harvest Fumigation	NR	A	ALL	Registered in strawberries for post-harvest control of **Western Flower Thrips**. Use only approved fumigation equipment. Treatment chamber must remain completely sealed for 1 hour exposure period.	-	-
Spinetoram (Success Neo) Corteva	5	Contact & Ingestion	1	A	ALL	Registered in strawberries for control of Loopers, Light Brown Apple Moth, Helicoverpa and **Western Flower Thrips**. Make 3 consecutive applications at either 3-5 day intervals when temperatures are greater than 20 deg C or at 6-12 day intervals when temperatures are less than 20 deg C. Any further sprays required should be from a different chemical group.	M Bee VH	-
Spinosad (Entrust Organic) Corteva	5	Contact & Ingestion	1	A	ALL	Registered in strawberries for control of Loopers, Light Brown Apple Moth, Helicoverpa and **Western Flower Thrips**. Make 3 consecutive applications at either 3-5 day intervals when temperatures are greater than 20 deg C or at 6-12 day intervals when temperatures are less than 20 deg C. Any further sprays required should be from a different chemical group.	L Bee H	-
Beauveria bassiana (Velifer) BASF	UN			P		Registered for suppression of Onion Thrips and **Western Flower Thrips** in protected vegetables and ornamentals. No MRLs required for a biological product.	L Bee L	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact and Ingestion		P		Registered in macadamias for control of Fruit Spotting Bugs, Lace Bug and Scirtothrips. Registered in the US in caneberries for control of Aphids and Whitefly, in bushberries for control of Aphids, Thrips and Blueberry Maggot and suppression of Scirtothrips, and control of Bugs and Leafhoppers in various crops. AU MRL 1.5 mg/kg. Codex MRL 1.5 mg/kg.	L Bee L	-
NUL3445 Nufarm	TBC			P		Product in development from Nufarm with activity on Thrips. Strawberries not currently in scope.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered in various crops for control of **Western Flower Thrips**. US registration in bushberry for control of various pests including Thrips (larvae). AU MRL 0.1 mg/kg. No Codex MRL.	M Bee L	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-
Rutherglen Bug (*Nysius vinitor*) **Priority: Moderate**								
Rated as a moderate priority in all regions except TAS, where it is rated as a low priority. Rutherglen Bug has a wide host range. Abundance increases in warm weather and as a highly mobile pest, continual reinfestation can cause control challenges for extended periods of time. Hort Innovation project BS12026 found that Rutherglen Bug usually only cause minor damage in strawberries. Nymphs can cause problems as a contaminant in punnets.								
Dimethoate	1B	Contact **Strawberry runner production only**	NR	A	QLD, VIC, SA, WA & TAS	Registered in **strawberry runners** for control of Aphids, Thrips, Jassids, Spider Mites, Strawberry Bug and **Rutherglen Bug**. Apply when pest first appears and repeat at 3 weekly intervals or as necessary. DO NOT apply to the whole field area. Apply to the bed, planted area or area covered by plants only, not areas such as walkways. Treatments per season not limited.	H Bee H	R1
Maldison PER13542	1B	Contact	3	A	ALL (excl. VIC)	Permitted in strawberries for control of **Rutherglen Bug** and *Pachybrachius* spp. DO NOT apply more than 3 applications per season, with a minimum retreatment interval of 7 days between consecutive applications. Apply when pests appear in crop.	H Bee H	-
Pyrethrins (Pyganic)	3A	Contact	NR	A	ALL	Registered in strawberries for control of insects (including beneficial predators) that may be present just prior to harvest such as: Fruit Fly, **Rutherglen Bug** and Spiders. Best results are achieved when applied 3-12 hours prior to harvest. Apply a maximum of 3 sprays at 3 day intervals.	VH Bee H	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	1	P-A	ALL	Registered in strawberries for control of Green Peach Aphid and Green Mirid. Registered for control of **Rutherglen Bug** in various crops.	M Bee VH	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact and Ingestion		P		Registered in macadamias for control of Fruit Spotting Bugs, Lace Bug and Scirtothrips. Registered in the US in caneberries for control of Aphids and Whitefly, in bushberries for control of Aphids, Thrips and Blueberry Maggot and suppression of Scirtothrips, and control of Bugs and Leafhoppers in various crops. AU MRL 1.5 mg/kg. Codex MRL 1.5 mg/kg.	L Bee L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
NUL3445 Nufarm	TBC			P		Product in development from Nufarm with activity on Bugs. Strawberries not currently in scope.	-	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-
Strawberry Aphid (*Chaetosiphon fragaefolii*) **Priority: Moderate**								
Rated as a moderate priority in all regions except TAS, where it is rated as a high priority and VIC, where it is rated as a low priority. Strawberry Aphid can cause damage to fruit quality if large infestations are not controlled. Honeydew can lead to the development of sooty mould on the fruit. Practising good IPM techniques will assist in stopping aphid flare and aphicides should be rotated regularly as resistance can develop rapidly.								
Afidopyropen (Versys) BASF PER87797	9D	Ingestion	1	A	ALL	Permitted in strawberries for control of Aphids including Green Peach Aphid, Black Peach Aphid, Melon Aphid and **Strawberry Aphid**. Apply as foliar spray at the first sign of insect pest infestation. Apply a maximum 4 applications per crop, with a minimum 14 day re-treatment interval between applications. Apply a maximum of 2 sprays before rotating to an alternative MoA insecticide for aphid control.	L Bee L	-
Botanical Oil (Eco-Oil)	-	Contact	NR	A	ALL	Registered in strawberries for control of Two Spotted Mite, **Aphids** and Sooty Mould. Spray when pest first appears. Apply 2 sprays 3-5 days apart. Repeat at signs of reinfestation. DO NOT apply more than 3 sprays to plants within a 4-8 week period.	L Bee L	-
Cyantraniliprole (Benevia) FMC	28	Ingestion	1	A	ALL	Registered in strawberries for control of Cluster Caterpillar, Cotton Bollworm, Light Brown Apple Moth, Native Budworm, Green Peach Aphid, Melon Aphid, **Strawberry Aphid** and suppression of Onion Thrips, Plague Thrips and Western Flower Thrips. Should be applied to a newly developing infestation. To maximise efficacy, apply sequential treatments. A maximum of 2 applications to be used per season. Apply on a 7-10 day spray interval.	L-M Bee VH	-
Dimethoate	1B	Contact **Strawberry runner production only**	NR	A	ALL	Registered in **strawberry runners** for control of **Aphids**, Thrips, Jassids, Spider Mites, Strawberry Bug and Rutherglen Bug. Apply when pest first appears and repeat at 3 weekly intervals or as necessary. DO NOT apply to the whole field area. Apply to the bed, planted area or area covered by plants only, not areas such as walkways. Treatments per season not limited.	H Bee H	R1

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Flonicamid (Mainman) UPL PER82598	29	Ingestion	1	A	ALL	Permitted in strawberries for control of **Aphids** including Green Peach Aphid, Whiteflies and Green Mirid. Apply as foliar spray at the first sign of insect pest infestation. DO NOT apply more than 3 applications per crop, with a minimum 7 day retreatment interval between applications.	M Bee VL	-
Petroleum / Paraffinic Oil	-	Contact	1	A	NSW, ACT, SA, WA & TAS	Registered in strawberries for control of **Aphids** and Mites. Spray no more than 4 times during growing season with 2 weeks minimum application interval. Do not spray stressed plants and avoid spraying open blooms.	L Bee L	-
Pirimicarb (Pirimor)	1A	Contact	2	A	QLD, NSW, ACT & WA	Registered in strawberries for control of **Aphids**. Do not use on carbamate resistant aphid populations. If aphids are not resistant to carbamates, use a maximum of 2 non-consecutive applications per season. DO NOT use as the first spray of the season if a carbamate was used as the last spray of the previous season.	VL Bee VL	R3
Pirimicarb (Pirimor) PER81573	1A	Contact	2	A	TAS	Permitted in strawberries for control of **Aphids**. Apply by foliar application when aphids are first detected. Apply a maximum of 2 sprays per season.	VL Bee VL	R3
Pymetrozine (Chess) Syngenta PER81810	9B	Ingestion	3	A	TAS	Permitted in protected-grown strawberries for control of various **Aphid** species, including Green Peach Aphid. Apply at first sign of aphid infestation. DO NOT apply more than 2 applications per season and do not use consecutive applications. Apply with a minimum re-treatment interval of 14 days. Monitor regularly for re-infestation and respray if necessary using an alternate product from a different chemical MoA group.	L Bee VL	R3
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	1	P-A	ALL	Registered in strawberries for control of Green Peach Aphid and Green Mirid. Registered for control of aphids generally in various crops.	M Bee VH	-
Beauveria bassiana (Velifer) BASF	UN			P		Registered for suppression of various aphids in protected vegetables and ornamentals. No MRLs required for a biological product.	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 and Ingestion		P		Registered in macadamias for control of Fruit Spotting Bugs, Lace Bug and Scirtothrips. Registered in the US in caneberries for control of Aphids and Whitefly, in bushberries for control of Aphids, Thrips and Blueberry Maggot and suppression of Scirtothrips, and control of Bugs and Leafhoppers in various crops. AU MRL 1.5 mg/kg. Codex MRL 1.5 mg/kg.	L Bee L	-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered in various crops for control of various Aphids. US registration in bushberry for control of various pests including Aphids. AU MRL 0.1 mg/kg. No Codex MRL.	M Bee L	-
Green Peach Aphid (*Myzus persicae*) **Priority: Moderate**								
Rated as a moderate priority in WA, a high priority in TAS, and a low priority in QLD and VIC. Green Peach Aphid should be managed in a similar way to Strawberry Aphid but they are harder to control with insecticides. Use of an IPM approach is vital to ensure that populations are kept below damaging levels and the longevity of available chemistry is maintained.								
Afidopyropen (Versys) BASF PER87797	9D	Ingestion	1	A	ALL	Permitted in strawberries for control of Aphids including **Green Peach Aphid**, Black Peach Aphid, Melon Aphid and Strawberry Aphid. Apply as foliar spray at the first sign of insect pest infestation. Apply a maximum 4 applications per crop, with a minimum 14 day re-treatment interval between applications. Apply a maximum of 2 sprays before rotating to an alternative MoA insecticide for aphid control.	L Bee L	-
Botanical Oil (Eco-Oil)	-	Contact	NR	A	ALL	Registered in strawberries for control of Two Spotted Mite, **Aphids** and Sooty Mould. Spray when pest first appears. Apply 2 sprays 3-5 days apart. Repeat at signs of reinfestation. DO NOT apply more than 3 sprays to plants within a 4-8 week period.	L Bee L	-
Cyantraniliprole (Benevia) FMC	28	Ingestion	1	A	ALL	Registered in strawberries for control of Cluster Caterpillar, Cotton Bollworm, Light Brown Apple Moth, Native Budworm, **Green Peach Aphid**, Melon Aphid, Strawberry Aphid and suppression of Onion Thrips, Plague Thrips and Western Flower Thrips. Should be applied to a newly developing infestation. To maximise efficacy apply sequential treatments. A maximum of 2 applications to be used per season. Apply on a 7-10 day spray interval.	L-M Bee VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Dimethoate	1B	Contact **Strawberry runner production only**	NR	A	ALL	Registered in **strawberry runners** for control of **Aphids**, Thrips, Jassids, Spider Mites, Strawberry Bug and Rutherglen Bug. Apply when pest first appears and repeat at 3 weekly intervals or as necessary. DO NOT apply to the whole field area. Apply to the bed, planted area or area covered by plants only, not areas such as walkways. Treatments per season not limited.	H Bee H	R1
Flonicamid (Mainman) UPL PER82598	29	Ingestion	1	A	ALL	Permitted in strawberries for control of Aphids including **Green Peach Aphid**, Whiteflies and Green Mirid. Apply as foliar spray at the first sign of insect pest infestation. DO NOT apply more than 3 applications per crop, with a minimum 7 day retreatment interval between applications.	M Bee VL	-
Petroleum / Paraffinic Oil		Contact	1	A	NSW, ACT, SA, WA & TAS	Registered in strawberries for control of **Aphids** and Mites. Spray no more than 4 times during growing season with 2 weeks minimum application interval. Do not spray stressed plants and avoid spraying open blooms.	L Bee L	-
Pirimicarb (Pirimor)	1A	Contact	2	A	QLD, NSW, ACT & WA	Registered in strawberries for control of **Aphids**. Do not use on carbamate resistant aphid populations. If aphids are not resistant to carbamates, use a maximum of 2 non-consecutive applications per season. DO NOT use as the first spray of the season if a carbamate was used as the last spray of the previous season.	VL Bee VL	R3
Pirimicarb (Pirimor) PER81573	1A	Contact	2	A	TAS	Permitted in strawberries for control of **Aphids**. Apply by foliar application when aphids are first detected. Apply a maximum of 2 sprays per season.	VL Bee VL	R3
Pymetrozine (Chess) Syngenta PER81810	9B	Ingestion	3	A	TAS	Permitted in protected-grown strawberries for control of various Aphid species, including **Green Peach Aphid**. For use in protected-grown crops. Apply at first sign of aphid infestation. DO NOT apply more than 2 applications per season and do not use consecutive applications. Apply with a minimum re-treatment interval of 14 days. Monitor regularly for re-infestation and respray if necessary using an alternate product from a different chemical MoA group.	L Bee VL	R3
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	1	A	ALL	Registered in strawberries for control of **Green Peach Aphid** and Green Mirid. DO NOT apply more than 4 times per season, and DO NOT make more than 2 consecutive applications per crop. Use a spray interval of 7 days.	M Bee VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Beauveria bassiana (Velifer) BASF	UN			P		Registered for suppression of various aphids in protected vegetables and ornamentals. No MRLs required for a biological product.	L Bee L	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact and Ingestion		P		Registered in macadamias for control of Fruit Spotting Bugs, Lace Bug and Scirtothrips. Registered in the US in caneberries for control of Aphids and Whitefly, in bushberries for control of Aphids, Thrips and Blueberry Maggot and suppression of Scirtothrips, and control of Bugs and Leafhoppers in various crops. AU MRL 1.5 mg/kg. Codex MRL 1.5 mg/kg.	L Bee L	-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered in various crops for control of various Aphids. US registration in bushberry for control of various pests including Aphids. AU MRL 0.1 mg/kg. No Codex MRL.	M Bee L	-
Queensland Fruit Fly (*Bactrocera tryoni*) **Priority: Moderate**								
Rated as a moderate priority in QLD, and a low priority in all other regions. Fruit exported interstate from QLD must be free of Queensland Fruit Fly.								
Pyrethrins (Pyganic)	3A	Contact	NR	A	ALL	Registered in strawberries for control of insects (including beneficial predators) that may be present just prior to harvest such as: **Fruit Fly**, Rutherglen Bug and Spiders. Clean up spray to remove insects that may be present just prior to harvest. Best results are achieved when applied 3-12 hours prior to harvest. Apply a maximum of 3 sprays at 3 day intervals.	VH Bee H	-
Spinetoram (Success Neo) Corteva PER87408	5	Ingestion	1	A	ALL (excl. VIC)	Permitted in strawberries for suppression of **Queensland Fruit Fly**, Lesser Queensland Fruit Fly and Mediterranean Fruit Fly. Apply as a foliar spray after flower set. DO NOT apply more than 4 applications per season, with a minimum 7-14 days between consecutive sprays.	M Bee VH	-
Spinosad (Naturalure Bait) Corteva	5	Ingestion / Bait	NR	A	ALL	Registered in fruit for baiting of **Queensland Fruit Fly** and Mediterranean Fruit Fly. Begin application as soon as monitoring traps indicate flies are present and fruit is at a susceptible stage. Repeat applications every 7 days, re-applying sooner if rain washes off the deposit. Apply as either a band or spot spray to the lower canopy, avoid spraying directly on the fruit. Treatments per season not limited.	L Bee H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Trichlorfon (Lepidex) PER12486	1B	Contact	14	A	ACT, NSW, NT, QLD, SA & WA	Permitted in strawberries for control of **Queensland Fruit Fly** and Mediterranean Fruit Fly. Apply as a cover spray to point of runoff. DO NOT apply more than 3 applications per crop per season with a minimum retreatment interval of 7 days between applications.	H Bee H	R2
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Ingestion/ IGR		P		Registered for suppression of **Queensland Fruit Fly** in avocado, citrus and mango. Acetamiprid: No AU MRL. Codex MRL 0.5 mg/kg. Pyriproxifen: AU MRL T0.5 mg/kg. No Codex MRL.	M Bee H	-
NUL3445 Nufarm	TBC			P		Product in development from Nufarm with activity on Fruit Fly. Strawberries not currently in scope.	-	-
Cyclamen Mite (*Phytonemus pallidus*) **Priority: Moderate**								
Cyclamen Mite is rated as a moderate priority in all regions except VIC, where it is rated as a low priority. The use of IPM is key to managing mite populations.								
Petroleum / Paraffinic Oil	-	Contact	1	P-A	NSW, ACT, SA, WA & TAS	Registered in strawberries for control of Aphids and Mites. Spray no more than 4 times during growing season with 2 weeks minimum application interval. Do not spray stressed plants and avoid spraying open blooms.	L Bee L	-
Abamectin	6	Ingestion	3	P-A	ALL	Registered in strawberries for control of Two-Spotted Mite and Western Flower Thrips.	M Bee H	-
Bifenazate (Acramite) UPL	20D	Contact & Ingestion	1	P-A	ALL	Registered in strawberries for control of Two Spotted Mite and Bryobia Mite.	L Bee H	-
Botanical Oil (Eco-Oil)		Contact	NR	P-A	ALL	Registered in strawberries for control of Two Spotted Mite, Aphids and Sooty Mould.	L Bee L	-
Hexythiazox (Calibre) Nufarm	10A	IGR / Contact	1	P-A	ALL	Registered in strawberries for control of Two Spotted Mite.	L Bee L	-
Milbemectin (Milbeknock) Sipcam	6	Ingestion	1	P-A	ALL	Registered in strawberries for control of Two Spotted Mite.	M Bee VH	-
Acequinocyl (Kanemite) UPL	20B	Contact & Ingestion		P		Not registered in Australia. US registration in strawberry for control of various spider mites, and in melons and okra for control of **Broad Mite**. No MRLs for AU or Codex.	L Bee L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Beauvaria bassiana (Velifer) BASF	UN	Biological	NR	P		Registered for suppression of Onion Thrips and Western Flower Thrips in protected vegetables and ornamentals and has activity on Thrips, Aphids, Whitefly and Mites. No MRLs required for a biological product.	L Bee L	-
Spiromesifen (Oberon) Bayer	23	Ingestion		P		Hort Innovation project ST19020 pending to generate residue, efficacy and crop safety data to obtain a label registration for control of Two Spotted Mite in strawberries (field & protected cropping). US registration in berries for control of Two Spotted Mite and Whiteflies and in fruiting vegetables for control of **Broad Mite**. AU MRL 1 mg/kg. No Codex MRL.	M Bee VL	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-
Snails and Slugs (*Helix aspersa, Cernuella virgata*) **Priority: Moderate**								
Rated as a moderate priority in all regions except QLD, where they are rated as a low priority. They cause direct feeding damage to fruit leading to reduced yields or marketability. Molluscicides can be used as a broadcast across the field or applied to localised areas of infestation.								
Iron EDTA Complex	-	Contact	7	A	ALL	Registered in strawberries for control of **Common Garden Snail**, **White Snail** and **Vine Snail**. Apply evenly to the field. Ensure pellets do not become lodged in plant foliage. Treatments per season not limited.	-	-
Metaldehyde	-	Contact	7	A	ALL	Registered in horticultural crops for control of **snails** and **slugs**. Broadcast evenly over the ground where snails and slugs are active or incorporate with seed when direct drilling. Treatments per season not limited.	-	-
Methiocarb (Mesurol) Bayer	1A	Contact	H:7 G:28	A	ALL	Registered in strawberries for control of **Common Garden Snail**, **Slugs**, **White Italian Snail** and **White Snail**. Keep away from domestic pets. Scatter baits evenly onto ground where snails and slugs occur. Treatments per season not limited.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Green Mirid (*Creontiades dilutus*) **Brown Mirid** (*Creontiades pacificus*) **Crop Mirid** (*Sidnia kinbergi*) **Priority: Moderate**								
Rated as a moderate priority in VIC, high priority in TAS and WA and a low priority in QLD. Mirids are highly mobile pests that can be sporadic but will swarm in large numbers under favourable conditions. They tend to cause significant damage to strawberry fruit when they are present during fruit ripening. Hort Innovation project BS12026 found that mirids usually cause severe damage in strawberries. Subsequent recommendations were made in BS 13003 that a number of cultural controls have potential use in managing mirids, including lucerne catch crops, lights traps, border sprays, shelter belts and interrow plantings to encourage natural predators, humidity management and biological aphid management.								
Flonicamid (Mainman) UPL PER82598	29	Ingestion	1	A	ALL	Permitted in strawberries for control of Aphids including Green Peach Aphid, Whiteflies and **Green Mirid**. Apply as foliar spray at the first sign of insect pest infestation. DO NOT apply more than 3 applications per crop, with a minimum 7 day retreatment interval between applications.	M Bee VL	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	1	A	ALL	Registered in strawberries for control of Green Peach Aphid and **Green Mirid**. DO NOT apply more than 4 times per season, and DO NOT make more than 2 consecutive applications per crop. Use a spray interval of 7 days.	M Bee VH	-
Dimethoate	1B	Contact Strawberry runner production only	NR	P-A	ALL	Registered in **strawberry runners** for control of Aphids, Thrips, Jassids, Spider Mites, Strawberry Bug and Rutherglen Bug. Registered for control of mirids in various other crops. Apply when pest first appears and repeat at 3 weekly intervals or as necessary. DO NOT apply to the whole field area. Apply to the bed, planted area or area covered by plants only, not areas such as walkways. Treatments per season not limited.	H Bee H	R1
Paraffinic Oil	-	Contact	1	P-A	NSW, ACT, SA, WA & TAS	Registered in strawberries for control of Aphids and Mites. Registered in cotton for control of **Green Mirids**.	L Bee L	-
Clitoria ternatea Extract (Sero-X) Growth Agriculture	-	Biological	NR	P		Registered in cotton for control of *Helicoverpa* spp., **Green Mirids** and Silverleaf Whitefly and in brassica leafy vegetables for control of Diamondback Moth. No MRLs required for biological product.	L Bee VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact and Ingestion		P		Registered in macadamias for control of Fruit Spotting Bugs, Lace Bug and Scirtothrips. Registered in the US in caneberries for control of Aphids and Whitefly, in bushberries for control of Aphids, Thrips and Blueberry Maggot and suppression of Scirtothrips, and control of Bugs and Leafhoppers in various crops. AU MRL 1.5 mg/kg. Codex MRL 1.5 mg/kg.	L Bee L	-
NUL3445 Nufarm	TBC			P		Product in development from Nufarm with activity on Bugs. Strawberries not currently in scope.	-	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-
Greenhouse Whitefly (*Trialeurodes vaporariorum*) **Priority: Moderate**								
Rated as a moderate priority in VIC, a high priority in WA, and a low priority in QLD and TAS. Greenhouse Whitefly are a sporadic pest with outbreaks leading to honeydew build up which can potentially impact fruit quality. Preserving natural enemies is an important part of an integrated whitefly management strategy.								
Flonicamid (Mainman) UPL PER82598	29	Ingestion	1	A	ALL	Permitted in strawberries for control of Aphids including Green Peach Aphid, **Whiteflies** and Green Mirid. Apply as foliar spray at the first sign of insect pest infestation. DO NOT apply more than 3 applications per crop, with a minimum 7 day retreatment interval between applications.	M Bee VL	-
Pyriproxyfen (Admiral) Sumitomo PER13331	7C	Contact / IGR	2	A	ALL (excl. VIC)	Permitted in strawberries for control of **Greenhouse Whitefly** and Silverleaf Whitefly. Apply at the first appearance of whitefly or when whiteflies reach threshold levels of 3-5 adults per leaf and/or equivalent levels of immatures. DO NOT apply more than twice per season with a minimum retreatment interval of 30 days between applications.	VL Bee L	-
Afidopyropen (Versys) BASF PER87797	9D	Ingestion	1	P-A	ALL	Permitted in strawberries for control of aphids. Registered for suppression of Silver Leaf White Fly in various crops.	L Bee L	-
Cyantraniliprole (Benevia) FMC	28	Ingestion	1	P-A	ALL	Registered in strawberries for control of Cluster Caterpillar, Cotton Bollworm, Light Brown Apple Moth, Native Budworm, Green Peach Aphid, Melon Aphid, Strawberry Aphid and suppression of Onion Thrips, Plague Thrips and Western Flower Thrips. Registered for control of whitefly in various crops.	L-M Bee VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	1	P-A	ALL	Registered for control of GPA and mirids in strawberries and registered for control of Greenhouse Whitefly in various crops.	M Bee VH	-
Beauveria bassiana (Velifer) BASF	UN	Biological		P		Registered for suppression of whitefly in protected vegetables and ornamentals. No MRLs required for a biological product.	L Bee L	-
Clitoria ternatea Extract (Sero-X) Growth Agriculture	-	Biological	NR	P		Registered in cotton for control of *Helicoverpa* spp., Green Mirids and Silverleaf Whitefly and in brassica leafy vegetables for control of Diamondback Moth. No MRLs required for biological product.	L Bee VL	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact and Ingestion		P		Registered in macadamias for control of Fruit Spotting Bugs, Lace Bug and Scirtothrips. Registered in the US in caneberries for control of Aphids and Whitefly, in bushberries for control of Aphids, Thrips and Blueberry Maggot and suppression of Scirtothrips, and control of Bugs and Leafhoppers in various crops. AU MRL 1.5 mg/kg. Codex MRL 1.5 mg/kg.	L Bee L	-
NUL3145 Nufarm	TBC			P		New product from Nufarm with whitefly activity. Strawberries not in scope.	-	-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered in various crops for control of Silverleaf Whitefly. US registration in bushberry for control of various pests and various crops for control of Whitefly. AU MRL 0.1 mg/kg. No Codex MRL.	M Bee L	-
Plague Thrips (*Thrips imaginis*) **Priority: Moderate**								
Rated as a moderate priority in TAS and VIC, a high priority in WA, and a low priority in QLD. Plague Thrips have a similar impact to Western Flower Thrips, although their incidence tends to be more sporadic in strawberries, and they often do not necessarily cause fruit damage when present.								
Cyantraniliprole (Benevia) FMC	28	Ingestion	1	A	ALL	Registered in strawberries for control of Cluster Caterpillar, Cotton Bollworm, Light Brown Apple Moth, Native Budworm, Green Peach Aphid, Melon Aphid, Strawberry Aphid and suppression of Onion Thrips, **Plague Thrips** and Western Flower Thrips. More active on nymphs than adults, it should be applied to a newly developing infestation. To maximise efficacy, apply sequential treatments. A maximum of 2 applications to be used per season. Apply on a 7-10 day spray interval.	L-M Bee VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Dimethoate	1B	Contact **Strawberry runner production only**	NR	A	ALL	Registered in strawberry runners for control of Aphids, **Thrips**, Jassids, Spider Mites, Strawberry Bug and Rutherglen Bug. For use in strawberry runner production only. Apply when pest first appears and repeat at 3 weekly intervals or as necessary. DO NOT apply to the whole field area. Apply to the bed, planted area or area covered by plants only, not areas such as walkways. Treatments per season not limited.	H Bee H	R1
Spinetoram (Success Neo) Corteva	5	Contact & Ingestion	1	P-A	ALL	Registered in strawberries for control of Loopers, Light Brown Apple Moth, Helicoverpa and Western Flower Thrips.	M Bee VH	-
Spinosad (Entrust Organic) Corteva	5	Contact & Ingestion	1	P-A	ALL	Registered in strawberries for control of Loopers, Light Brown Apple Moth, Helicoverpa and Western Flower Thrips.	L Bee H	-
Beauveria bassiana (Velifer) BASF	UN			P		Registered for suppression of Onion Thrips and Western Flower Thrips in protected vegetables and ornamentals. No MRLs required for a biological product.	L Bee L	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact and Ingestion		P		Registered in macadamias for control of Fruit Spotting Bugs, Lace Bug and Scirtothrips. Registered in the US in cane berries for control of Aphids and Whitefly, in bushberries for control of Aphids, Thrips and Blueberry Maggot and suppression of Scirtothrips, and control of Bugs and Leafhoppers in various crops. AU MRL 1.5 mg/kg. Codex MRL 1.5 mg/kg.	L Bee L	-
NUL3445 Nufarm	TBC			P		Product in development from Nufarm with activity on Thrips. Strawberries not currently in scope.	-	-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered in various crops for control of **Plague Thrips**. US registration in bushberry for control of various pests including Thrips (larvae). AU MRL 0.1 mg/kg. No Codex MRL.	M Bee L	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Root-Knot Nematode (*Meloidogyne* spp.) **Priority: Low**								
Rated as a low priority in all regions except TAS, where it is rated as a high priority. Various nematode species affect strawberries with Root-Knot Nematode the most significant across all growing regions. Fumigation before planting is commonly used to reduce nematode numbers. The impact of nematodes may be underestimated because the effects on production can be difficult to detect.								
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Fumigant	NR	A	ALL	Registered in strawberries for pre-planting control of Soil Borne Diseases including Fusarium and **Verticillium Wilts**, Rhizoctonia and Pythium. Apply as either a broadacre or a row treatment and place at least 20cm below the soil surface. Allow at least 14 days after application before planting. ***For use by professional and registered fumigators only.***	-	-
Abamectin (Tervigo) Syngenta PER86820	6	Contact	NR	A	ALL	Permitted in strawberries for control of **Root-Knot Nematode**. Apply when the water content of the soil is close to full. Apply at early stages of pest development as a preventative treatment. DO NOT apply more than 4 applications per crop production cycle at minimum 10 day retreatment interval. Apply using injection unit through direct injection into drip/trickle irrigation system into soil or growing media in hydroponic systems, during the second quarter of the irrigation cycle.	M Bee H	-
Chloropicrin (Agrocelhone NE Soil Fumigant)	8B	Fumigant	NR	A	ALL	Registered in strawberries for pre-plant control of **Nematodes** and Insects. Inject at least 15-18cm deep, roll soil to level and pack and water immediately to seal in gas. Exposure time of 2-3 days and do not plant for at least 10 days after the end of treatment or if gas odour is still present. For use by professional and registered fumigators only.	-	-
Ethanedinitrile (EDN Fumigas)	-	Fumigant	NR	A	ALL	Registered in strawberries and **strawberry runners** for pre-planting control of Soil Borne Pathogens, Nematodes (***Meloidogyne* spp.**, *Steinernema* spp.) and weeds. ***For use by licensed fumigators or approved persons only.***	-	-
Fenamiphos (Nemacur) PER86746	1B	Contact **Strawberry runner production only**	NR	A	QLD	Permitted in strawberry runners for control of Leaf and Bud Nematode and **Root Knot Nematode**. **For use in strawberry runner crops only, by staff employed by Sweets Strawberry Runners at Stanthorpe.** Apply as a post-lifting dip treatment. Immerse plants in dip solution for 10 minutes.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Fluazaindolizine (Reklemel, Salibro) Corteva	New			P		Development underway in AU, to be launched globally in 2021. New MOA nematicide from Corteva.	-	-
Fluensulfone (Nimitz) Adama	UN	Contact		P		Currently registered in several crops for Root-Knot Nematode and Root Lesion Nematode. No MRLs in place for AU or Codex.	L Bee L	-
Fluopyram (Velum Prime) Bayer	7			P		Registration pending in AU in various crops. AU MRL 1.5 mg/kg. Codex MRL 0.4 mg/kg.	-	-
NUL3145 Nufarm	TBC			P		Nematicide in development from Nufarm.	-	-
SYNSTN1 Syngenta	TBC			P		Nematicide in development from Syngenta.	-	-
Root-Lesion Nematode (*Pratylenchus* spp.) **Priority: Low**								
Rated as a low priority in all regions. Fumigation before planting is commonly used to reduce nematode numbers. The impact of nematodes may be underestimated because the effects on production can be difficult to detect.								
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Fumigant	NR	A	ALL	Registered in strawberries for pre-plant control of **Plant Parasitic Nematodes**, Symphylans and Wireworms. ***For use by professional and registered fumigators only.***	-	-
Chloropicrin (Agrocelhone NE Soil Fumigant)	8B	Fumigant	NR	A	ALL	Registered in strawberries for pre-plant control of **Nematodes** and Insects. Inject at least 15-18cm deep, roll soil to level and pack and water immediately to seal in gas. Exposure time of 2-3 days and do not plant for at least 10 days after the end of treatment or if gas odour is still present. For use by professional and registered fumigators only.	-	-
Ethanedinitrile (EDN Fumigas)	-	Fumigant	NR	P-A	ALL	Registered in strawberries and **strawberry runners** for pre-plant control of Soil-Borne Pathogens, Nematodes and Weeds. **For use by licensed fumigators or approved persons only.**	-	-
Fluazaindolizine (Reklemel, Salibro) Corteva	New			P		Development underway in AU, to be launched globally in 2021. New MOA nematicide from Corteva.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Fluensulfone (Nimitz) Adama	UN	Contact		P		Currently registered in several crops for Root-Knot Nematode and Root Lesion Nematode. No MRLs in place for AU or Codex.	L Bee L	-
Fluopyram (Velum Prime) Bayer	7			P		Registration pending in AU in various crops. AU MRL 1.5 mg/kg. Codex MRL 0.4 mg/kg.	-	-
NUL3145 Nufarm	TBC			P		Nematicide in development from Nufarm.	-	-
SYNSTN1 Syngenta	TBC			P		Nematicide in development from Syngenta.	-	-
Leaf and Bud Nematode (*Aphelenchoides ritzemabosi*) **Priority: Low**								
Rated as a low priority in QLD and VIC, a high priority in TAS, and a moderate priority in WA. Leaf and Bud Nematodes attack the above-ground parts of the strawberry plant. They cause disease-like symptoms with plant stunting and leaf distortion easy to confuse with other disorders.								
Fenamiphos (Nemacur) PER86746	1B	Contact **Strawberry runner production only**	NR	A	QLD	Permitted in strawberry runners for control of **Leaf and Bud Nematode** and Root Knot Nematode. **For use by staff employed by Sweets Strawberry Runners at Stanthorpe.** Apply as a foliar treatment. DO NOT use more than 2 applications per season. And DO NOT use a retreatment interval of less than 14 days between applications.	-	-
Fenamiphos (Nemacur) PER85217	1B	Contact **Strawberry runner production only**	NR	A	TAS	Permitted in strawberry runners for control of **Leaf and Bud Nematode.** Apply as a foliar treatment. DO NOT use more than 2 applications per season. And DO NOT use a retreatment interval of less than 14 days between applications.	-	-
Peroxyacetic Acid + Hydrogen Peroxide (Peratec Plus) PER85548	M	Contact	1	A	ALL (excl. VIC)	Permitted in strawberries for control of **Foliar Nematode**. **For use by Driscoll's employees only.** Apply by foliar application when foliar nematodes are detected. DO NOT use more than 4 applications per season with a minimum retreatment interval of 5-7 days.	-	-
Fluazaindolizine (Reklemel, Salibro) Corteva	New			P		Development underway in AU, to be launched globally in 2021. New MOA nematicide from Corteva.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Fluopyram (Velum Prime) Bayer	7			P		Registration pending in AU in various crops. AU MRL 1.5 mg/kg. Codex MRL 0.4 mg/kg.	-	-
NUL3145 Nufarm	TBC			P		Nematicide in development from Nufarm.	-	-
SYNSTN1 Syngenta	TBC			P		Nematicide in development from Syngenta.	-	-
Lygaeid Bugs (*Lygaeidae*) **Priority: Low**								
Rated as a low priority in all regions except TAS and WA, where it is rated as a moderate priority. Hort Innovation project BS12026 found that Lygaeid Bugs do not damage strawberries. Correct identification is important to distinguish them from mirids. Lygaeid Bugs generally do not warrant control.								
Dimethoate	1B	Contact Strawberry runner production only	NR	P-A	ALL	Registered in **strawberry runners** for control of Aphids, Thrips, Jassids, Spider Mites, Strawberry Bug and Rutherglen Bug. Registered for control of plant bugs in various other crops.	H Bee H	R1
Flonicamid (Mainman) UPL PER82598	29	Ingestion	1	P-A	ALL	Permitted in strawberries for control of Aphids, Whiteflies and Mirids.	M Bee VL	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	1	P-A	ALL	Registered in strawberries for control of Green Peach Aphid and Green Mirid.	M Bee VH	-
Clitoria ternatea Extract (Sero-X) Growth Agriculture		Biological	NR	P		Registered in cotton for control of *Helicoverpa* spp., Green Mirids and Silverleaf Whitefly and in brassica leafy vegetables for control of Diamondback Moth. No MRLs required for biological product.	L Bee VL	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact and Ingestion		P		Registered in macadamias for control of Fruit Spotting Bugs, Lace Bug and Scirtothrips. Registered in the US in caneberries for control of Aphids and Whitefly, in bushberries for control of Aphids, Thrips and Blueberry Maggot and suppression of Scirtothrips, and control of Bugs and Leafhoppers in various crops. AU MRL 1.5 mg/kg. Codex MRL 1.5 mg/kg.	L Bee L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
NUL3445 Nufarm	TBC			P		Product in development from Nufarm with activity on Bugs. Strawberries not currently in scope.	-	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-
Onion Thrips (*Thrips tabaci*) **Priority: Low**								
Rated as a low priority in all regions except TAS and VIC, where they are rated as a moderate priority. Onion Thrips are less of a threat in strawberries than other thrips species and crops can tolerate significant numbers with little impact on yield or quality.								
Cyantraniliprole (Benevia) FMC	28	Ingestion	1	A	ALL	Registered in strawberries for control of Cluster Caterpillar, Cotton Bollworm, Light Brown Apple Moth, Native Budworm, Green Peach Aphid, Melon Aphid, Strawberry Aphid and suppression of **Onion Thrips**, Plague Thrips and Western Flower Thrips. More active on nymphs than adults, it should be applied to a newly developing infestation. To maximise efficacy apply sequential treatments. A maximum of 2 applications to be used per season. Apply on a 7-10 day spray interval.	L-M Bee VH	-
Dimethoate	1B	Contact **Strawberry runner production only**	NR	A	ALL	Registered in **strawberry runners** for control of Aphids, **Thrips**, Jassids, Spider Mites, Strawberry Bug and Rutherglen Bug. Apply when pest first appears and repeat at 3 weekly intervals or as necessary. DO NOT apply to the whole field area. Apply to the bed, planted area or area covered by plants only, not areas such as walkways. Treatments per season not limited.	H Bee H	R1
Abamectin	6	Contact and Ingestion	3	P-A	ALL	Registered in strawberries for control of Two-Spotted Mite and Western Flower Thrips.	M Bee H	-
Ethyl Formate		Contact / Post-Harvest Fumigation	NR	P-A	ALL	Registered in strawberries for post-harvest control of Western Flower Thrips.	-	-
Spinetoram (Success Neo) Corteva	5	Contact & Ingestion	1	P-A	ALL	Registered in strawberries for control of Loopers, Light Brown Apple Moth, Helicoverpa and Western Flower Thrips.	M Bee VH	-
Spinosad (Entrust Organic) Corteva	5	Contact & Ingestion	1	P-A	ALL	Registered in strawberries for control of Loopers, Light Brown Apple Moth, Helicoverpa and Western Flower Thrips.	L Bee H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Beauveria bassiana (Velifer) BASF	UN			P		Registered for suppression of **Onion Thrips** and Western Flower Thrips in protected vegetables and ornamentals. No MRLs required for a biological product.	L Bee L	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact and Ingestion		P		Registered in macadamias for control of Fruit Spotting Bugs, Lace Bug and Scirtothrips. Registered in the US in caneberries for control of Aphids and Whitefly, in bushberries for control of Aphids, Thrips and Blueberry Maggot and suppression of Scirtothrips, and control of Bugs and Leafhoppers in various crops. AU MRL 1.5 mg/kg. Codex MRL 1.5 mg/kg.	L Bee L	-
NUL3445 Nufarm	TBC			P		Product in development from Nufarm with activity on Thrips. Strawberries not currently in scope.	-	-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered in bulb vegetables for control of **Onion Thrips**. US registration in bushberry for control of various pests including Thrips (larvae). AU MRL 0.1 mg/kg. No Codex MRL.	M Bee L	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-
Light Brown Apple Moth (*Epiphyas postvittana*) **Priority: Low**								
Rated as a low priority in all regions except TAS, where it is rated as a high priority, and WA where it is rated as moderate priority. It can cause significant feeding damage to fruit, reducing yields and marketability of strawberries.								
Cyantraniliprole (Benevia) FMC	28	Ingestion	1	A	ALL	Registered in strawberries for control of Cluster Caterpillar, Cotton Bollworm, **Light Brown Apple Moth**, Native Budworm, Green Peach Aphid, Melon Aphid, Strawberry Aphid and suppression of Onion Thrips, Plague Thrips and Western Flower Thrips. Apply treatment to eggs and early instar stages of a newly developing pest infestation. To maximise efficacy, apply sequential treatments. Apply a maximum of 2 applications per season on a 7-10 day interval.	L-M Bee VH	-
Emamectin (Proclaim) Syngenta	6	Ingestion	H:3 NG	A	ALL	Registered in strawberries for control of Cluster Caterpillar, Heliothis, **Light Brown Apple Moth** and Loopers. Spray at first sign of insect infestation. Apply just prior to or after eggs hatch when larvae are small. DO NOT target large larvae. DO NOT use more than 3 applications per crop, with a minimum retreatment interval of 7 days.	M Bee H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Methomyl (Lannate)	1A	Contact	3	A	SA, WA	Registered in strawberries for control of Budworm, Cluster Caterpillar, Loopers and **Light Brown Apple Moth**. Apply when pests first appear. Repeat depending on infestation. Treatments per season not limited.	H Bee H	R2
Spinetoram (Success Neo) Corteva	5	Ingestion	NR	A	ALL	Registered in strawberries for control of Loopers, **Light Brown Apple Moth**, Helicoverpa and Western Flower Thrips. Target sprays against mature eggs and newly-hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur. Do not use more than 4 applications per season.	M Bee VH	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	NR	A	ALL	Registered in strawberries for control of Loopers, **Light Brown Apple Moth**, Helicoverpa and Western Flower Thrips. Target sprays against mature eggs and newly-hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur. Do not use more than 4 applications per season.	L Bee H	-
Indoxacarb (Avatar) FMC PER14192	22A	Ingestion	2	P-A	ALL (excl. VIC)	Permitted in strawberries for control of White Fringed Weevil and Garden Weevil. Registered for control of Light Brown Apple Moth in various crops.	M Bee H	R3
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-
Cluster Caterpillar (*Spodoptera litura*) **Priority: Low**								
Rated as a low priority in all regions except WA, where it is rated as a moderate priority. Cluster Caterpillar is more abundant in spring under favourable seasonal conditions. Large numbers can infest crops in a short time period with the potential to cause significant impacts on crop health and fruit yield.								
Chlorantraniliprole (Coragen) FMC	28	Ingestion	1	A	ALL	Registered in strawberries for control of **Cluster Caterpillar**, Cotton Bollworm and Native Budworm. Target sprays against eggs and newly hatched larvae before they become entrenched. A maximum of 3 applications are to be applied to any one crop. No more than 2 consecutive sprays per crop, with a minimum spray interval of 7 days.	L Bee VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Cyantraniliprole (Benevia) FMC	28	Ingestion	1	A	ALL	Registered in strawberries for control of **Cluster Caterpillar**, Cotton Bollworm, Light Brown Apple Moth, Native Budworm, Green Peach Aphid, Melon Aphid, Strawberry Aphid and suppression of Onion Thrips, Plague Thrips and Western Flower Thrips. Apply treatment to eggs and early instar stages of a newly developing pest infestation. To maximise efficacy apply sequential treatments. Apply a maximum of 2 applications per season on a 7-10 day interval.	L-M Bee VH	-
Emamectin (Proclaim) Syngenta	6	Ingestion	H:3 NG	A	ALL	Registered in strawberries for control of **Cluster Caterpillar**, Heliothis, Light Brown Apple Moth and Loopers. Spray at first sign of insect infestation. Apply just prior to or after eggs hatch when larvae are small. DO NOT target large larvae. DO NOT use more than 3 applications per crop, with a minimum retreatment interval of 7 days.	M Bee H	-
Flubendiamide (Belt) Bayer	28	Ingestion	1	A	ALL	Registered in strawberries for control of Heliothis and **Cluster Caterpillar**. Target sprays to egg hatch. Use spray intervals of 7-14 days. A maximum of 3 applications may be used per crop, within a time period of not less than 14 days.	L Bee L	-
Methomyl (Lannate)	1A	Contact	3	A	NSW, NT, QLD, VIC, WA & TAS	Registered in strawberries for control of Budworm, **Cluster Caterpillar**, Loopers and Light Brown Apple Moth. Apply when pests first appear. Repeat depending on infestation. Treatments per season not limited.	H Bee H	R2
Trichlorfon (Lepidex)	1B	Contact	2	A	QLD, NT	Registered in strawberries for control of Cutworm and **Cluster Caterpillar**. Apply when pests are first seen. Treatments per season not limited.	H Bee H	R2
Indoxacarb (Avatar) FMC PER14192	22A	Ingestion	2	P-A	ALL (excl. VIC)	Permitted in strawberries for control of White Fringed Weevil and Garden Weevil. Registered for control of LBAM in various crops. Registered for control of for cluster caterpillar in brassicas and fruiting vegetables.	M Bee H	R3
Spinetoram (Success Neo) Corteva	5	Ingestion	NR	P-A	ALL	Registered in strawberries for control of Loopers, Light Brown Apple Moth, Helicoverpa and Western Flower Thrips. Registered for control of Cluster Caterpillar in brassica vegetables and canola.	M Bee VH	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Tetraniliprole (Vayego 200SC) Bayer	28	Ingestion		P		Registered for control of various weevils, beetles and Lepidoptera in almonds, macadamias, pome and stone fruit. Strawberries not currently planned for registration but Hort Innovation project ST17000 data generation under development to register in raspberries and blackberries for various pests including; Light Brown Apple Moth, Loopers, Helicoverpa, **Cluster Caterpillar** and Monolepta beetle.	L-M Bee VH	-
Other Lepidoptera, including Cotton Bollworm / Corn Earworm (*Helicoverpa armigera*), **Native Budworm** (*Helicoverpa punctigera*), **Loopers** (*Pseudococcus jackbeardsleyi*) **Priority: Low**								
Cotton Bollworm and Native Budworm are rated as a low priority in all regions except TAS and WA, where they are rated as a moderate priority. Loopers are rated as a low priority in all regions except TAS, where they are rated as a high priority, and WA where they are rated as a moderate priority. Loopers are mainly leaf feeders and seldom cause serious crop effects. *Helicoverpa* spp. are more damaging because they prefer to feed on the buds and fruit.								
Chlorantraniliprole (Coragen) FMC	28	Ingestion	1	A	ALL	Registered in strawberries for control of Cluster Caterpillar, **Cotton Bollworm** and **Native Budworm**. Target sprays against eggs and newly hatched larvae before they become entrenched. A maximum of 3 applications are to be applied to any one crop. No more than 2 consecutive sprays per crop, with a minimum spray interval of 7 days.	L Bee VL	-
Cyantraniliprole (Benevia) FMC	28	Ingestion	1	A	ALL	Registered in strawberries for control of Cluster Caterpillar, **Cotton Bollworm**, Light Brown Apple Moth, **Native Budworm**, Green Peach Aphid, Melon Aphid, Strawberry Aphid and suppression of Onion Thrips, Plague Thrips and Western Flower Thrips. Apply treatment to eggs and early instar stages of a newly developing pest infestation. To maximise efficacy, apply sequential treatments. Apply a maximum of 2 applications per season on a 7-10 day interval.	L-M Bee VH	-
Emamectin (Proclaim) Syngenta	6	Ingestion	H:3 NG	A	ALL	Registered in strawberries for control of Cluster Caterpillar, **Heliothis**, Light Brown Apple Moth and **Loopers**. Spray at first sign of insect infestation. Apply just prior to or after eggs hatch when larvae are small. DO NOT target large larvae. DO NOT use more than 3 applications per crop, with a minimum retreatment interval of 7 days.	M Bee H	-
Flubendiamide (Belt) Bayer	28	Ingestion	1	A	ALL	Registered in strawberries for control of **Heliothis** and Cluster Caterpillar. Target sprays to egg hatch. Use spray intervals of 7-14 days. A maximum of 3 applications may be used per crop, within a time period of not less than 14 days.	L Bee L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Methomyl (Lannate)	1A	Contact	3	A	NSW, NT, QLD, VIC, WA, TAS & SA	Registered in strawberries for control of **Budworm**, Cluster Caterpillar, **Loopers** and Light Brown Apple Moth. Apply when pests first appear. Repeat depending on infestation. Treatments per season not limited.	H Bee H	R2
Nuclear Polyhedrosis Virus (Vivus) AgBiTech	31	Biological / Ingestion	NR	A	ALL	Registered in strawberries for control of **Corn Earworm** and **Native Budworm**. Has a short residual activity and retreatment may be required at 2-3 day intervals. Target application when the majority of larvae are less than 7mm in length. Treatments per season not limited.	VL Bee VL	-
Spinetoram (Success Neo) Corteva	5	Ingestion	NR	A	ALL	Registered in strawberries for control of **Loopers**, Light Brown Apple Moth, **Helicoverpa** and Western Flower Thrips. Target sprays against mature eggs and newly-hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur. Do not use more than 4 applications per season.	M Bee VH	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	NR	A	ALL	Registered in strawberries for control of **Loopers**, Light Brown Apple Moth, **Helicoverpa** and Western Flower Thrips. Target sprays against mature eggs and newly-hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur. Do not use more than 4 applications per season.	L Bee H	-
Indoxacarb (Avatar) FMC PER14192	22A	Ingestion	2	P-A	ALL (excl. VIC)	Permitted in strawberries for control of White Fringed Weevil and Garden Weevil. Registered for control of *Helicoverpa* spp. and Loopers in various crops.	M Bee H	R3
Clitoria ternatea Extract (Sero-X) Growth Agriculture		Biological	NR	P		Registered in cotton for control of ***Helicoverpa* spp.**, Green Mirids and Silverleaf Whitefly and in brassica leafy vegetables for control of Diamondback Moth. No MRLs required for biological product.	L Bee VL	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Tetraniliprole (Vayego 200SC) Bayer	28	Ingestion		P		Registered for control of various weevils, beetles and Lepidoptera in almonds, macadamias, pome and stone fruit. Strawberries not currently planned for registration but Hort Innovation project ST17000 data generation under development to register in raspberries and blackberries for various pests including; Light Brown Apple Moth, Loopers, ***Helicoverpa***, Cluster Caterpillar and Monolepta beetle.	L-M Bee VH	-
Mediterranean Fruit Fly (*Ceratitis capitata*) **Priority: Low**								
Rated as a low priority in all regions. Mediterranean Fruit Fly do not usually cause damage in strawberries.								
Pyrethrins (Pyganic)	3A	Contact	NR	A	ALL	Registered in strawberries for control of insects (including beneficial predators) that may be present just prior to harvest such as: **Fruit Fly**, Rutherglen Bug and Spiders. Clean up spray to remove insects that may be present just prior to harvest. Best results are achieved when applied 3-12 hours prior to harvest. Apply a maximum of 3 sprays at 3 day intervals.	VH Bee H	-
Spinetoram (Success Neo) Corteva PER87408	5	Ingestion	1	A	ALL (excl. VIC)	Permitted in strawberries for suppression of Queensland Fruit Fly, Lesser Queensland Fruit Fly and **Mediterranean Fruit Fly**. Apply as a foliar spray after flower set. DO NOT apply more than 4 applications per season, with a minimum 7-14 days between consecutive sprays.	M Bee VH	-
Spinosad (Naturalure Bait) Corteva	5	Ingestion / Bait	NR	A	ALL	Registered in fruit for baiting of Queensland Fruit Fly and **Mediterranean Fruit Fly**. Begin application as soon as monitoring traps indicate flies are present and fruit is at a susceptible stage. Repeat applications every 7 days, re-applying sooner if rain washes off the deposit. Apply as either a band or spot spray to the lower canopy, avoid spraying directly on the fruit. Treatments per season not limited.	L Bee H	-
Trichlorfon (Lepidex) PER12486	1B	Contact	14	A	ACT, NSW, NT, QLD, SA & WA	Permitted in strawberries for control of Queensland Fruit Fly and **Mediterranean Fruit Fly**. Apply as a cover spray to point of runoff. DO NOT apply more than 3 applications per crop per season with a minimum retreatment interval of 7 days between applications.	H Bee H	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Ingestion/ IGR		P		Registered for suppression of Queensland Fruit Fly in avocado, citrus and mango. Acetamiprid: No AU MRL. Codex MRL 0.5 mg/kg. Pyriproxifen: AU MRL T0.5 mg/kg. No Codex MRL.	M Bee H	-
NUL3445 Nufarm	TBC			P		Product in development from Nufarm with activity on Fruit Fly. Strawberries not currently in scope.	-	-
Other Whitefly, including Silver Leaf Whitefly (*Bemisia tabaci*), **Spiralling Whitefly** (*Aleurodicus dispersus*) **Priority: Low**								
Silverleaf Whitefly is rated as a low priority in all regions except WA, where it is rated as a moderate priority. Spiralling Whitefly is rated as a low priority in all regions. Both species can infest strawberries, particularly in warm, drier growing regions. It is important to use integrated pest management strategies to ensure populations are kept in check. Insecticide options are available if required.								
Flonicamid (Mainman) UPL PER82598	29	Ingestion	1	A	ALL	Registered in strawberries for control of Aphids including Green Peach Aphid, **Whiteflies** and Green Mirid. Apply as foliar spray at the first sign of insect pest infestation. DO NOT apply more than 3 applications per crop, with a minimum 7 day retreatment interval between applications.	M Bee VL	-
Pyriproxyfen (Admiral) Sumitomo PER13331	7C	Contact / IGR	2	A	ALL (excl. VIC)	Permitted in strawberries for control of Greenhouse Whitefly and **Silverleaf Whitefly**. Apply at the first appearance of whitefly or when whiteflies reach threshhold levels of 3-5 adults per leaf and/or equivalent levels of immatures. DO NOT apply more than twice per season with a minimum retreatment interval of 30 days between applications.	VL Bee L	-
Cyantraniliprole (Benevia) FMC	28	Ingestion	1	P-A	ALL	Registered in strawberries for control of Cluster Caterpillar, Cotton Bollworm, Light Brown Apple Moth, Native Budworm, Green Peach Aphid, Melon Aphid, Strawberry Aphid and suppression of Onion Thrips, Plague Thrips and Western Flower Thrips. Registered for control of whitefly in various crops.	L-M Bee VH	-
Beauveria bassiana (Velifer) BASF	UN	Biological		P		Registered for suppression of whitefly in protected vegetables and ornamentals. No MRLs required for a biological product.	L Bee L	-
Clitoria ternatea Extract (Sero-X) Growth Agriculture	-	Biological	NR	P		Registered in cotton for control of *Helicoverpa* spp., Green Mirids and **Silverleaf Whitefly** and in brassica leafy vegetables for control of Diamondback Moth. No MRLs required for biological product.	L Bee VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact and Ingestion		P		Registered in macadamias for control of Fruit Spotting Bugs, Lace Bug and Scirtothrips. Registered in the US in caneberries for control of Aphids and Whitefly, in bushberries for control of Aphids, Thrips and Blueberry Maggot and suppression of Scirtothrips, and control of Bugs and Leafhoppers in various crops. AU MRL 1.5 mg/kg. Codex MRL 1.5 mg/kg.	L Bee L	-
NUL3145 Nufarm	TBC			P		New product from Nufarm with whitefly activity. Strawberries not in scope.	-	-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered in various crops for control of **Silverleaf Whitefly**. US registration in bushberry for control of various pests and various crops for control of Whitefly. AU MRL 0.1 mg/kg. No Codex MRL.	M Bee L	-
Garden Weevil (*Phlyctinus callosus*) **Priority: Low**								
Rated as a low priority in all regions except WA, where it is rated as a high priority. Garden Weevil was introduced in WA from South Africa. They can have a significant impact on yield and fruit quality if left uncontrolled.								
Indoxacarb (Avatar) FMC PER14192	22A	Ingestion	H:2 NG	A	ALL (excl. VIC)	Permitted in strawberries for control of White Fringed Weevil and **Garden Weevil**. Apply just after peak weevil emergence in spring. A second application may be required if sufficient weevils emerge in early summer. DO NOT apply more than 2 applications in any one cropping cycle. DO NOT retreat within 7 days.	M Bee H	R3
NUL3445 Nufarm	TBC			P		Product in development from Nufarm with activity on Weevils. Strawberries not currently in scope.	-	-
Tetraniliprole (Vayego 200SC) Bayer	28	Ingestion		P		Registered for control of various weevils, beetles and Lepidoptera in almonds, macadamias, pome and stone fruit. Strawberries not currently planned for registration but Hort Innovation project ST17000 data generation under development to register in raspberries and blackberries for various pests including; Light Brown Apple Moth, Loopers, Helicoverpa, Cluster Caterpillar and Monolepta beetle.	L-M Bee VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Green Vegetable Bug (*Nezara viridula*) **Priority: Low**								
Rated as a low priority in all regions except WA, where it is rated as a moderate priority. Green Vegetable Bugs are usually favoured by hot, dry weather. Broad spectrum insecticides, if required, should be used strategically to ensure that impact on beneficial insects is minimised.								
Dimethoate	1B	Contact Strawberry runner production only	NR	P-A	QLD, VIC, SA, WA & TAS	Registered in **strawberry runners** for control of Aphids, Thrips, Jassids, Spider Mites, Strawberry Bug and Rutherglen Bug.	H Bee H	R1
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact and Ingestion		P		Registered in macadamias for control of Fruit Spotting Bugs, Lace Bug and Scirtothrips. Registered in the US in caneberries for control of Aphids and Whitefly, in bushberries for control of Aphids, Thrips and Blueberry Maggot and suppression of Scirtothrips, and control of Bugs and Leafhoppers in various crops. AU MRL 1.5 mg/kg. Codex MRL 1.5 mg/kg.	L Bee L	-
NUL3445 Nufarm	TBC			P		Product in development from Nufarm with activity on Bugs. Strawberries not currently in scope.	-	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-
Strawberry Bug (*Euander lacertosus*) **Priority: Low**								
Rated as a low priority in all regions. Strawberry Bugs are usually favoured by hot, dry weather. Broad spectrum insecticides, if required, should be used strategically to ensure that impact on beneficial insects is minimised. Nymphs can cause problems as a contaminant in punnets.								
Dimethoate	1B	Contact Strawberry runner production only	NR	A	QLD, VIC, SA, WA & TAS	Registered in **strawberry runners** for control of Aphids, Thrips, Jassids, Spider Mites, **Strawberry Bug** and Rutherglen Bug. Apply when pest first appears and repeat at 3 weekly intervals or as necessary. DO NOT apply to the whole field area. Apply to the bed, planted area or area covered by plants only, not areas such as walkways. Treatments per season not limited.	H Bee H	R1

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact and Ingestion		P		Registered in macadamias for control of Fruit Spotting Bugs, Lace Bug and Scirtothrips. Registered in the US in caneberries for control of Aphids and Whitefly, in bushberries for control of Aphids, Thrips and Blueberry Maggot and suppression of Scirtothrips, and control of Bugs and Leafhoppers in various crops. AU MRL 1.5 mg/kg. Codex MRL 1.5 mg/kg.	L Bee L	-
NUL3445 Nufarm	TBC			P		Product in development from Nufarm with activity on Bugs. Strawberries not currently in scope.	-	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-
Broken Backed Bug (*Taylorilygus apicalis*) **Apple Dimpling Bug** (*Campylomma liebknechti*) **Priority: Low**								
Broken Backed Bug is rated as a low priority in all regions except TAS, where it is rated as a moderate priority. Apple Dimpling Bug is rated as a low priority in all regions. These bugs do not cause damage in strawberries.								
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact and Ingestion		P		Registered in macadamias for control of Fruit Spotting Bugs, Lace Bug and Scirtothrips. Registered in the US in caneberries for control of Aphids and Whitefly, in bushberries for control of Aphids, Thrips and Blueberry Maggot and suppression of Scirtothrips, and control of Bugs and Leafhoppers in various crops. AU MRL 1.5 mg/kg. Codex MRL 1.5 mg/kg.	L Bee L	-
NUL3445 Nufarm	TBC			P		Product in development from Nufarm with activity on Bugs. Strawberries not currently in scope.	-	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-
Broad Mite (*Polyphagotarsonemus latus*) **Priority: Low**								
Rated as a low priority in all regions. The use of IPM is key to managing mite populations.								
Petroleum / Paraffinic Oil	-	Contact	1	P-A	NSW, ACT, SA, WA & TAS	Registered in strawberries for control of Aphids and Mites. Spray no more than 4 times during growing season with 2 weeks minimum application interval. Do not spray stressed plants and avoid spraying open blooms.	L Bee L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Abamectin	6	Ingestion	3	P-A	ALL	Registered in strawberries for control of Two-Spotted Mite and Western Flower Thrips.	M Bee H	-
Bifenazate (Acramite) UPL	20D	Contact & Ingestion	1	P-A	ALL	Registered in strawberries for control of Two Spotted Mite and Bryobia Mite.	L Bee H	-
Hexythiazox (Calibre) Nufarm	10A	IGR / Contact	1	P-A	ALL	Registered in strawberries for control of Two Spotted Mite.	L Bee L	-
Milbemectin (Milbeknock) Sipcam	6	Ingestion	1	P-A	ALL	Registered in strawberries for control of Two Spotted Mite.	M Bee VH	-
Acequinocyl (Kanemite) UPL	20B	Contact & Ingestion		P		Not registered in Australia. US registration in strawberry for control of various spider mites, and in melons and okra for control of **Broad Mite**. No MRLs for AU or Codex.	L Bee L	-
Beauvaria bassiana (Velifer) BASF	UN	Biological	NR	P		Registered for suppression of Onion Thrips and Western Flower Thrips in protected vegetables and ornamentals and has activity on Thrips, Aphids, Whitefly and Mites. No MRLs required for a biological product.	L Bee L	-
Spiromesifen (Oberon) Bayer	23	Ingestion		P		Hort Innovation project ST19020 pending to generate residue, efficacy and crop safety data to obtain a label registration for control of Two Spotted Mite in strawberries (field & protected cropping). US registration in berries for control of Two Spotted Mite and Whiteflies and in fruiting vegetables for control of **Broad Mite**. AU MRL 1 mg/kg. No Codex MRL.	M Bee VL	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-
European Earwig (*Forficula auricularia*) **Priority: Low**								
Rated as a low priority in all regions except TAS and WA, where it is rated as a moderate priority. European Earwigs are widespread in temperate growing regions, but strawberries are not a preferred host. Limited insecticide options are available for controlling earwigs.								
Chlorpyrifos (Lorsban) PER85622	1B	Contact / Bait	NR	A	TAS	Permitted in strawberries for baiting **European Earwig**. Only for the use of staff employed by Costa Exchange. Baits can be used in traps attached to hydroponic table legs or broadcast across the soil surface under production tables during non-fruiting periods.	H Bee H	R1

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Scarab Beetle (*Scarabidae*) **Priority: Low**								
Rated as a low priority in all regions except WA, where it is rated as a moderate priority. Scarab Beetles are a soil borne insect that can damage seedlings if in high enough numbers but will tend to be controlled incidentally by pre-plant soil fumigation.								
Chlorpyrifos (Suscon Blue Soil Insecticide) PER81745	1B	Contact	NR	A	QLD	Permitted in strawberries for control of **Scarab Beetle**. Apply during bed forming prior to planting. DO NOT make more than one application. Apply by Precision Granular Boom applicator and immediately cover with mulch to ensure product remains within the target area and is not available to birds.	H Bee H	R1
Fall Armyworm (*Spodoptera frugiperda*) **Priority: Unknown**								
Fall Armyworm has recently been detected in northern Australia, although not yet seen in strawberries. Suspected detections should be reported to Biosecurity Agencies immediately.								
Chlorantraniliprole (Coragen) FMC PER89353	28	Ingestion	H:1 NG	A	ALL (excl. VIC)	Permitted in strawberries (field and protected cropping) for control of **Fall Armyworm**. Target treatment to eggs at hatch or small larvae (prior to third instar stage) before pests become entrenched. Do not use more than 3 applications per crop. Do not use more than 2 consecutive treatments with a minimum interval of 7 days.	L Bee VL	-
Emamectin (Proclaim) Syngenta PER89263	6	Ingestion	H:3 NG	A	ALL (excl. VIC)	Permitted in strawberries for control of **Fall Armyworm**. Treat when pests appear, targeting eggs at hatch or small larvae (prior to third instar stage) before the pest becomes entrenched. Repeat application depending on infestation. DO NOT use more than 3 applications per crop, with a minimum retreatment interval of 7 days.	M Bee H	-
Indoxacarb (Avatar) FMC PER89278	22A	Ingestion	H:2 NG	A	ALL (excl. VIC)	Permitted in strawberries for control of **Fall Armyworm**. Treat when pests appear, targeting eggs at hatch or small larvae (prior to third instar stage) before the pest becomes entrenched. DO NOT apply more than 2 applications in any one cropping cycle. DO NOT retreat within 7 days.	M Bee H	R3
Methomyl (Lannate) PER89293	1A	Contact	Fresh 3 Froz 10	A	ALL	Permitted in strawberries (field grown only) for control of **Fall Armyworm**. Target treatments against eggs and newly hatched larvae (prior to third instar stage) before they become entrenched. Treatments per season not limited.	H Bee H	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spinetoram (Success Neo) Corteva PER89241	5	Ingestion	NR	A	ALL (excl. VIC)	Permitted in berry fruit for control of **Fall Armyworm**. Treat when pests appear, targeting eggs at hatch or small larvae (prior to third instar stage) before the pest becomes entrenched. Apply repeat applications at 7-14 day intervals as new infestations occur. DO NOT make any more than 4 applications per crop.	M Bee VH	-
Spinosad (Entrust Organic) Corteva PER89870	5	Ingestion	1	A	ALL (excl. VIC)	Permitted in berryfruit for control of **Fall Armyworm**. Target treatments against eggs at hatch or small larvae (prior to third instar stage) before the pest becomes entrenched. Do not make more than 4 applications to any crop in one season.	L Bee H	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.	-	-
Tetraniliprole (Vayego 200SC) Bayer	28	Ingestion		P		Registered for control of various weevils, beetles and Lepidoptera in almonds, macadamias, pome and stone fruit. Strawberries not currently planned for registration but Hort Innovation project ST17000 data generation under development to register in raspberries and blackberries for various pests including; Light Brown Apple Moth, Loopers, Helicoverpa, Cluster Caterpillar and Monolepta beetle.	L-M Bee VH	-

4.3 Weeds in strawberries

4.3.1 Weed priorities

Common Name	Scientific Name
Moderate	
Wireweed	*Polygonum aviculare*

No weeds have been nominated as a high priority, but Wireweed is rated as a moderate priority.

There is a large reliance on the use of pre-plant fumigation and covering beds with plastic film to keep fields weed free. The fumigation is necessary for management of soil-borne diseases and soil nematodes, with weed control being a secondary benefit of this practice. Products such as glufosinate cannot be used in conjunction with fumigation so it is important to plan weed control strategies carefully. Controlling weeds in non-crop areas gives much more scope to use broad spectrum and specific herbicides to maintain good farm hygiene and reduce the seed bank that can move into the field.

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

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

4.3.2 Available and potential products for weed control

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

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

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory Risk
Wireweed (*Polygonum aviculare*) **Priority: Moderate**							
Rated as a moderate priority in all regions except QLD and TAS, where it is rated as a low priority. An aggressive broadleaf weed that is difficult to control with herbicides.							
Chlorthal-Dimethyl (Dacthal)	D**	Strawberries	Registered in strawberries for control of various Grass and Broadleaf Weeds, including **Wireweed**. Can be applied at transplanting or on established plantings in autumn and early spring. Do not apply after first bloom. Can be sprayed over plants without injury.	NR	A	ALL	-
Glufosinate (Basta)	N**	Strawberries / Directed or Shielded Spray to Inter-Row	Registered in strawberries for control of various Grass and Broadleaf Weeds, including **Wireweed**. Apply as a directed or shield spray to the inter-row area. Do not allow spray or spray drift to contact the crop, including strawberry runners. Not recommended for use in conjunction with soil fumigation or plastic mulch.	H:NR G:56	A	ALL	R3
Simazine	C**	Strawberries / Pre-Emergent Between Beds	Registered in strawberries for control of various Grass and Broadleaf Weeds, including **Wireweed**. Apply to bare, moist soil between polyethylene covered beds.	NR	A	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory Risk
Fluroxypyr (Starane) Corteva	I**		Registered in non-crop areas and pastures for control of **Wireweed**. No MRLs for AU or Codex.		P		-
Grass and Broadleaf Weeds **Priority: Low**							
Weed incidence in strawberries is generally reduced by the use of pre-plant fumigation and plastic mulch covers. There are limited herbicide options available.							
Chlorthal-Dimethyl (Dacthal)	D**	Strawberries	Registered in strawberries for control of various **Grass and Broadleaf Weeds**. Can be applied at transplanting or on established plantings in autumn and early spring. Do not apply after first bloom. Can be sprayed over plants without injury.	NR	A	ALL	-
Ethanedinitrile (EDN Fumigas)	-	Strawberries / Strawberry Runners	Registered in strawberries and strawberry runners for pre-plant control of Soil-Borne Pathogens, Nematodes and Weeds. **For use by licensed fumigators or approved persons only.**	NR	A	ALL	-
Fluazifop – P (Fusilade)	A	Strawberries	Registered in strawberries for control of various **Grass Weeds**. Apply to young, actively growing weeds as an overall application or spot spray.	28	A	ALL	-
Glufosinate (Basta)	N**	Strawberries / Directed or Shielded Spray to Inter-Row	Registered in strawberries for control of various **Grass and Broadleaf Weeds**. Apply as a directed or shield spray to the inter-row area. Do not allow spray or spray drift to contact the crop, including strawberry runners. Not recommended for use in conjunction with soil fumigation or plastic mulch.	H:NR G:56	A	ALL	R3
Glyphosate (Roundup)	M**	Agricultural Areas / Pre-Plant Clean Up and Wick Wiper	Registered in strawberries for control of various **Grass and Broadleaf Weeds**. Apply as a pre-plant application or with a wick wiper for spot control.	NR	A	ALL	R3
Simazine	C**	Strawberries / Pre-Emergent Between Beds	Registered in strawberries for control of various **Grass and Broadleaf Weeds**. Apply to bare, moist soil between polyethylene covered beds.	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/F2020C00713
APVMA Permit search	https://productsearch.apvma.gov.au/permits
APVMA Product search	https://productsearch.apvma.gov.au/products
Codex MRL database	http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/
Qld Dept of Agriculture and Fisheries	https://www.daf.qld.gov.au/business-priorities/agriculture/plants/fruit-vegetable
Australian Strawberry Growers Council	www.abgc.org.au
Cotton Pest Management Guide 2020-21	https://www.cottoninfo.com.au/publications/cotton-pest-management-guide
CropLife Australia	https://www.croplife.org.au/
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, viruses, weeds, etc.
SARP	Strategic Agrichemical Review Process
TBC	To be continued
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 strawberries
Appendix 2. Products available for control of insects, mites and other pests in strawberries
Appendix 3. Products available for weed control in strawberries
Appendix 4. Current permits for use in strawberries
Appendix 5. Strawberry Maximum Residue Limits (MRLs)
Appendix 6. Strawberry Agrichemical Regulatory Risk Assessment

Appendix 1. Products available for disease control in strawberries

Active Ingredient (Trade Name)	Chemical Group	Situation	Diseases / Comments	States	WHP Days	Regulatory Risk
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Strawberries / Soil Fumigation Pre-Plant	Soil Borne Diseases including Fusarium & Verticillium Wilts Rhizoctonia Pythium	ALL	NR	-
Alpha Amylase (from *Bacillus amyloliquefaciens*) (Serifel) BASF	BM 02	Strawberries	Grey Mould (*Botrytis cinerea*)	ALL	NR	-
Aureobasidium pullulans (Botector) Nufarm		Strawberries / Field & Protected Cropping	Botrytis Blight & Fruit Rot / Grey Mould (*Botrytis cinerea*) Suppression of: Anthracnose Fruit Rot (*Colletotrichum* spp.) Phomopsis Fruit Rot (*Phomopsis* spp.) Rhizopus Fruit Rot (*Rhizopus* spp.)	ALL	NR	-
Bacillus amyloliquefaciens (Serenade Opti) Bayer	BM 02	Strawberries / Field & Protected Cropping	Botrytis (*Botrytis cinerea*)	ALL	NR	-
Bromo Chloro Dimethyl Hydantoin (BCDMH)		Fruit & Vegetables / Sanitiser / Post-Harvest Wash	External Rot-Causing Organisms	ALL	NR	-
Bupirimate (Nimrod) Adama	8	Strawberry Nursery / Non-Fruiting Only	Powdery Mildew	ALL	NR	-
Captan	M4	Strawberries	Grey Mould (*Botrytis cinerea*) Gloeosporium Fruit Rot Phytophthora Root Rot (*Phytophthora nicotianae*) Black Spot / Anthracnose (*Colletotrichum acutatum*) Scorch (*Diplocarpon earlianum*) Leaf Blight (*Dendrophoma obscurans*)	ALL	1	-

Active Ingredient (Trade Name)	Chemical Group	Situation	Diseases / Comments	States	WHP Days	Regulatory Risk
Chlorine	-	Fruit & Vegetables / Sanitiser / Post-Harvest Wash	Bacteria and Fungi	ALL	NR	-
Chloropicrin	-	Pre-Planting Soil Fumigation	Soil-Borne Fungus Diseases Bacteria	ALL	NR	-
Copper (Cu) present as copper ammonium complex	M1	Strawberries	Leaf Spot (*Mycosphaerella fragariae*) Grey Mould (*Botrytis cinerea*)	VIC, SA, TAS & WA	1	-
Copper (Cu) present as copper hydroxide	M1	Strawberries	Leaf Spot Grey Mould	VIC, TAS, SA & WA	1	-
Copper (Cu) present as copper oxychloride	M1	Strawberries	Leaf Scorch Leaf Spots	ALL	1	-
Copper (Cu) present as cuprous oxide	M1	Strawberries	Leaf Spot (*Mycosphaerella fragariae*) Grey Mould	VIC, TAS, SA & WA	1	-
Cyflufenamid (Flute) AgNova	U6	Strawberries / Field & Protected Cropping / Strawberry Runners & Plug Plants	Powdery Mildew (*Podosphaera aphanis*)	ALL	NR	-
Ethanedinitrile (EDN Fumigas)	-	Strawberry Runners / Strawberries / Fumigation	Soil Borne Pathogens: *Bipolaris sorokiniana* *Fusarium acuminatum* *Fusarium oxysporum* *Phytophthora cactorum* *Phytophthora cryptogea* *Pythium sulcatum* *Pythium ultimum* *Rhizoctonia fragariae* *Rhizoctonia solani* *Sclerotium rolfsii* *Macrophomina phaseolina*	ALL	NR	-
Fenhexamid (Teldor) Bayer	17	Strawberries	Grey Mould	ALL	NR	-

Active Ingredient (Trade Name)	Chemical Group	Situation	Diseases / Comments	States	WHP Days	Regulatory Risk
Fluazinam (Gem) Adama PER83871	29	Strawberry Runner Production / Non-Fruiting Only	Leaf Blotch (*Gnomoniopsis fructicola*)	QLD	NR	-
Fludioxonil + Cyprodinil (Switch) Syngenta	12+9	Strawberries	Crown & Petiole Rots (*Colletotrichum gloeosporioides*)	ALL	3	R3
Iprodione (Rovral)	2	Strawberries	Grey Mould (*Botrytis cinerea*)	ALL	1	R2
Isofetamid (Kenja) ISK / AgNova	7	Strawberries	Grey Mould (*Botrytis cinerea*)	ALL	NR	-
Mancozeb + Metalaxyl-M (Ridomil Gold MZ) Syngenta	M3+4	Strawberries / Non-Fruiting (strawberry runners)	Eye Spot (*Mycosphaerella fragariae*) Leaf Blight (*Dendrophoma obscurans*) Root Rot (*Phytophthora nicotianae*) Scorch (*Diplocarpon earlianum*)	ALL	7	R2
Metalaxyl-M (Ridomil Gold) Syngenta + Phosphorous Acid PER13697	4+33	Strawberry Runners / Non-Fruiting in Foundation Nurseries Only	Root and crown rot (*Phytophthora cactorum*)	QLD	NR	-
Myclobutanil (Systhane) Corteva	3	Strawberries	Powdery Mildew	ALL	NR	R3
Penthiopyrad (Fontelis) Corteva	7	Strawberry	Grey Mould (*Botrytis cinerea*) Powdery Mildew (*Sphaerotheca* spp.)	ALL	NR	-
Phosphorous Acid PER80064	33	Strawberries (Post-Planting Only)	Crown Rot (*Phytophthora* spp.)	ALL (excl. VIC)	NR	-
Potassium Bicarbonate (EcoCarb)	M2	Strawberries	Powdery Mildew	ALL	NR	-

Active Ingredient (Trade Name)	Chemical Group	Situation	Diseases / Comments	States	WHP Days	Regulatory Risk
Prochloraz (Octave)	3	Strawberries / Non-fruiting strawberry runners	Colletotrichum Crown Rot / Stolon Rot (*Colletotrichum gloeosporioides*)	QLD, WA	NR	-
Pyraclostrobin (Cabrio) BASF PER14483	11	Strawberry Runners (Non-Fruiting)	Crown or Petiole Rot (*Colletotrichum gloeosporioides*)	QLD, TAS & VIC	NR	-
Pyrimethanil (Scala) Bayer	9	Strawberries	Grey Mould (*Botrytis cinerea*)	ALL	1	-
Quinoxyfen (Legend) Corteva PER14577	13	Strawberry Runner Production	Powdery Mildew (*Podosphaera aphanis*)	ALL (excl. VIC)	NR	-
Streptomyces lydicus (Actinovate)	BM 02	Strawberries	Powdery Mildew Phytophthora	ALL	NR	
Sulphur	M2	Strawberries	Powdery Mildew	NSW, WA	NR	-
Sulphur (Thiovit Jet) Syngenta PER83325	M2	Strawberries	Powdery Mildew (*Podosphaera aphanis*)	QLD & TAS	NR	-
Thiram	M3	Strawberries	Black Spot (*Colletotrichum acutatum*) Grey Mould (*Botrytis cinerea*)	QLD, VIC, SA, TAS & WA	2	R2
Trifloxystrobin (Flint) Bayer	11	Strawberries	Powdery Mildew (*Sphaerotheca macularis*)	ALL	1	-
Zineb	M3	Strawberries	Leaf Blight	QLD, WA	7	R2
			Scorch	TAS		

Appendix 2. Products available for control of insects, mites, nematodes and other pests in strawberries

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory Risk
1,3-Dichloropropene + Chloropicrin (Telone C-35)	8B	Strawberries / Soil Fumigation Pre-Plant	Plant Parasitic Nematodes Symphylans (garden centipedes) Wireworms	ALL	NR	-
Abamectin	6	Strawberries	Two Spotted Mite (*Tetranychus urticae*) Western Flower Thrips (*Frankliniella occidentalis*)	ALL	3	-
Abamectin (Tervigo) Syngenta PER86820	6	Strawberry (field and protected, including hydroponic production systems)	Root-knot nematode (*Meloidogyne spp.*)	ALL	NR	-
Afidopyropen (Versys) BASF PER87797	9D	Strawberries / Field & Protected	Aphids including Green peach aphid (*Myzus persicae*) Black peach aphid (*Brachycaudus persicae*) Melon aphid (*Aphis gossypii*) Strawberry aphid (*Chaetosiphon fragaefolii*)	ALL	1	-
Bifenazate (Acramite) UPL	20D	Strawberries	Two Spotted Mite (*Tetranychus urticae*) Bryobia Mite (*Bryobia rubrioculus*)	ALL	1	-
Botanical Oil (Eco-Oil)		Strawberries	Two Spotted Mite Aphids Sooty Mould	ALL	NR	-
Carbaryl (Bugmaster)	1A	Strawberry (runner production only)	Grasshoppers	ALL	NR	R3
Chlorantraniliprole (Coragen) FMC	28	Strawberries / Field & Protected Cropping	Cluster Caterpillar (*Spodoptera litura*) Cotton Bollworm (*Helicoverpa armigera*) Native Budworm (*Helicoverpa punctigera*)	ALL	1	-
Chlorantraniliprole (Coragen) FMC PER89353	28	Strawberries / Field & Protected Cropping	Fall Armyworm (*Spodoptera frugiperda*)	ALL (excl. VIC)	H:1 NG	-

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory Risk
Chloropicrin	8B	Strawberries / Soil Fumigation Pre-Plant	Nematodes Insects	ALL	NR	-
Chlorpyrifos (Lorsban)	1B	Strawberries	Field Crickets Mole Crickets	QLD	NR G:2	R1
Chlorpyrifos (Lorsban) PER85622	1B	Strawberries / Baits / Hydroponic Grown Crops Only	European earwig (*Forficula auricularia*)	TAS	NR	R1
Chlorpyrifos (Suscon Blue Soil Insecticide) PER81745	1B	Strawberries	Scarab beetles (Scarabaeidae)	QLD	NR	R1
Cyantraniliprole (Benevia) FMC	28	Strawberries	Cluster Caterpillar (*Spodoptera litura*) Cotton Bollworm (*Helicoverpa armigera*) Light Brown Apple Moth (*Epiphyas postvittana*) Native Budworm (*Helicoverpa punctigera*) Green Peach Aphid (*Myzus persicae*) Melon Aphid (*Aphis gossypii*) Strawberry Aphid (*Chaetosiphon fragaefolii*) Suppression of: Onion Thrips (*Thrips tabaci*) Plague Thrips (*Thrips imaginis*) Western Flower Thrips (*Frankliniella occidentalis*)	ALL	1	-
Dimethoate	1B	Strawberries / Runner Production / Vegetative Planting Material Only	Aphids Thrips Jassids Spider Mites	ALL	NR	R1
			Strawberry Bug Rutherglen Bug	QLD, VIC, SA, WA & TAS		
Emamectin (Proclaim) Syngenta	6	Strawberries	Cluster Caterpillar (*Spodoptera litura*) Heliothis (*Helicoverpa* spp.) Light Brown Apple Moth (*Epiphyas postvittana*) Loopers (*Chrysodeixis* spp.)	ALL	H:3 NG	-

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory Risk
Emamectin (Proclaim) Syngenta PER89263	6	Strawberries	Fall Armyworm (*Spodoptera frugiperda*)	ALL (excl. VIC)	H:3 NG	-
Ethanedinitrile (EDN Fumigas)		Strawberries / Strawberry Runners / Fumigation	Nematodes: *Meloidogyne* spp. *Steinernema* spp.	ALL	NR	-
Ethyl Formate		Strawberry / Post-Harvest Fumigation	Western Flower Thrips (*Frankliniella occidentalis*)	ALL	NR	-
Fenamiphos (Nemacur)	1B	Strawberry (Runner Production Only)	Crimp Nematode	QLD	NR	-
Fenamiphos (Nemacur) PER86746	1B	Strawberry Runner Nursery Production (Non-Fruiting) Crops Only / Soil Production	Leaf and bud nematode (*Aphelenchoides spp.*)	QLD (specifically Sweets Runners at Stanthorpe)	NR	-
		Strawberry Runner Nursery Production (Non-Fruiting) Crops Only / Post-Lifting Dip Treatment	Root-knot nematode (*Meloidogyne spp.*)			
Fenamiphos (Nemacur) PER85217	1B	Strawberry Runner Nursery Production (Non-Fruiting) Crops Only	Leaf and Bud Nematode (*Aphelenchoides fragariae*)	TAS	NR	-
Fenbutatin Oxide (Torque) BASF	12B	Strawberries	Two Spotted Mite (*Tetranychus urticae*)	QLD, NSW, VIC, SA, WA, NT	1	R3
Fipronil PER86492	2B	Berry Farms / Bait	European Wasp (*Vespula germanica*) Common Wasp (*Vespula vulgaris*)	ALL	NR	R3
Flonicamid (Mainman) UPL PER82598	29	Strawberries / Field & Protected	Aphids Including Green Peach Aphid (*Myzus persicae*) Whiteflies (*Bemisia tabaci type B*) Green Mirid (*Creontiades dilutes*)	ALL	1	-

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory Risk
Flubendiamide (Belt) Bayer	28	Strawberry (Field & Protected Cropping)	Heliothis (*Helicoverpa* spp.) Cluster Caterpillar (*Spodoptera litura*)	ALL	1	-
Hexythiazox (Calibre) Nufarm	10A	Strawberries	Two Spotted Mite	ALL	1	-
Indoxacarb (Avatar) FMC PER14192	22A	Strawberries	Whitefringed Weevil (*Graphognathus leucoloma*) Garden Weevil (*Phlyctinus callosus*)	ALL (excl. VIC)	2	R3
Indoxacarb (Avatar) FMC PER89278	22A	Strawberries	Fall Armyworm (*Spodoptera frugiperda*)	ALL (excl. VIC)	H:2 NG	R3
Iron EDTA Complex		Strawberries	Common Garden Snail White Snail Vine Snail	ALL	7	-
Maldison	1B	Strawberries	Fruit Fly	ALL	3	R2
Maldison PER13542	1B	Strawberries	Rutherglen Bug (*Nysius vinitor*) *Pachybrachius* spp.	ALL (excl. VIC)	3	R2
Metaldehyde		Horticultural Crops	Snails Slugs	ALL	7	-
Methiocarb (Mesurol) Bayer	1A	Strawberries	Common Garden Snail Slugs White Italian Snail White Snail	ALL	H:7 G:28	-
Methomyl (Lannate)	1A	Strawberries	Budworm (*Helicoverpa* spp.) Cluster Caterpillar (*Spodoptera litura*) Loopers	NSW, NT, QLD, VIC, WA & TAS	Fresh 3 Froz 10	R2

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory Risk
			Budworm (*Helicoverpa* spp.) Light Brown Apple Moth (*Epiphyas postvittana*)	SA, WA		
Methomyl (Lannate) PER89293	1A	Strawberries / Field Grown Only	Fall Armyworm (*Spodoptera frugiperda*)	ALL	Fresh 3 Froz 10	R2
Milbemectin (Milbeknock) Sipcam	6	Strawberries	Two Spotted Mite (*Tetranychus urticae*)	ALL	1	-
Nuclear Polyhedrosis Virus of *Helicoverpa armigera* (Vivus) AgBiTech	31	Strawberry	Corn Earworm (*Helicoverpa armigera*) Native Budworm (*Helicoverpa punctigera*)	ALL	NR	-
Permethrin PER85743	3A	Berry Crops / Wasp Feeder Stations	European Wasp (*Vespula germanica*)	ALL	NR	-
Peroxyacetic Acid + Hydrogen Peroxide (Peratec Plus) PER85548		Strawberries	Foliar nematode (*Aphelenchoides fragariae*)	ALL (excl. VIC)	1	-
Petroleum / Paraffinic Oil		Strawberries	Aphids Mites	NSW, ACT, SA, WA & TAS	1	-
Pirimicarb (Pirimor)	1A	Strawberries	Aphids	QLD, NSW, ACT & WA	2	R3
Pirimicarb (Pirimor) PER81573	1A	Strawberries	Aphids	TAS	2	R3
Propargite (Omite)	12C	Strawberries	Two Spotted Mite (*Tetranychus urticae*)	VIC, TAS, NSW, ACT, WA & QLD	3	R3
Pymetrozine (Chess) Syngenta PER81810	9B	Strawberries / Protected Grown	Various Aphid Species, Including Green Peach Aphid (*Myzus persicae*)	TAS	3	R3

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory Risk
Pyrethrins (Pyganic)	3A	Strawberry	Insects (including beneficial predators) that may be present just prior to harvest such as: Fruit Fly Rutherglen Bug Spiders	ALL	NR	-
Pyriproxyfen (Admiral) Sumitomo PER13331	7C	Strawberries	Greenhouse Whitefly (*Trialeurodes vaporariorum*) Silverleaf Whitefly (*Bemisia tabaci*)	ALL (excl. VIC)	2	-
Spinetoram (Success Neo) Corteva	5	Strawberries	Loopers Light Brown Apple Moth Helicoverpa Western Flower Thrips	ALL	NR	-
Spinetoram (Success Neo) Corteva PER87408	5	Strawberries	Suppression Only Of: Queensland Fruit Fly (*Bactrocera tryoni*) Lesser Queensland Fruit Fly (*Bactrocera neohumeralis*) Mediterranean Fruit Fly (*Ceratitis capitata*)	ALL (excl. VIC)	1	-
Spinetoram (Success Neo) Corteva PER89241	5	Berry Fruit	Fall Armyworm (*Spodoptera frugiperda*)	ALL (excl. VIC)	NR	-
Spinosad (Naturalure) Corteva	5	Fruit / Fruit Fly Bait	Queensland Fruit Fly (*Bactrocera tryoni*) Mediterranean Fruit Fly (*Ceratitis capitata*)	ALL	NR	-
Spinosad (Entrust Organic) Corteva	5	Strawberries	Loopers Light Brown Apple Moth Heliothis Western Flower Thrips	ALL	1	-
Spinosad (Entrust Organic) Corteva PER89870	5	Berryfruit	Fall Armyworm (*Spodoptera frugiperda*)	ALL (excl. VIC)	1	-

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory Risk
Sulfoxaflor (Transform) Corteva	4C	Strawberries	Green Peach Aphid Green Mirid	ALL	1	-
Trichlorfon (Lepidex)	1B	Strawberries	Cutworm	QLD	2	R2
			Cluster Caterpillar	QLD, NT		
Trichlorfon (Lepidex) PER12486	1B	Strawberries	Queensland Fruit Fly (*Bactrocera tryoni*) Mediterranean Fruit Fly (*Ceratitis capitata*)	ACT, NSW, NT, QLD, SA & WA	14	R2

Appendix 3. Products available for weed control in strawberries

Active ingredient (Trade Name)	Chemical Group	Situation	Comment / Use / Weed	WHP (days)	States	Regulatory Risk
Chlorthal-Dimethyl (Dacthal)	D**	Strawberries	Grass and broadleaf weeds	NR	ALL	R3
Ethanedinitrile (EDN Fumigas)	-	Strawberries / Strawberry Runners	Grass and Broadleaf Weeds	NR	ALL	-
Fluazifop – P (Fusilade)	A***	Strawberries	Grass weeds	28	ALL	-
Glufosinate (Basta)	N**	Strawberries	Grass and broadleaf weeds Directed or Shielded Spray to Inter-Row	H:NR G:56	ALL	R3
Glyphosate (Roundup)	M**	Agricultural Areas	Grass and broadleaf weeds Fallow or Wick Wiper	NR	ALL	R3
Simazine	C**	Strawberries	Grass and broadleaf weeds Pre-Emergent Between Beds	NR	ALL	R3

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

Appendix 4. Current permits for use in strawberries

Permit No.	Description	Issued Date	Expiry Date	Permit Holder
PER87797	Afidopyropen (Versys) / Strawberry/ Aphids (Field and Protected Cropping) All States & Territories	4-Sep-19	30-Sep-24	Hort Innovation
PER83397 Version 2	Cholecalciferol / Strawberry Blocks / Rats and Mice	20-Apr-17	28-Feb-22	BASF Australia
PER87408	Spinetoram (Success Neo) / Blueberries, Strawberries, Rubus And Rubus Hybrids / Fruit Fly	15-Apr-19	30-Apr-24	Hort Innovation
PER81745 Version 2	Chlorpyrifos (Suscon Blue and Green Soil) / Strawberries / Scarab Beetles QLD only	21-Oct-15	30-Sep-23	Hort Innovation
PER14192 Version 2	Indoxacarb (Avatar) / Strawberries / White Fringed Weevil and Garden Weevil Field Grown Only	24-Dec-13	30-Sep-23	Strawberries Australia c/- Hort Innovation
PER13542 Version 2	Maldison / Strawberries / Rutherglen Bug	1-Jul-12	30-Jun-22	Strawberries Australia c/- Hort Innovation
PER14307 Version 2	Zinc Phosphide / Strawberry Production / Mice Excludes Runner Production	15-Apr-16	30-Apr-21	Strawberries Australia c/- Hort Innovation
PER82598	Flonicamid (Mainman) / Strawberries / Aphids Field and Protected Cropping	11-Oct-15	30-Nov-21	Strawberries Australia c/- Hort Innovation
PER81810	Pymetrozine (Chess) / Strawberry / Various Aphid Species Including Green Peach Aphid Protected Cropping (TAS only)	8-Aug-15	30-Apr-21	Costa Exchange
PER80064 Version 3	Phosphorous Acid / Strawberries/ Phytophthora Post-Planting Only	6-Oct-11	31-Oct-25	Hort Innovation
PER13331 Version 3	Pyriproxyfen (Admiral) / Strawberries / Greenhouse & Silverleaf Whitefly	15-Apr-16	31-Aug-25	Hort Innovation
PER12486 Version 5	Trichlorfon / Specified Berry Fruit / Fruit Fly	11-Oct-15	31-May-21	ABGA c/- Hort Innovation
PER86492 Version 3	Fipronil / Orchards, Vineyards and Berry Farms / European Wasp	14-Sep-18	30-Sep-23	NSW Department of Primary Industries
PER85743	Permethrin Dust / Berry Crops / European Wasps	19-Feb-18	28-Feb-23	ABGA c/- Wollongbar Primary Industries Institute
PER89241	Spinetoram (Success Neo) / Various Crops / Fall Armyworm	06-Mar-20	31-Mar-23	Hort Innovation
PER89263	Emamectin (Proclaim) / Various crops / Fall Armyworm	10-Mar-20	31-Mar-23	Hort Innovation

Permit No.	Description	Issued Date	Expiry Date	Permit Holder
PER89278	Indoxacarb (Avatar) / Various Crops / Fall Armyworm Field Grown Only	13-Mar-20	31-Mar-23	Hort Innovation
PER89293	Methomyl (Lannate) / Various Crops as per Label / Fall Armyworm Field Grown Only	10-Apr-20	30-Apr-23	Hort Innovation
PER89353	Chlorantraniliprole (Coragen) / Various Crops / Fall Armyworm Field and Protected Cropping	05-May-20	31-May-23	Hort Innovation
PER89870	Spinosad (Entrust Organic) / Various Crops / Fall Armyworm	21-Jul-20	31-Jul-23	Hort Innovation

Strawberry permits with limited persons who can use the product under permit

Permit No.	Description	Issued Date	Expiry Date	Permit Holder
PER83325 Version 2	Sulphur (Thiovit Jet) / Strawberries / Powdery Mildew (QLD & TAS) **For use by staff employed or growers contracted by Driscolls.**	1-Aug-17	31-Aug-22	Driscolls Australia
PER86820	Abamectin (Tervigo) / Strawberry (Fragaria sp.) / Root-Knot Nematode Field and Protected Cropping, including Hydroponics **For use by staff employed or growers contracted by Driscolls.**	2-Aug-18	31-Aug-21	Driscolls Australia
PER85622	Chlorpyrifos (Lorsban) / Strawberry (Fragraria sp.) / European Earwig Hydroponic Grown Crops Only (TAS only) **For use by staff employed or persons contracted by Costa Exchange.**	21-Dec-17	31-Dec-20	Costa Exchange
PER85548	Peroxyacetic Acid + Hydrogen Peroxide (Peratec Plus) / Foliar Nematode / Strawberry **For use by staff employed or persons contracted by Driscolls.**	14-Dec-17	31-Dec-20	Driscolls Australia
PER81573	Pirimicarb (Pirimor) / Strawberries / Various Aphid Species (TAS only) **For use by Driscolls contracted growers only.**	11-Oct-15	30-Oct-20	Driscolls Australia

Current Permits for use in strawberry runner production

Permit No.	Description	Issued Date	Expiry Date	Permit Holder
PER14577 Version 2	Quinoxyfen (Legend) / **Strawberry Runner Production** / Powdery Mildew	23-May-14	31-Dec-20	Hort Innovation
PER14483 Version 2	Pyraclostrobin (Cabrio) / **Strawberry Runners (Non-Fruiting)** / Crown or Petiole Rot (QLD, TAS & VIC)	29-Oct-13	30-Sep-23	Strawberries Australia c/- Hort Innovation
PER85217	Fenamiphos (Nemacur) / **Strawberry Runner Production Crops Only (Non-Fruiting)** / Leaf and Bud Nematode (TAS only)	1-Feb-18	31-Jan-21	Driscolls Australia
PER13697 Version 2	Metalaxyl-M (Ridomil Gold) and Phosphorous Acid / **Strawberry Runners** / Root and Crown Rot (Phytophthora cactorum) (QLD only)	28-Aug-12	30-Sep-22	Strawberries Australia c/- Hort Innovation
PER83871	Fluazinam / **Strawberry Runner Production Only** / Leaf Blotch (QLD only)	19-May-17	30-Jun-22	Strawberries Australia c/- Hort Innovation
PER86746	Fenamiphos (Nemacur) / Strawberry / Root-Knot Nematode (QLD only) **Runners Only. For use by staff employed or contracted by Sweets Strawberry Runners at Stanthorpe.**	5-Jul-18	31-Jul-21	Driscolls Australia

Appendix 5. Strawberry Maximum Residue Limits (MRLs)

CODEX commodity groupings of Strawberries and subgroups:

AO2 0002 Fruits
FB 0018 Berries and other small fruits
FB 0275 Strawberry
FB 2009 Low growing berries

Note: Exports account for only 5% of strawberry production although export volumes have been increasing in recent years. Export markets for strawberries include Thailand, Singapore, New Zealand, Hong Kong and UAE. Available information indicates that in the absence of specific limits in legislation, that 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 Code	Description	APVMA MRL mg/kg	Codex MRL mg/kg
2,4-D	FB 0018	Berries and other small fruits		0.1
Abamectin	FB 0275	Strawberry	0.1	0.15
Acetamiprid	FB 0275	Strawberry		0.5
Acibenzolar-S-methyl	FB 2009	Low growing berries		
Afidopyropen	FB 0275	Strawberry	T0.1	
Azinphos-methyl	FB 0275	Strawberry	1	
Azoxystrobin	FB 0275	Strawberry	10	10
Bifenazate	FB 0275	Strawberry	2	2
Bifenthrin	FB 0275	Strawberry	1	1
Boscalid	FB 0275	Strawberry	10	3
Bromide Ion	FB 0275	Strawberry		30
Bromopropylate	FB 0275	Strawberry		2
Bupirimate	FB 0275	Strawberry	1	
Buprofezin	FB 0276	Strawberry		3
Captan	FB 0275	Strawberry	10	15
Carbaryl	FB 0275	Strawberry	*0.01	
Carbendazim	FB 0018	Berries and other small fruits		1
Carfentrazone-ethyl	FB 0018	Berries and other small fruits	T*0.05	
Chlorantraniliprole	FB 0018	Berries and other small fruits	2.5	1
Chlorothalonil	FB 0018	Berries and other small fruits	T10	
	FB 0275	Strawberry		5
Chlorpyrifos	FB 0275	Strawberry	0.3	0.3
Chlorpyrifos-methyl	FB 0275	Strawberry	0.5	0.06
Clofentezine	FB 0275	Strawberry	2	2
Clopyralid	FB 0275	Strawberry	4	
Clothianidin	FB 0018	Berries and other small fruits		0.07
Cyantraniliprole	FB 0275	Strawberry	0.7	1.5
Cycloxydim	FB 0275	Strawberry	3	3
Cyflufenamid	FB 0275	Strawberry	0.3	
Cyflumetofen	FB 0275	Strawberry		0.6
	FB 0275	Strawberry	0.6	

Chemical	Codex Code	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Cyhalothrin	FB 0018	Berries and other small fruits		0.2
	FB 0275	Strawberry	0.5	
Cypermethrin	FB 0018	Berries and other small fruits	0.5	
Cypermethrins (including alpha- and zeta cypermethrin)	FB 0274	Strawberry		0.07
Cyprodinil	FB 0018	Berries and other small fruits		10
	FB 0275	Strawberry	5	
Deltamethrin	FB 0275	Strawberry		0.2
Diazinon	AO2 0002	Fruit	0.5	
Diazinon	FB 0275	Strawberry		0.1
Dichlofluanid	FB 0275	Strawberry	10	
Dicofol	FB 0275	Strawberry	1	
Difenoconazole	FB 0275	Strawberry	0.4	2
Dimethoate	FB 0275	Strawberry	0.02	
Dimethomorph	FB 0275	Strawberry		0.5
Dinocap	FB 0276	Strawberry		0.5
Diquat	AO2 0002	Fruit	*0.05	
Diquat	FB 0276	Strawberry		*0.05
Dithiocarbamates	FB 0275	Strawberry	10	5
Emamectin	FB 0275	Strawberry	0.05	
Ethoprophos	FB 0275	Strawberry		*0.02
Etoxazole	FB 0275	Strawberry	0.2	
Fenamidone	FB 0275	Strawberry		0.04
Fenamiphos	FB 0275	Strawberry	*0.05	
Fenarimol	FB 0276	Strawberry		T1
Fenbutatin oxide	FB 0018	Berries and other small fruits	1	
Fenbutatin oxide	FB 0275	Strawberry		10
Fenhexamid	FB 0275	Strawberry	10	10
Fenpropathrin	FB 0275	Strawberry		2
Fenpyrazamine	FB 0275	Strawberry		3
Fenpyroximate	FB 0275	Strawberry	1	0.3
Fenvalerate	FB 0018	Berries and other small fruits	1	
Flonicamid	FB 2009	Low growing berries		1.5
Flonicamid	FB 0275	Strawberry	T2	
Fluazifop-p-butyl	FB 0018	Berries and other small fruits	0.2	
Fluazifop-p-butyl	FB 0275	Strawberry		0.3
Fluazinam	FB 0275	Strawberry	T*0.05	
Flubendiamide	FB 0275	Strawberry	0.3	
Fludioxonil	FB 0275	Strawberry	5	3
Fluensulfone	FB 2009	Low growing berries		0.5
Fluopyram	FB 0275	Strawberry	1.5	0.4
Flupyradifurone	FB 0275	Strawberry	1.5	1.5
Flutriafol	FB 0276	Strawberry		1.5
Fluxapyroxad	FB 0018	Berries and other small fruits	7	7
Folpet	FB 0275	Strawberry		5

Chemical	Codex Code	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Fosetyl-aluminium	FB 0275	Strawberry	75	70
Glufosinate and Glufosinate-ammonium	FB 0018	Berries and other small fruits	0.1	
Glufosinate and Glufosinate-ammonium	FB 0275	Strawberry		0.3
Glyphosate	FB 0018	Berries and other small fruits	*0.05	
Haloxyfop	FB 0018	Berries and other small fruits	*0.05	
Hexythiazox	FB 0018	Berries and other small fruits	1	
Hexythiazox	FB 0275	Strawberry		6
Imidacloprid	FB 0275	Strawberry	0.5	0.5
Indoxacarb	FB 0018	Berries and other small fruits	2	
Inorganic bromide	AO2 0002	Fruit	20	
Inorganic bromide	FB 0275	Strawberry	30	
Iprodione	FB 0018	Berries and other small fruits	12	
Iprodione	FB 0275	Strawberry		10
Isofetamid	FB 2009	Low growing berries		4
Kresoxim-methyl	FB 0018	Berries and other small fruits	1.5	
Maldison / Malathion	FB 0275	Strawberry	1	1
Mandestrobin	FB 0275	Strawberry	3	
Mepanipyrim	FB 0275	Strawberry	2	
Meptyldinocap	FB 0275	Strawberry		0.3
Metalaxyl	FB 0018	Berries and other small fruits	T0.5	
Metaldehyde	AO2 0002	Fruit	1	
Methiocarb	AO2 0002	Fruit	T0.1	
Methiocarb	FB 0275	Strawberry		1
Methomyl	FB 0275	Strawberry	3	
Methoxyfenozide	FB 0275	Strawberry		2
Methyl bromide	AO2 0002	Fruit	T*0.05	
Metrafenone	FB 0275	Strawberry	0.6	0.6
Milbemectin	FB 0275	Strawberry	0.2	
Myclobutanil	FB 0275	Strawberry	2	0.8
Napropamide	FB 0018	Berries and other small fruits	*0.1	
Novaluron	FB 0275	Strawberry		0.5
Omethoate	AO2 0002	Fruit	2	
Oryzalin	AO2 0002	Fruit	0.1	
Paraquat	FB 0018	Berries and other small fruits		*0.01
Paraquat	AO2 0002	Fruit	*0.05	
Penconazole	FB 0275	Strawberries	0.5	0.5
Pendimethalin	FB 0018	Berries and other small fruits	*0.05	
Penthiopyrad	FB 0275	Strawberry	5	3
Permethrin	FB 0276	Strawberry		1
Phenmedipham	FB 0275	Strawberry	0.3	
Phosphorous acid	FB 0275	Strawberry	T500	
Piperonyl butoxide	AO2 0002	Fruit	8	
Pirimicarb	FB 0018	Berries and other small fruits		1
Pirimicarb	FB 0275	Strawberry	3	

Chemical	Codex Code	Description	APVMA MRL mg/kg	Codex MRL mg/kg
Procymidone	FB 0275	Strawberry	*0.02	
Propaquizafop	FB 0275	Strawberry	*0.05	
Propargite	FB 0275	Strawberry	7	
Pymetrozine	FB 0275	Strawberry	T0.3	
Pyraclostrobin	FB 0018	Berries and other small fruits	3	
Pyraclostrobin	FB 0275	Strawberry		1.5
Pyrethrins	AO2 0002	Fruit	1	
Pyridaben	FB 0275	Strawberry	1	
Pyrimethanil	FB 2009	Low growing berries		3
Pyrimethanil	FB 0275	Strawberry	5	
Pyriofenone	FB 2009	Low growing berries		0.5
Pyriproxyfen	FB 0275	Strawberry	T0.5	
Quinoxyfen	FB 0275	Strawberry	0.3	1
Sethoxydim	FB 0275	Strawberry	10	
Simazine	AO2 0002	Fruit	*0.1	
Spinetoram	FB 0018	Berries and other small fruits	0.5	
Spinetoram	FB 0275	Strawberry		0.15
Spinosad	FB 0018	Berries and other small fruits	0.7	
Spirodiclofen	FB 0275	Strawberry		2
Spiromesifen	FB 2009	Low growing berries		3
Spiromesifen	FB 0275	Strawberry	1	
Sulfoxaflor	FB 0275	Strawberry	0.5	0.5
Sulphur dioxide	FB 0275	Strawberry	T30	
Tebufenpyrad	FB 0275	Strawberry	1	
Tetraconazole	FB 0275	Strawberry	0.2	
Thiacloprid	FB 0018	Berries and other small fruits		1
Thiacloprid	FB 0275	Strawberry	1	
Thiamethoxam	FB 0018	Berries and other small fruits	0.5	0.5
Thiophanate-methyl	FB 0275	Strawberry	*0.1	
Triadimefon	FB 0275	Strawberry	0.5	0.7
Triadimenol	FB 0275	Strawberry	0.5	0.7
Trichlorfon	FB 0018	Berries and other small fruits	T2	
Trifloxystrobin	FB 0275	Strawberry	2	1
Trifluralin	AO2 0002	Fruit	*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.

NOTE: For the groups "Berries and other small fruits" and "Fruits" listed above, (strawberry) crop group exclusions (if any) have not been specified.

* Indicates that an MRL is at the Limit of Quantitation (LOQ)
T = Temporary MRL
E = The MRL is based on extraneous residues
Po = The MRL accommodates post-harvest treatment of the commodity

Sources: APVMA MRLs: Agricultural and Veterinary Chemicals Code (MRL Standard) Instrument 2019. Compilation 8. Prepared 9 July 2020.
CODEX MRLs: CODEX Alimentarius International Food Standards database (February 2020), http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/

Appendix 6. Strawberry Agrichemical Regulatory Risk Assessment

Strawberry
Agrichemical Regulatory
Risk Assessment

September 2020

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

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

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

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

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				
Aphids				
Aphids	Afidopyropen (PER87797)	9D		Afidopyropen - Data generation project ST16006 underway for a label registration
	Dimethoate	1B	Codex: MRL deletion recommended. EU proposing to set all MRLs to < 0.01 mg/kg	
	Flonicamid (PER82598)	29		
	Paraffinic/petroleum oil	-		
	Pirimicarb (PER81573)	1A	Codex - JMPR Periodic re-evaluation 2022/23 EU: Candidate for substitution Codex - JMPR Periodic re-evaluation 2020	
	Pymetrozine (PER81810)	9B	EU- Being phased out Codex – No registrant support	
Black peach aphid	Afidopyropen (PER87797)	9D		
Cabbage aphid	Pyrethrins	3A		
Cotton (Melon) aphid	Afidopyropen (PER87797)	9D		
	Cyantraniliprole	28		
Green peach aphid	Afidopyropen (PER87797)	9D		
	Cyantraniliprole	28		
	Flonicamid (PER82598)	29		
	Pymetrozine (PER81810)	9B	EU- Being phased out Codex – No registrant support	
	Sulfoxaflor	4C	USA – Pollinator concerns	
Strawberry aphid	Afidopyropen (PER87797)	9D		
	Cyantraniliprole	28		

Strawberry Agrichemical Regulatory Risk Assessment

Problem	Active Constituents	Chemical Group	Comment	Activities
Beetles/Weevils				
Garden weevil	Indoxacarb (PER14192)	**22A**	EU: Proposed non-renewal	
Scarab beetles	Chlorpyrifos (PER81745)	**1B**	Currently under review by the APVMA & outcome uncertain. Potential issues w.r.t. environmental loading and worker exposure. Canada – proposed cancellation of most uses. EU: Cancellation of use USA – EPA decision to allow continued use	
Whitefringed weevil	Indoxacarb (PER14192)	**22A**	EU: Proposed non-renewal	
Caterpillars/Lepidoptera				
Australian cabbage looper	Methomyl	**1A**	APVMA – nominated for review Canada – Re-evaluation completed (2018). Majority of uses removed EU: No authorisations	
Bollworm (H. *armigera*) Native budworm (H. *punctigera*) Helicoverpa spp.	Cyantraniliprole	**28**		
	Emamectin benzoate	**6**		
	Flubendiamide	**28**		
	Helicoverpa NPV	**31**		
	Methomyl	**1A**	APVMA – nominated for review Canada – Re-evaluation completed (2018). Majority of uses removed EU: No authorisations	
	Spinetoram	**5**		
	Spinosad	**5**		
Cabbage white butterfly	Pyrethrins	**3A**		
Caterpillars	Pyrethrins	**3A**		
	Spinetoram	**5**		

Problem	Active Constituents	Chemical Group	Comment	Activities
Cluster caterpillar	Cyantraniliprole	**28**		
	Emamectin benzoate	**6**		
	Flubendiamide	**28**		
	Methomyl	**1A**	APVMA – nominated for review Canada – Re-evaluation completed (2018). Majority of uses removed EU: No authorisations	
	Trichlorfon	**1B**	APVMA – nominated for review Codex – No MRLs Europe – deregistered US – No MRLs	
Cutworms	Trichlorfon	**1B**		
Fall armyworm	Chlorantraniliprole (PER89353)	**28**		
	Emamectin benzoate (PER89263)	**6**		
	Indoxacarb (PER89278)	**22A**	EU: Proposed non-renewal	
	Methomyl (PER89293)	**1A**	APVMA – nominated for review Canada – Re-evaluation completed (2018). Majority of uses removed EU: No authorisations	
Lightbrown apple moth	Cyantraniliprole	**28**		
	Emamectin benzoate	**6**		
	Methomyl	**1A**	APVMA – nominated for review Canada – Re-evaluation completed (2018). Majority of uses removed EU: No authorisations	
	Pyrethrins	**3A**		
	Spinetoram	**5**		

Problem	Active Constituents	Chemical Group	Comment	Activities
Loopers	Emamectin benzoate	6		
	Methomyl	1A	APVMA – nominated for review Canada – Re-evaluation completed (2018). Majority of uses removed EU: No authorisations	
	Spinetoram	5		
Fruit fly				
Fruit flies	Malathion	1B	APVMA – Under review – chemistry	
	Pyrethrins	3A		
	Spinetoram (PER87408)	5		
Mediterranean fruit fly	Spinetoram (PER87408)	5		
	Trichlorfon (PER12486)	1B	APVMA – nominated for review Codex – No MRLs Europe – deregistered US – No MRLs	
Queensland fruit fly	Dimethoate	1B	Codex: MRL deletion recommended. EU proposing to set all MRLs to < 0.01 mg/kg	
	Spinetoram (PER87408)	5		
	Trichlorfon (PER12486)	1B	APVMA – nominated for review Codex – No MRLs Europe – deregistered US – No MRLs	

Problem	Active Constituents	Chemical Group	Comment	Activities
Grasshoppers/Locusts				
Field crickets	Chlorpyrifos	**1B**	Currently under review by the APVMA & outcome uncertain. Potential issues w.r.t. environmental loading and worker exposure. Canada – proposed cancellation of most uses. EU: Cancellation of use USA – EPA decision to allow continued use	
Grasshoppers	Carbaryl	**1A**	Canada: Review recently completed, retained but with a large number of uses deleted Codex: Toxicology review scheduled 2020 Europe: Authorisation not renewed	
Mole crickets	Chlorpyrifos	**1B**	Currently under review by the APVMA & outcome uncertain. Potential issues w.r.t. environmental loading and worker exposure. Canada – proposed cancellation of most uses. EU: Cancellation of use USA – EPA decision to allow continued use	
Wingless grasshopper	Dimethoate	**1B**	Codex: MRL deletion recommended. EU proposing to set all MRLs to < 0.01 mg/kg	
Plant bugs				
Green mirid	Flonicamid (PER82598)	**29**		
	Sulfoxaflor	**4C**	USA – Pollinator concerns	
Green vegetable bug	Dimethoate	**1B**	Codex: MRL deletion recommended. EU proposing to set all MRLs to < 0.01 mg/kg	
Jassids	Dimethoate	**1B**		
Rutherglen bug	Dimethoate	**1B**		
	Malathion (PER13542)	**1B**	APVMA – Under review – chemistry	
	Pyrethrins	**3A**		
Strawberry bug	Dimethoate	**1B**	Codex: MRL deletion recommended. EU proposing to set all MRLs to < 0.01 mg/kg	

Strawberry Agrichemical Regulatory Risk Assessment

Problem	Active Constituents	Chemical Group	Comment	Activities
		Mites		
Bryobia mite	Bifenazate	**20**	EU: Proposed non-renewal	
Mites	Paraffinic/petroleum oil	**-**		
	Propargite	**12C**	APVMA – nominated for review	
Redlegged earth mite	Dimethoate	**1B**	Codex: MRL deletion recommended. EU proposing to set all MRLs to < 0.01 mg/kg	
Spider mite	Dicofol	**UN**	APVMA – Nominated for review No Codex MRLs nominated for listing under the Stockholm Convention. EU: No authorisation in place	
	Dimethoate	**1B**	Codex: MRL deletion recommended. EU proposing to set all MRLs to < 0.01 mg/kg	
Two-spotted (Red spider) mite	Abamectin	**6**		
	Bifenazate	**20**	EU: Proposed non-renewal	
	Dicofol	**UN**	APVMA – Nominated for review No Codex MRLs nominated for listing under the Stockholm Convention. EU: No authorisation in place	
	Fenbutatin oxide	**12B**	APVMA – Nominated for review Codex - To be reviewed 2020/21. No supporting registrant EU: No authorisation in place	
	Hexythiazox	**10A**	Codex – No MRLs	
	Propargite	**12C**	APVMA – nominated for review	

Problem	Active Constituents	Chemical Group	Comment	Activities
Thrips				
Onion thrips	Cyantraniliprole	**28**		
Plague thrips	Cyantraniliprole	**28**		
	Pyrethrins	**3**		
Thrips	Dimethoate	**1B**	Codex: MRL deletion recommended. EU proposing to set all MRLs to < 0.01 mg/kg	
Western flower thrips	Abamectin	**6**		
	Cyantraniliprole	**28**		
	Spinetoram	**5**		
	Spinosad	**5**		
White fly				
Greenhouse whitefly	Pyrethrins	**3A**		
	Pyriproxyfen (PER13331)	**7C**	EU – Authorisation renewal process underway	
Silverleaf (Poinsettia) whitefly	Flonicamid (PER82598)	**9C**		
	Pyriproxyfen (PER13331)	**7C**	EU – Authorisation renewal process underway	
Other				
European earwig	Chlorpyrifos (PER85622)	**1B**	Currently under review by the APVMA & outcome uncertain. Potential issues w.r.t. environmental loading and worker exposure. EU: Proposed cancellation of use Canada – proposed cancellation of most uses. USA – EPA decision to allow continued use	
Symphylids	1,3-dichloropropene + chloropicrin	**8B**		

Problem	Active Constituents	Chemical Group	Comment	Activities
Slug and snails				
Slugs	Copper complex	-		
	Iron-EDTA complex	-		
	Methiocarb	1A		
	Copper complex	-		
	Iron-EDTA complex	-		
White bradybaena (Oriental) snail	Methiocarb	1A		
White Italian (Sand dune) snail	Iron-EDTA complex	-		
	Methiocarb	1A		
Nematodes				
Foliar nematodes	Peroxyacetic acid + Hydrogen peroxide (PER85548) Driscoll staff or Driscoll contractors only	-		
Root-knot nematodes	Abamectin (PER86820) Driscoll staff or Driscoll contractors only	6		
	Fenamiphos (PER86746) Strawberry runner nursery production (non-fruiting) crops only Driscoll staff or Driscoll contractors only	1B		
Strawberry Leaf & bud nematode	Fenamiphos (PER85217) Strawberry runner nursery production (non-fruiting) only	1B		

Strawberry Agrichemical Regulatory Risk Assessment

Problem	Active Constituents	Chemical Group	Comment	Activities
DISEASES				
Bactericide	Iodine	**M**		
Black spot	Captan	**M4**		
	Thiram	**M3**	APVMA - Nominated for review Canada – Proposed cancelling of all foliar uses Codex - To be reviewed 2022/23 Europe – No authorisation in place	
Botrytis rot	*Bacillus amyloliquefaciens*	**BM 02**		
Charcoal stem rot	Cyanogen (ethanedinitrile)	**-**		
Colletotrichum crown/stolon rot	Cyprodinil + fludioxonil	**9 + 12**	Cyprodinil - Canada – Under review EU: Candidate for substitution Fludioxonil - EU – Under review EU: Candidate for substitution	
	Prochloraz	**3**		
	Pyraclostrobin (PER14483 - runners only)	**11**		
Damping off	Cyanogen (ethanedinitrile)			
	Copper as ammonium acetate	**M1**	EU: Candidates for substitution and their uses to be phased out	
	Mancozeb + Metalaxyl	**M3 + 4**	Mancozeb APVMA - Nominated for review Canada – Under review Codex - To be reviewed 2022/23 Metalaxyl EU: Candidate for substitution	
Fusarium wilt	1,3-dichloropropene + chloropicrin	**-**		
	Cyanogen (ethanedinitrile)	**-**		
Gnomoniopsis fruit rot / leaf blotch	Fluazinam (PER83871 runners only)	**29**		

Strawberry Agrichemical Regulatory Risk Assessment

Problem	Active Constituents	Chemical Group	Comment	Activities
Grey mould	*Bacillus amyloliquefaciens*	**BM 02**		
	Captan	**M4**		
	Copper as ammonium acetate	**M1**	EU: Candidates for substitution and their uses to be phased out	
	Cyprodinil + fludioxonil	**9 + 12**	Cyprodinil - Canada – Under review EU: Candidate for substitution Fludioxonil - EU – Under review EU: Candidate for substitution	
	Fenhexamid	**17**		
	Iprodione	**2**	Europe – Deregistered Canada – Majority of food crop uses deleted Codex – Review scheduled for 2022	
	Penthiopyrad	**7**		
	Pyrimethanil	**9**		
	Thiram	**M3**	APVMA - Nominated for review Canada – Proposed cancelling of all foliar uses Codex - To be reviewed 2022/23 Europe – No authorisation in place	
Leaf diseases/spots	Copper		EU: Candidates for substitution and their uses to be phased out	
	Zineb	**M3**	APVMA - Nominated for review Codex - To be reviewed 2022/23 EU: No authorisation in place	
Leaf scorch (Red spot)	Captan	**M4**		
	Copper	**M1**	EU: Candidates for substitution and their uses to be phased out	
	Mancozeb + Metalaxyl	**M3 + 4**	Mancozeb APVMA - Nominated for review Canada – Under review Codex - To be reviewed 2022/23 Metalaxyl EU: Candidate for substitution	

Strawberry Agrichemical Regulatory Risk Assessment

Problem	Active Constituents	Chemical Group	Comment	Activities
Leaf scorch (Red spot)	Zineb	**M3**	APVMA - Nominated for review Codex - To be reviewed 2022/23 EU: No authorisation in place	
Leaf Blotch	Fluazinam (PER83871 – runner production only (non-fruiting)	**29**		
Phomopsis leaf blight/fruit rot	Captan	**M4**		
	Mancozeb + metalaxyl	**M3 + 4**	Mancozeb APVMA - Nominated for review Canada – Under review Codex - To be reviewed 2022/23 Metalaxyl EU: Candidate for substitution	
Phytophthora crown rot	Phosphorous acid (PER80064 & PER13697)	**33**		
	Metalaxyl-M (PER13697)	**4**		
	Streptomyces lydicus	**BM 02**		
Phytophthora fruit rot	Captan	**M4**		
	Mancozeb + metalaxyl	**M3 + 4**	Mancozeb APVMA - Nominated for review Canada – Under review Codex - To be reviewed 2022/23 Metalaxyl EU: Candidate for substitution	
Phytophthora trunk/collar rot	Cyanogen (ethanedinitrile)			
Powdery mildew	Bupirimate – runners only	**8**		
	Cyflufenamid (PER80670 runners only)	**U6**		
	Myclobutanil	**3**	APVMA - Nominated for review	
	Potassium bicarbonate	**M2**		
	Streptomyces lydicus	**BM 02**		
	Sulfur (PER83325)	**M2**		
	Trifloxystrobin	**11**		
	Quinoxyfen (PER14577 - runner production only)	**13**		

Problem	Active Constituents	Chemical Group	Comment	Activities
Pythium diseases - soil borne	1,3-dichloropropene +chloropicrin	-		
	Cyanogen (ethanedinitrile)	-		
Rhizoctonia rot	1,3-dichloropropene +chloropicrin	-		
	Cyanogen (ethanedinitrile)	-		
Ripe fruit spot	Captan	M4		
Root and collar rot	Cyanogen (ethanedinitrile)	-		
Sclerotium crown rot	Cyanogen (ethanedinitrile)	-		
Spot blotch	Cyanogen (ethanedinitrile)	-		
Verticillium wilt	1,3-dichloropropene +chloropicrin	-		
WEEDS				
Broadleaf weeds and grasses	Chlorthal-dimethyl	D	EU: No authorisation in place	
	Fluazifop	A		
	Glufosinate-ammonium	N	EU: No authorisation in place	
	Glyphosate	M	Ongoing issues internationally	
	Simazine	C	APVMA – Nominated for review EU: No authorisation in place	

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