Lychee

Strategic Agrichemical Review Process (SARP)

March 2025

Hort Innovation
Project – MT23001

Hort Innovation Project Number:
MT23001 – 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 lychee industry across Australia. The information in this report will assist the industry with its agrichemical selection and usage into the future.

Date of report:
March 2025

Disclaimer:
Hort Innovation makes no representations and expressly disclaims all warranties (to the extent permitted by law) about the accuracy, completeness, or currency of information in the lychee industry SARP Report. Users of this material should take independent action before relying on its accuracy in any way.

Reliance on any information provided by Hort Innovation is entirely at your own risk. Hort Innovation is not responsible for, and will not be liable for, any loss, damage, claim, expense, cost (including legal costs) or other liability arising in any way (including from Hort Innovation or any other person's negligence or otherwise) from your use or non-use of the lychee industry SARP Report, or from reliance on information contained in the material or that Hort Innovation provides to you by any other means.

Communications Manager
Hort Innovation
Level 7, 141 Walker Street
North Sydney NSW 2060
Australia
Email: communications@horticulture.com.au
Phone: 02 8295 2300

Hort Innovation LYCHEE FUND

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

Table of Contents

1. Summary

The strategic levy investment project Strategic Agrichemical Review Process (SARP) - Updates (MT23001) is part of the Hort Innovation Lychee Fund. A Strategic Agrichemical Review Process (SARP), through the process of a desktop audit and industry liaison; Assesses the importance of the diseases, insects and weeds (plant pests) that can affect a horticultural industry;

(i) Assesses the importance of the diseases, insects and weeds (plant pests) that can affect a horticultural industry;
(ii) Evaluates the availability and effectiveness of fungicides, insecticides and herbicides (pesticides) to control the plant pests;
(iii) Determines any gaps in the pest control strategy and
(iv) Identifies suitable new or alternatives pesticides to address the gaps.

Alternative pesticides should ideally be selected for benefits of:

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

The results of this process will provide the Lychee 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:

Disease	Priority
Pepper Spot / Anthracnose (*Colletotrichum gloeosporioides*)	H
Pepper Spot / Post-Harvest (*Colletotrichum gloeosporioides*)	H

1.2 Insects and other pests

The high priority insects and other pests are:

Insects and Other Pests	Priority
Fruit Spotting Bug (*Amblypelta nitida*)	H
Banana Spotting Bug (*Amblypelta lutescens*)	H
Macadamia Nutborer (*Cryptophlebia ombrodelta*)	H
Conspicuous Looper (*Oxyodes tricolor*)	H
Castor Oil Looper (*Achaea janata*)	H
Flower-Eating Caterpillars (*Homoeosoma vagella*, *Xanthodes congenita*)	H
Flatid Planthopper (*Colgaroides acuminata*, *Siphanta hebes*)	H
White Louse Scale (*Unaspis citri*)	H
Soft Green Scale (*Coccus viridis*)	H
Green Shield Scale (*Chloropulvinaria psidii*)	H
Erinose Mite (*Aceria litchi*)	H

1.3 Weeds

The high priority weeds are:

Weeds	Priority
Flaxleaf Fleabane (*Conyza bonariensis*)	H

1.4 Plant Growth Regulators

There were no high priority plant growth regulator issues identified but the following was identified as a moderate priority issue:

PGR Issue	Priority
Restriction of Vegetative Growth	M

2. The Australian Lychee Industry

Lychee production occurs predominantly in Queensland in summer months. Key production regions are Sunshine Coast, Bundaberg, Rockhampton and Atherton Tableland. The production window is relatively short and domestic fresh consumption accounts for 91% of total supply. Export volumes, although relatively small, are key to ensuring placement of fruit can occur during the key production window. For the year ending June 2024, Australia exported 179 tonnes of fresh lychees, representing 9% of total production.

Total production for the year ending June 2024 was 2,100 tonnes. The value of production was worth $38 million. Production and revenue are affected by seasonal variations from year to year. The Australia Lychee Growers Association claims that new plantings that are yet to reach maturity yield are anticipated to increase annual production by up to 75% to 5,000-5,500 tonnes within the next 10 years. The industry is focused on growing its export volumes to ensure the domestic market is not over-supplied.

Fresh Lychee Seasonality by State[1]

State	23/24 Tonnes	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Queensland	2,079												
New South Wales	21												
Availability Legend			High			Medium			Low			None	

Australian lychees are exported to the USA, New Zealand, Canada, Hong Kong, Singapore, Malaysia, Indonesia, Europe, Middle East and UK. The USA is now the main export destination followed by Canada, New Zealand and Hong Kong.

[1] Hort Innovation (2025). Australian Horticulture Statistics Handbook 2023/24. [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 lychee 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 lychee industry regarding pesticide access, Hort Innovation has undertaken the current project to update the Strategic Agrichemical Review Process (SARP) for lychee.

The SARP process identifies diseases, insect pests and weeds of major concern to the lychee 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 lychee 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 lychee but attempts to prioritise the major problems.

Exotic plant pests, not present in Australia, are not addressed in this document. Biosecurity plans have been developed for the Lychee 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. More information is available at this link[2].

[2] https://www.planthealthaustralia.com.au/industries/

3.2 Minor use permits and registration

From a pesticide access perspective, the APVMA classifies onions as a major crop. They fit within the APVMA Crop Group 009: Bulb vegetables and the subgroup 009A: Bulb onions. Access to minor use permits can be achieved as long as a reasonable justification is provided in accordance with the APVMA's minor use guidance[3]. 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 lychee industry is for manufacturers to register new pesticides uses in the crop.

3.3 Methods

The current version of the Lychee Strategic Agrichemical Review Process (SARP) 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: 6 November 2023 Survey closed: 30 June 2024 There were an inadequate number of survey responses received so industry priorities were updated in consultation with the ALGA management committee in February 2025.
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 MT20007
Captured industry input	Collated and analysed survey results Consolidated and incorporated industry needs and insights

[3] https://apvma.gov.au/node/10931

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 lychee
Appendix 2. Products available for control of insects and other pests in lychee
Appendix 3. Products available for weed control in lychee
Appendix 4. Plant Growth Regulators available in lychee
Appendix 5. Current permits for use in lychee
Appendix 6. Lychee Maximum Residue Limits (MRLs)
Appendix 7. Lychee regulatory risk assessment

4. Diseases, pests and weeds of Lychee

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[4].

Information on regulatory risk derived from project MT20007 (Chapter 4) - Regulatory support and coordination (Appendix 7) has been incorporated. Some of the suggested options have no overseas MRLs (see Appendix 6). If treated fruit is to be exported nil residues at harvest would be needed for these options. While care has been taken to ensure the accuracy of the information provided in this document the APVMA registered label and where relevant the APVMA approved permit must always be followed.

[4] https://www.croplife.org.au/resources/programs/resistance-management/

4.1 Diseases of Lychee

4.1.1 Disease priorities

Disease	Priority
Pepper Spot / Anthracnose (*Colletotrichum gloeosporioides*)	H
Pepper Spot / Post-Harvest (*Colletotrichum gloeosporioides*)	H
Trunk (Stem) Canker (*Phytophthora* spp.)	L
Phytophthora Root Rot / Stem Rot (*Phytophthora* spp.)	L
Lychee Dieback / Tree Decline (*Phytophthora* spp., *Phytopythium* spp., *Fusarium* spp.)	L
Algal Spot (*Cephaleuros virescens*)	L

Pepper Spot was identified as a high priority disease of lychee. The disease required control measures both in-crop and post-harvest. It is recommended that an Integrated Disease Management Strategy is implemented, including a range of cultural practices to support fungicides, and potentially reduce the reliance on fungicides for disease control.

Cultural controls include:

- Biosecurity measures to prevent importing infections from other farms.
- Promoting good drainage and avoid waterlogging through irrigation.
- Farm hygiene – remove dead plant material that could contain disease inoculum.
- Avoid crop stress through good nutrition and water management.

Regular use of protectant fungicides is usually required for control of in-crop diseases as well as preventing infections that can manifest post-harvest. In controlling fungal and bacterial diseases, the industry should be mindful of resistance management. In addition to cultural controls, it is important to include a range of fungicide groups in a foliar spray program, including the use of protectant fungicides. Fungicide programs should be planned at the start of the season to ensure that effective disease control is achieved in conjunction with appropriate product rotation.

CropLife Australia have resistance management strategies related to the control of diseases in various crops[5], and users should refer to this before using any product.

[5] https://www.croplife.org.au/resources/programs/resistance-management/

4.1.2 Available and potential products for priority diseases

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

Availability		Regulatory risk (refer to Appendix 7)	
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
Pepper Spot (*Colletotrichum gloeosporioides*) **Priority: High**							
Rated as a high priority in lychees. Pepper Spot is widespread in wetter, coastal growing regions. It results in superficial spots that can make fruit unmarketable in severe cases. Spots also occur on small stems, leaves and leaf petioles. Flowering to fruit set is the critical period for controlling the disease in-crop and a protectant fungicide program should be used in conjunction with cultural controls, including pruning out dead wood, removing infected fruit and dead leaves and keeping the canopy open. Fungicide options are limited by absence of US MRLs for pyraclostrobin, fluopyram and trifloxystrobin. Establishment of these MRLs would enable use of Cabrio and Luna Sensation for fruit that is destined for export to the US.							
Bacillus amyloliquefaciens strain QST713 (Serenade Opti) Bayer	BM02	Biological	NR	A	ALL	Registered in tropical fruit (excluding banana) for control of **Anthracnose** (*Colletotrichum* spp.) and suppression of Stem End Rot. Begin applications as a foliar spray when crop reaches susceptible stage for Anthracnose infection. Use a retreatment interval of 7-21 days. Maximum number of applications per season not specified.	-
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime Soil Ameliorant and Biofungicide) Bayer	BM02	Biological	NR	A	ALL	Registered in tropical fruit (excluding banana) for control of **Anthracnose** (*Colletotrichum* spp.) and suppression of Stem End Rot. Begin applications as a foliar spray when crop reaches susceptible stage for Anthracnose infection. Use a retreatment interval of 7-21 days. Maximum number of applications per season not specified.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Copper as Copper Ammonium Acetate	M1	Protectant	1	A	ALL	Registered in lychee for control of **Lychee Pepper Spot** (*Colletotrichum gloeosporioides*) and Phytophthora Stem Canker. Apply as a foliar spray from the end of flowering to harvest. Use a retreatment interval of 14-28 days. Maximum number of treatments per season not specified.	-
Copper as Cupric Hydroxide Copper as Cuprous Oxide PER13660	M1	Protectant	1	A	ALL (excl. VIC)	Permitted in lychees for control of **Lychee Pepper Spot** (*Colletotrichum gloeosporioides*). Apply as a foliar spray from 1 month prior to panicle emergence until harvest. Use a retreatment interval of 14-28 days. Maximum number of treatments per season not specified.	-
Cyprodinil + Fludioxonil (Switch) PER82879	9+12	Protectant	14	A	ALL	Permitted in lychee for control of **Lychee Pepper Spot** / Anthracnose (*Colletotrichum gloeosporioides*). Apply as a foliar spray from early flowering onwards. Use a retreatment interval of 7-14 days. Maximum of 4 applications per season, with no more than 2 consecutive applications.	R3
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Protectant & Curative	3 NG	A	ALL	Registered in litchis for control of **Lychee Pepper Spot** (*Colletotrichum gloeosporioides*). Apply as a foliar spray when crop development reaches susceptible stage for disease infection to occur. Use a retreatment interval of 14-21 days. Maximum of 3 applications per season.	-
Mancozeb PER13659	M3	Protectant	7	A	NSW & QLD	Permitted in lychee for control of **Lychee Pepper Spot** (*Colletotrichum gloeosporioides*). Apply as a foliar spray throughout flowering. Use a retreatment interval of 21-28 days. Maximum number of applications per season not specified.	R2
Prochloraz (Octave WP) PER80369	3	Protectant	28	A	NSW, QLD, NT & WA	Permitted in lychee for control of Anthracnose / **Pepper Spot** (*Colletotrichum gloeosporioides*). Apply as a foliar spray only during flowering to early fruit set. Use a retreatment interval of 21-28 days. Maximum of 3 applications per season with no more than 2 consecutive.	R3
Pyraclostrobin (Cabrio) BASF PER80367	11	Protectant & Curative	3 NG	A	NSW, QLD, NT & WA	Permitted in lychee (field-grown only) for control of Anthracnose / **Pepper Spot** (*Colletotrichum gloeosporioides*). Apply as a foliar spray from early fruit development onwards. Use a retreatment interval of 10-14 days. Maximum of 3 applications per season with no more than 2 consecutive applications.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Aureobasidium pullulans Strain DSM 14940 & DSM 14941 (Botector) Nufarm	-	Biological / Protectant	NR	P		Registered for suppression of **Anthracnose** in berries.	-
BLAD (Problad Plus)	BM 01	Biological		P		Registered in stone fruit for suppression of Brown Rot. US registration for control of **Anthracnose** in grapes and strawberries.	**-**
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 ***Colletotrichum* spp.** in cucurbits, leafy vegetables, pome fruit, stone fruit, strawberries and tree nuts.	**-**
Mefentrifluconazole (Belanty) BASF	3	Protectant & Curative		P		Registered for control of Powdery Mildew in grapes, control of Black Spot and Powdery Mildew and suppression of Alternaria in apples, control of Blossom Blight and suppression of Leaf Rust, Shot Hole and Hull Rot in almonds, control of Husk Spot in macadamias, control of Powdery Mildew and Gummy Stem Blight in cucurbits, and control of Powdery Mildew and Target Spot in fruiting vegetables. US registration for control of **Anthracnose** in fruiting vegetables and tree nuts.	-
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Protectant & Curative		P		Registered for control of Grey Mould in berries, Grey Mould & Powdery Mildew in strawberries and grapes, Grey Mould & White Mould in lettuce & leafy vegetables and White Mould, Grey Mould and Early Blight in potato. US registration for control of **Anthracnose** in grape and small fruit vine climbing (except fuzzy kiwifruit), lemon & lime, low-growing berries, specific tree nuts, almonds and bushberries.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Pepper Spot – Post Harvest (*Colletotrichum gloeosporioides*) **Priority: High**							
Rated as a high priority in lychees. Pepper Spot infections occur in crop but the symptoms often manifest post-harvest. There are a range of measures that can be used to prevent disease establishment and spread during packing and transport to market. Practising good hygiene with harvest and post-harvest activities is vital. Control is not required for fruit sold to the domestic market. Exports require fruit to retain fruit quality for 30+ days.							
Bromo Chloro Dimethyl Hydatoin (BCDMH)	-	Sanitiser / Post-Harvest Treatment	NR	A	ALL	Registered in fruit for surface sterilisation in post-harvest wash systems. Apply as a spray or dip with a minimum contact time of 60 seconds.	-
Chlorine	-	Sanitiser	NR	A	ALL	Registered as a sanitiser for post-harvest control of bacteria and fungi. Spray prepared solution onto produce and equipment.	-
Didecyl Dimethyl Ammonium Chloride	-	Sanitiser / Post-Harvest	NR	A	ALL	Registered in tropical & sub-tropical fruit (inedible peel) as a post-harvest treatment for control of post-harvest diseases. Dip fruit in solution for 3 minutes.	-
Iodine	-	Sanitiser	NR	A	ALL	Registered in tropical & sub-tropical fruit as a post-harvest treatment for control of bacteria and fungi. Dip the fruit for a minimum of 1 minute.	-
Peroxyacetic Acid	-	Sanitiser	NR	A	ALL	Registered as a post-harvest treatment for bacteria. Post-harvest spray or dip. Ensure a minimum of 45 seconds contact time.	-
Fludioxonil + Azoxystrobin (Graduate A+) Syngenta	12+11	Protectant / Post-harvest treatment		P		Registered for post-harvest control of **Anthracnose** in avocado.	R3

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Trunk (Stem) Canker (*Phytophthora* spp.) **Priority: Low**							
Rated as a low priority in lychees. Trunk (Stem) Canker can develop in trees that have suffered stress such as flood, drought or salinity. Physical injury to the bark can provide an entry point to infection and the use of sprinklers that wet the trunk should be avoided. Copper is used to treat canker wounds after they appear.							
Copper as Cupric Hydroxide	M1	Protectant	1	A	QLD & NSW	Registered in tropical fruit for control of **Phytophthora Stem Canker**. Mix into a smooth consistency and apply directly to stem cankers. Retreatment interval not specified. Repeat applications up to a maximum of 5 per season until natural healing is commenced.	-
Copper as Tribasic Copper Sulphate Copper as Copper Ammonium Acetate Copper as Cuprous Oxide					ALL		
Copper as Copper Ammonium Acetate						Registered in lychee for control of Lychee Pepper Spot (*Colletotrichum gloeosporioides*) and **Phytophthora Stem Canker**. Mix into a smooth consistency and apply directly to stem cankers. Retreatment interval not specified. Repeat applications up to a maximum of 5 per season until natural healing is commenced.	
Mandipropamid (Revus) Syngenta	40	Curative / Protectant		P		Registered for control of Downy Mildew in grapes, lettuce, leafy vegetables and oilseed poppies. US registration for control of **Phytophthora** in various crops, including as a foliar application for protection of citrus from Phytophthora Root Rot.	-
Metalaxyl-M (Ridomil Gold 25G) Syngenta	4	Protectant & Curative		P		Registered for control of **Phytophthora Root Rot** in asparagus, avocados, macadamia nuts and peaches.	R3
Oxathiopiprolin (Zorvec Enicade) Corteva	49	Protectant & Curative		P		Registered for control of Downy Mildew in bulb vegetables, brassicas, cucurbits, leafy vegetables and poppies. Permitted for control of **Phytophthora Root Rot** in raspberries and blackberries. US registration for control of **Phytophthora** Canker and Brown Rot in citrus.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Phosphorous Acid	33	Protectant & Curative		P		Registered for control of **Phytophthora Root Rot** in citrus, ornamentals and avocado.	-
Phytophthora Root Rot / Stem Rot (*Phytophthora* spp.) **Priority: Low**							
Rated as a low priority in lychees. Phytophthora can infect trees that are subject to waterlogging and stress. Ensure good drainage in orchards and use efficient irrigation systems to avoid infections. No fungicide treatments currently available.							
Chloropicrin + 1,3-Dichloropropene (Telone C-35)	8B	Soil Fumigant	NR	A	ALL	Registered in fruit crops as a soil fumigant for control of plant parasitic Nematodes, Symphylans, Wireworms, soil borne diseases (including *Fusarium* and *Verticillium* wilts, *Rhizoctonia, Pythium*) and suppression of weeds. Restricted chemical. ***For use by professional and registered fumigators only.***	-
Streptomyces lydicus WYEC108 (Actinovate) Novozymes Bioag	BM 02	Biological	NR	A	ALL	Registered in all crops as a biological soil amendment to supplement the activity of natural soil organisms by making nutrients more available for improved plant growth. Apply as a soil drench, transplant dip or through irrigation to the area immediately surrounding the roots or seeds. Use a retreatment interval of 14-90 days. Maximum number of applications per season not specified.	-
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime Soil Ameliorant and Biofungicide) Bayer	BM02	Biological	NR	P-A	ALL	Registered in tropical fruit (excluding banana) for control of Anthracnose (*Colletotrichum* spp.) and suppression of Stem End Rot. Registered for suppression of soil-borne diseases such as Black Scurf in potatoes and Pineapple Disease in sugarcane and it is also registered as a biofungicide for control of Yellow Sigatoka in bananas as a foliar spray.	-
Streptomyces lydicus (Actinovate) Novozymes BioAg	BM02	Biological	NR	P-A	ALL	Registered in all crops as a biological soil amendment to stimulate soil organisms to make nutrients more available for plant growth. Registered for control of **Phytophthora** in strawberries and tomato.	-
Mandipropamid (Revus) Syngenta	40	Curative / Protectant		P		Registered for control of Downy Mildew in grapes, lettuce, leafy vegetables and oilseed poppies. US registration for control of **Phytophthora** in various crops, including as a foliar application for protection of citrus from Phytophthora Root Rot.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Metalaxyl-M (Ridomil Gold 25G) Syngenta	4	Protectant & Curative		P		Registered for control of **Phytophthora Root Rot** in asparagus, avocados, macadamia nuts and peaches.	R3
Oxathiopiprolin (Zorvec Enicade) Corteva	49	Protectant & Curative		P		Registered for control of Downy Mildew in bulb vegetables, brassicas, cucurbits, leafy vegetables and poppies. Permitted for control of **Phytophthora Root Rot** in raspberries and blackberries. US registration for control of **Phytophthora** Canker and Brown Rot in citrus.	-
Phosphorous Acid	33	Protectant & Curative		P		Registered for control of **Phytophthora Root Rot** in citrus, ornamentals and avocado.	-
Lychee Dieback / Tree Decline (*Phytophthora* spp., *Phytopythium* spp. *and Fusarium* spp.) **Priority: Moderate**							
Rated as a low priority in lychees. Slow or sudden tree death has been regularly recorded throughout Australian lychee growing areas. In young trees the decline is usually sudden (over several days), whereas in older trees the decline is slow and tree health declines over a few years. The exact cause of slow and sudden decline is unknown, but isolated organisms include *Phytophthora* spp., *Phytopythium* spp. and *Fusarium* spp. Trees on poorly drained soils may be more susceptible to slow decline symptoms. Some growers have reported success in saving trees by pruning when symptoms first appear and boosting nutrition by the addition of urea. There are currently no registrations or permits for chemical control.							
Chloropicrin + 1,3-Dichloropropene (Telone C-35)	8B	Soil Fumigant	NR	A	ALL	Registered in fruit crops as a soil fumigant for control of plant parasitic Nematodes, Symphylans, Wireworms, soil borne diseases (including *Fusarium* and *Verticillium* wilts, *Rhizoctonia, Pythium*) and suppression of weeds. Restricted chemical. ***For use by professional and registered fumigators only.***	-
Streptomyces lydicus WYEC108 (Actinovate) Novozymes Bioag	BM 02	Biological	NR	A	ALL	Registered in all crops as a biological soil amendment to supplement the activity of natural soil organisms by making nutrients more available for improved plant growth. Apply as a soil drench, transplant dip or through irrigation to the area immediately surrounding the roots or seeds. Use a retreatment interval of 14-90 days. Maximum number of applications per season not specified.	-

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	BM02	Biological	NR	P-A	ALL	Registered in tropical fruit (excluding banana) for control of Anthracnose (*Colletotrichum* spp.) and suppression of Stem End Rot. Registered for suppression of soil-borne diseases such as Black Scurf in potatoes and Pineapple Disease in sugarcane and it is also registered as a biofungicide for control of Yellow Sigatoka in bananas as a foliar spray.	-
Streptomyces lydicus (Actinovate) Novozymes BioAg	BM02	Biological	NR	P-A	ALL	Registered in all crops as a biological soil amendment to stimulate soil organisms to make nutrients more available for plant growth. Registered for control of Phytophthora in strawberries and tomato.	-
Mandipropamid (Revus) Syngenta	40	Curative / Protectant		P		Registered for control of Downy Mildew in grapes, lettuce, leafy vegetables and oilseed poppies. US registration for control of Phytophthora in various crops, including as a foliar application for protection of citrus from Phytophthora Root Rot.	-
Metalaxyl-M (Ridomil Gold 25G) Syngenta	4	Protectant & Curative		P		Registered for control of Phytophthora Root Rot in asparagus, avocados, macadamia nuts and peaches.	R3
Oxathiopiprolin (Zorvec Enicade) Corteva	49	Protectant & Curative		P		Registered for control of Downy Mildew in bulb vegetables, brassicas, cucurbits, leafy vegetables and poppies. Permitted for control of Phytophthora Root Rot in raspberries and blackberries. US registration for control of Phytophthora Canker and Brown Rot in citrus.	-
Phosphorous Acid	33	Protectant & Curative		P		Registered for control of Phytophthora Root Rot in citrus, ornamentals and avocado.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Algal Spot (*Cephaleuros virescens*) **Priority: Low**							
Rated as a low priority in lychees. Applications of copper are effective in managing the disease.							
Copper as Cupric Hydroxide Copper as Tribasic Copper Sulphate Copper as Copper Oxychloride Copper as Copper Ammonium Acetate	M1	Protectant	1	A	QLD & NSW	Registered in litchi for control of **Parasitic Algae** (*Cephaleuros virescens*). Apply to affected trunk and limbs during the wet season. Use a retreatment interval of 28 days. Maximum number of treatments not specified.	-

4.2 Insect and other pests of Lychee

4.2.1 Insect and other pest priorities

Insects and Other Pests	Priority
Fruit Spotting Bug (*Amblypelta nitida*)	H
Banana Spotting Bug (*Amblypelta lutescens*)	H
Macadamia Nutborer (*Cryptophlebia ombrodelta*)	H
Conspicuous Looper (*Oxyodes tricolor*)	H
Castor Oil Looper (*Achaea janata*)	H
Flower-Eating Caterpillars (*Homoeosoma vagella*, *Xanthodes congenita*)	H
Flatid Planthopper (*Colgaroides acuminata*, *Siphanta hebes*)	H
White Louse Scale (*Unaspis citri*)	H
Soft Green Scale (*Coccus viridis*)	H
Green Shield Scale (*Chloropulvinaria psidii*)	H
Erinose Mite (*Aceria litchi*)	H
Leafroller Moth (*Lobesia* sp., *Adoxophyes* sp., *Platypeplus aprobola*)	M
Fruit Piercing Moth (*Eudocima* spp.)	M
Yellow Peach Moth (*Conogethes punctiferalis*)	M
Leafminer (*Conopomorpha litchiella*)	M
Two Spotted Mite (*Tetranychus urticae*)	M
Pacific Spider Mite (*Tetranychus pacificus*)	M
Tea Red Spider Mite (*Oligonychus coffeae*)	M
Red-Shouldered Leaf Beetle (*Monolepta australis*)	M
Citrus Mealybug (*Planococcus* spp.)	L
Green Vegetable Bug (*Nezara viridula*)	L
Swarming Leaf Beetle (*Rhyparida* spp.)	L
Elephant Beetle (*Xylotrupes gideon*)	L
Longicorn Trunk Borer (*Acalolepta vastator*)	L
Stem Girdler (*Orthorrhinus klugi*, *Eutyrhinus meditabundus*, *Asynonychus* sp.)	L
Borer (*Carmenta chrysophanes*)	L
Citrus Branchborer (*Uracanthus cryptophagus*)	L
Green Tree Ant (*Oecophylla smaragdina*)	L
Coastal Brown Ant (*Pheidole megacephala*)	L
Queensland Fruit Fly (*Bactrocera tryoni*)	L
Fall Armyworm (*Spodoptera frugiperda*)	L

Lychees are impacted by a wide variety of insect and other pests, with Fruit Spotting Bug, Banana Spotting Bug, Macadamia Nutborer, Conspicuous Looper, Castor Oil Looper, Flower-Eating Caterpillars, Flatid Planthopper, White Louse Scale, Soft Green Scale, Green Shield Scale and Erinose Mite rated as high priority pests. It is important to take an Integrated Pest Management (IPM) Approach to pest control in lychees. The diversity of insects that will attack crops mean 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 with regard to preserving the beneficial insects that play an important role in the crop.

The diverse range of insect and mite pests in lychee necessitates careful planning with resistance management. Growers should refer to resistance management strategies listed on the CropLife website[6] when planning their pest management programs.

[6] https://www.croplife.org.au/resources/programs/resistance-management/

4.2.2 Available and potential products for priority insects and other pests

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

Availability		Regulatory risk (refer to Appendix 7)	
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 2019-20 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
Fruit Spotting Bug (*Amblypelta nitida*) **Banana Spotting Bug** (*Amblypelta lutescens*) **Priority: High**								
Rated as a high priority in lychees. These are serious pests which sting the fruit at all stages from fruit set until picking. Feeding on green fruit results in fruit drop and heavy infestations can cause major green fruit loss if not controlled. An insecticide program is required to protect the developing fruit. It may be possible to identify and treat hot-spots in the orchard.								
Acetamiprid + Pyriproxyfen (Trivor) Adama PER89943	4A+7C	Contact & Ingestion	28 NG	A	ALL (excl. VIC)	Permitted in lychee for control of **Fruit Spotting Bugs** (*Amblypelta nitida*, *Amblypelta lutescens*), Mealybugs (Pseudococcidae), Scale Insects (Coccoidea), Plant Hoppers (Fulgoroidea), Leafhoppers (*Empoasca* spp.) and suppression of Mediterranean Fruit Fly (*Ceratitis capitata*) and Queensland Fruit Fly (*Bactrocera tryoni*). Apply as a foliar spray when monitoring indicates pest is becoming active in crop. Use a minimum retreatment interval of 14 days. Maximum of 2 applications per season.	M Bee:H	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Beta-Cyfluthrin (Bulldock) PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in lychee for control of **Fruit Spotting Bug** (*Amblypelta nitida*), **Banana Spotting Bug** (*Amblypelta lutescens*), Elephant or Rhino Beetle (*Xylotrupes gideon*), Red-Shouldered Leaf Beetle (*Monolepta australis*), Swarming Leaf Beetle (*Rhyparida* spp.), Longicorn Trunk Borer (*Acalolepta vastator*), Macadamia Nut Borer (*Cryptophlebia ombrodelta*), Mango Tip Borer (*Penicillaria jocosatrix*), Flatid Planthopper (Flatidae), Green Vegetable Bug (*Nezara viridula*), Lychee Stink Bug (*Tessaratoma papillosa*) and Yellow Peach Moth (*Conogethes punctiferalis*). Apply as a foliar spray when pest numbers are sufficient to cause economic damage. Do not use at flowering. Use a minimum retreatment interval of 21 days. Maximum of 4 applications per year.	VH Bee:H	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion	3 NG	A	ALL	Registered in tropical & sub-tropical fruits, inedible peel (excluding bananas, pineapple) for control of **Banana Spotting Bug** (*Amblypelta lutescens*), **Fruit Spotting Bug** (*Amblypelta nitida*), Green Planthopper & Mango Planthopper. Apply as a foliar spray once local pest thresholds are reached. Use a minimum retreatment interval of 14 days. Maximum of 2 applications per year, and a maximum of 1 application during flowering.	L Bee:L	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	3	A	ALL	Registered in assorted tropical & sub-tropical fruit, inedible peel (except banana, pineapple) for control of **Banana Spotting Bug** & **Fruit Spotting Bug**. Apply as a foliar spray as part of a season long program targeting pests when active in the crop. Use a minimum retreatment interval of 14 days. Maximum of 2 applications per season.	M Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Trichlorfon PER14743	1B	Contact	7	A	ALL (excl. VIC)	Permitted in lychee for control of Flatid Planthopper, Flower-Eating Caterpillar, Loopers, Yellow Peach Moth (*Conogethes punctiferalis*) and suppression of **Fruit-Spotting Bug** (*Amblypelta nitida*), **Banana-Spotting Bug** (*Amblypelta lutescens* ssp. *lutescens*), Green Vegetable Bug (*Nezara viridula*) & Lychee Stink Bug (*Lyramorpha rosea*). Apply as a foliar spray when pest is present in sufficient numbers to cause economic damage. Do not spray during flowering when bees are foraging. Use a minimum retreatment interval of 7-10 days. Maximum of 6 applications per season.	H Bee:H	R2
Flonicamid (Mainman) UPL	29	Ingestion		P		Registered for control of Mirids in strawberries and nursery stock.	M Bee:VL	-
Macadamia Nutborer (*Cryptophlebia ombrodelta*) **Priority: High**								
Rated as a high priority in lychees. Nut Borer is the most significant Lepidopteran pest of lychees. Larvae bore into the fruit and seed. Only young fruit drop. Damaged mature fruit will weep and stain other fruit in the panicle. Removing fallen fruit and the use of parasitoid wasps form part of an integrated approach to managing the pest.								
Beta-Cyfluthrin (Bulldock) PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in lychee for control of Fruit Spotting Bug (*Amblypelta nitida*), Banana Spotting Bug (*Amblypelta lutescens*), Elephant or Rhino Beetle (*Xylotrupes gideon*), Red-Shouldered Leaf Beetle (*Monolepta australis*), Swarming Leaf Beetle (*Rhyparida* spp.), Longicorn Trunk Borer (*Acalolepta vastator*), **Macadamia Nut Borer** (*Cryptophlebia ombrodelta*), Mango Tip Borer (*Penicillaria jocosatrix*), Flatid Planthopper (Flatidae), Green Vegetable Bug (*Nezara viridula*), Lychee Stink Bug (*Tessaratoma papillosa*) and Yellow Peach Moth (*Conogethes punctiferalis*). Apply as a foliar spray when pest numbers are sufficient to cause economic damage. Do not use at flowering. Use a minimum retreatment interval of 21 days. Maximum of 4 applications per year.	VH Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Carbaryl (Bugmaster)	1A	Contact	NR	A	ALL	Registered in litchis (non-flowering, non-fruiting trees only) for control of Castor Oil Looper (*Achaea janata*), Leaf Eating Looper (Geometridae), **Macadamia Nutborer** (*Cryptophlebia ombrodelta*), Red Shouldered Leaf Beetle (*Monolepta australis*), Swarming Leaf Beetle (*Rhyparida* spp.), Yellow Peach Moth (*Conogethes punctiferalis*), Leafroller Moth (Tortricidae) & Wingless Grasshopper (*Phaulacridium vittatu*). Apply as a foliar spray at first sign of pest activity and repeat as necessary. Retreatment interval and maximum number of treatments per season not specified.	H Bee:H	R2
Methoxyfenozide (Prodigy) Corteva	18	Ingestion	14 NG	A	ALL	Registered in lychee for control of **Macadamia Nut Borer**. Apply as a foliar spray when pest numbers reach economic threshold, targeting eggs and early instar larvae. Retreatment interval not specified. Maximum of 3 applications per season.	VL Bee:VL	-
Tebufenozide (Mimic)	18	Ingestion	14	A	ALL	Registered in lychee for control of **Macadamia Nut Borer**. Apply as a foliar spray, using 2 applications at 6 and 12 weeks prior to harvest.	L Bee:L	-
Spinetoram (Success Neo) Corteva	5	Ingestion	NR NG	P-A	ALL	Registered in tropical & sub-tropical fruits, inedible peel for control of Flower-Eating Caterpillars, Leafrollers, Loopers, Yellow Peach Moth, Red-Banded Thrips & Sorghum Head Caterpillar.	M Bee:H	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	NR G:14	P-A	ALL	Registered in tropical & sub-tropical fruits, inedible peel for control of Flower-Eating Caterpillars, Leafrollers, Loopers, Yellow Peach Moth, Red-Banded Thrips & Sorghum Head Caterpillar.	L Bee:L	-
Tetraniliprole (Vayego 200SC) Bayer PER92133	28	Ingestion	3 NG	P-A	NSW, NT & QLD	Permitted in lychee for control of Mango Shoot Looper (*Perixera illepidaria*).	L-M Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Emamectin (Proclaim) Syngenta	6	Ingestion		P		Registered for control of Diamondback Moth, Cabbage White Butterfly, Heliothis, Cluster Caterpillar & Loopers in brassica vegetables, root & tuber vegetables (except potato), leafy vegetables and brassica leafy vegetables, Heliothis & Fall Armyworm in sweet corn, Cluster Caterpillar, Heliothis, Light Brown Apple Moth & Loopers in strawberries, Heliothis & Cluster Caterpillar in lettuce & fruiting vegetables, Heliothis, Cluster Caterpillar & Cucumber Moth in cucurbits, Heliothis, Cluster Caterpillar & Loopers in legume vegetables, and Light Brown Apple Moth & Grapevine Moth in grapes.	M Bee:H	-
Indoxacarb (Avatar Evo) FMC	22A	Ingestion		P		Registered for control of Cabbage White Butterfly, Heliothis, Cluster Caterpillar, Centre Grub and Diamondback Moth in brassica vegetables, Heliothis & Lucerne Leafroller in leafy vegetables, Heliothis, Soybean Looper Cluster Caterpillar and Tomato Leaf Miner in fruiting vegetables, Beet Web Worm, Heliothis & Light Brown Apple Moth in celery, Heliothis & Cluster Caterpillar in cucurbits, Heliothis in sweet corn, Light Brown Apple Moth in blueberries & rubus, Codling Moth, Heliothis & Light Brown Apple Moth in pome fruit, Heliothis, Oriental Fruit Moth, Light Brown Apple Moth & Pear and Cherry Slug in stone fruit, and Grapevine Moth & Light Brown Apple Moth in grapes.	M Bee:H	R3
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Diamond Back Moth, Cabbage White Butterfly and suppression of Heliothis in brassica vegetables and brassica leafy vegetables, suppression of Onion Thrips and Plague Thrips in bulb vegetables, control of Two Spotted Mite and Cucumber Moth and suppression of Broad Mite, Bean Red Spider Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in cucurbits, and control of Two Spotted Mite and Broad Mite and suppression of Tomato Russet Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in fruiting vegetables.	H Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Conspicuous Looper (*Oxyodes tricolor*) **Castor Oil Looper** (*Achaea janata*) **Priority: High**								
Rated as a high priority in lychees. Loopers are a serious pest that feed on leaves and in severe infestations can strip the whole tree of foliage. Infestations are more common on new flushes. Control is necessary only if small trees and critical growth flushes are affected.								
Carbaryl (Bugmaster)	1A	Contact	NR	A	ALL	Registered in litchis (non-flowering, non-fruiting trees only) for control of **Castor Oil Looper** (*Achaea janata*), **Leaf Eating Looper** (Geometridae), Macadamia Nutborer (*Cryptophlebia ombrodelta*), Red Shouldered Leaf Beetle (*Monolepta australis*), Swarming Leaf Beetle (*Rhyparida* spp.), Yellow Peach Moth (*Conogethes punctiferalis*), Leafroller Moth (Tortricidae) & Wingless Grasshopper (*Phaulacridium vittatu*). Apply as a foliar spray at first sign of pest activity and repeat as necessary. Retreatment interval and maximum number of treatments per season not specified.	H Bee:H	R2
Spinetoram (Success Neo) Corteva	5	Ingestion	NR NG	A	ALL	Registered in tropical & sub-tropical fruits, inedible peel for control of Flower-Eating Caterpillars, Leafrollers, **Loopers**, Yellow Peach Moth, Red-Banded Thrips & Sorghum Head Caterpillar. Apply as a foliar spray when numbers exceed threshold, targeting mature eggs and newly hatched larvae. Use a retreatment interval of 7-14 days. Maximum of 4 applications per season.	M Bee:H	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	NR G:14	A	ALL	Registered in tropical & sub-tropical fruits, inedible peel for control of Flower-Eating Caterpillars, Leafrollers, **Loopers**, Yellow Peach Moth, Red-Banded Thrips & Sorghum Head Caterpillar. Apply as a foliar spray when numbers exceed threshold, targeting mature eggs and newly hatched larvae. Use a retreatment interval of 7-14 days. Maximum of number of applications per season nor specified.	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Trichlorfon PER14743	1B	Contact	7	A	ALL (excl. VIC)	Permitted in lychee for control of Flatid Planthopper, Flower-Eating Caterpillar, **Loopers**, Yellow Peach Moth (*Conogethes punctiferalis*) and suppression of Fruit-Spotting Bug (*Amblypelta nitida*), Banana-Spotting Bug (*Amblypelta lutescens* ssp. *lutescens*), Green Vegetable Bug (*Nezara viridula*) & Lychee Stink Bug (*Lyramorpha rosea*). Apply as a foliar spray when pest is present in sufficient numbers to cause economic damage. Do not spray during flowering when bees are foraging. Use a minimum retreatment interval of 7-10 days. Maximum of 6 applications per season.	H Bee:H	R2
Bacillus thuringiensis subsp Kurstaki Strain HD-1 (DiPel)	11	Ingestion / Biological	NR	P-A	ALL	Registered in fruit for control of Armyworm (*Spodoptera* spp.), Cotton Bollworm (*Helicoverpa armigera*), Native Budworm (*Helicoverpa punctigera*), Cabbage Moth (*Plutella xylostella*), Cabbage White Butterfly (*Pieris rapae*), Green Looper (*Chrysodeixis eriosoma*), Light Brown Apple Moth (*Epiphyas postvittana*), Pear Looper (*Ectropis excursaria*), Soybean Looper (*Thysanoplusia orichalcea*), Vine Moth (*Phalaenoides glycinae*, *Agarista agricola*) & Tobacco Looper (*Chrysodeixis argentifera*).	VL Bee:VL	-
Methoxyfenozide (Prodigy) Corteva PER91798	18	Ingestion	14 NG	P-A	ALL	Permitted in lychee for control of Mango Shoot Looper (*Perixera illepidaria*).	VL Bee:VL	-
Tetraniliprole (Vayego 200SC) Bayer PER92133	28	Ingestion	3 NG	P-A	NSW, NT & QLD	Permitted in lychee for control of Mango Shoot Looper (*Perixera illepidaria*).	L-M Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Emamectin (Proclaim) Syngenta	6	Ingestion		P		Registered for control of Diamondback Moth, Cabbage White Butterfly, Heliothis, Cluster Caterpillar & Loopers in brassica vegetables, root & tuber vegetables (except potato), leafy vegetables and brassica leafy vegetables, Heliothis & Fall Armyworm in sweet corn, Cluster Caterpillar, Heliothis, Light Brown Apple Moth & Loopers in strawberries, Heliothis & Cluster Caterpillar in lettuce & fruiting vegetables, Heliothis, Cluster Caterpillar & Cucumber Moth in cucurbits, Heliothis, Cluster Caterpillar & Loopers in legume vegetables, and Light Brown Apple Moth & Grapevine Moth in grapes.	M Bee:H	-
Indoxacarb (Avatar Evo) FMC	22A	Ingestion		P		Registered for control of Cabbage White Butterfly, Heliothis, Cluster Caterpillar, Centre Grub and Diamondback Moth in brassica vegetables, Heliothis & Lucerne Leafroller in leafy vegetables, Heliothis, Soybean Looper Cluster Caterpillar and Tomato Leaf Miner in fruiting vegetables, Beet Web Worm, Heliothis & Light Brown Apple Moth in celery, Heliothis & Cluster Caterpillar in cucurbits, Heliothis in sweet corn, Light Brown Apple Moth in blueberries & rubus, Codling Moth, Heliothis & Light Brown Apple Moth in pome fruit, Heliothis, Oriental Fruit Moth, Light Brown Apple Moth & Pear and Cherry Slug in stone fruit, and Grapevine Moth & Light Brown Apple Moth in grapes.	M Bee:H	R3
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Diamond Back Moth, Cabbage White Butterfly and suppression of Heliothis in brassica vegetables and brassica leafy vegetables, suppression of Onion Thrips and Plague Thrips in bulb vegetables, control of Two Spotted Mite and Cucumber Moth and suppression of Broad Mite, Bean Red Spider Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in cucurbits, and control of Two Spotted Mite and Broad Mite and suppression of Tomato Russet Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in fruiting vegetables.	H Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Flatid Planthopper (*Colgaroides acuminata*, *Siphanta hebes*) **Priority: High**								
Rated as a high priority in lychees. Planthoppers are a widespread pest that produce honeydew which promotes the growth of sooty mould on fruit stems and fruit. Control measures are required to control severe infestations that occur during fruit development.								
Acetamiprid + Pyriproxyfen (Trivor) Adama PER89943	4A+7C	Contact & Ingestion	28 NG	A	ALL (excl. VIC)	Permitted in lychee for control of Fruit Spotting Bugs (*Amblypelta nitida*, *Amblypelta lutescens*), Mealybugs (Pseudococcidae), Scale Insects (Coccoidea), **Plant Hoppers** (Fulgoroidea), Leafhoppers (*Empoasca* spp.) and suppression of Mediterranean Fruit Fly (*Ceratitis capitata*) and Queensland Fruit Fly (*Bactrocera tryoni*). Apply as a foliar spray when numbers exceed local pest thresholds. Use a minimum retreatment interval of 14 days. Maximum of 2 applications per season.	M Bee:H	R2
Beta-Cyfluthrin (Bulldock) PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in lychee for control of Fruit Spotting Bug (*Amblypelta nitida*), Banana Spotting Bug (*Amblypelta lutescens*), Elephant or Rhino Beetle (*Xylotrupes gideon*), Red-Shouldered Leaf Beetle (*Monolepta australis*), Swarming Leaf Beetle (*Rhyparida* spp.), Longicorn Trunk Borer (*Acalolepta vastator*), Macadamia Nut Borer (*Cryptophlebia ombrodelta*), Mango Tip Borer (*Penicillaria jocosatrix*), **Flatid Planthopper** (Flatidae), Green Vegetable Bug (*Nezara viridula*), Lychee Stink Bug (*Tessaratoma papillosa*) and Yellow Peach Moth (*Conogethes punctiferalis*). Apply as a foliar spray when pest numbers are sufficient to cause economic damage. Do not use at flowering. Use a minimum retreatment interval of 21 days. Maximum of 4 applications per year.	VH Bee:H	-
Buprofezin (Applaud) Corteva PER88401	16	Ingestion	14 NG	A	ALL (excl. VIC)	Permitted in lychee for control of Scale Insects, Mealybugs and **Flatid Planthoppers**. Apply as a foliar spray when nymph / crawler stages exceed threshold and are prevalent. Use a retreatment interval of 14-21 days. Maximum of 2 applications per crop. NOTE that this permit has expired at time of publication, pending consideration of renewal by APVMA.	M Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Trichlorfon PER14743	1B	Contact	7	A	ALL (excl. VIC)	Permitted in lychee for control of **Flatid Planthopper**, Flower-Eating Caterpillar, Loopers, Yellow Peach Moth (*Conogethes punctiferalis*) and suppression of Fruit-Spotting Bug (*Amblypelta nitida*), Banana-Spotting Bug (*Amblypelta lutescens* ssp. *lutescens*), Green Vegetable Bug (*Nezara viridula*) & Lychee Stink Bug (*Lyramorpha rosea*). Apply as a foliar spray when pest is present in sufficient numbers to cause economic damage. Do not spray during flowering when bees are foraging. Use a minimum retreatment interval of 7-10 days. Maximum of 6 applications per season.	H Bee:H	R2
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion	3 NG	P-A	ALL	Registered in tropical & sub-tropical fruits, inedible peel (excluding bananas, pineapple) for control of Banana Spotting Bug (*Amblypelta lutescens*), Fruit Spotting Bug (*Amblypelta nitida*), Green Planthopper & Mango Planthopper.	L Bee:L	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	3	P-A	ALL	Registered in assorted tropical & sub-tropical fruit, inedible peel (except banana, pineapple) for control of Banana Spotting Bug & Fruit Spotting Bug.	M Bee:VH	-
Flonicamid (Mainman) UPL	29	Ingestion		P		Registered for control of Mirids in strawberries and nursery stock.	M Bee:VL	-
Flower-Eating Caterpillars (*Homoeosoma vagella*, *Xanthodes congenita*) **Priority: High**								
Rated as a high priority in lychees. A widespread pest with damage caused by larvae that feed on buds, flowers and young fruit. This usually results in yield loss as damaged buds and flowers generally fall off. Marketability of fruit can also be impacted by blemishing.								
Spinetoram (Success Neo) Corteva	5	Ingestion	NR NG	A	ALL	Registered in tropical & sub-tropical fruits, inedible peel for control of **Flower-Eating Caterpillars**, Leafrollers, Loopers, Yellow Peach Moth, Red-Banded Thrips & Sorghum Head Caterpillar. Apply as a foliar spray when numbers exceed threshold, targeting mature eggs and newly hatched larvae. Use a retreatment interval of 7-14 days. Maximum of 4 applications per season.	M Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spinosad (Entrust Organic) Corteva	5	Ingestion	NR G:14	A	ALL	Registered in tropical & sub-tropical fruits, inedible peel for control of **Flower-Eating Caterpillars**, Leafrollers, Loopers, Yellow Peach Moth, Red-Banded Thrips & Sorghum Head Caterpillar. Apply as a foliar spray when numbers exceed threshold, targeting mature eggs and newly hatched larvae. Use a retreatment interval of 7-14 days. Maximum of number of applications per season nor specified.	L Bee:L	-
Trichlorfon PER14743	1B	Contact	7	A	ALL (excl. VIC)	Permitted in lychee for control of Flatid Planthopper, **Flower-Eating Caterpillar**, Loopers, Yellow Peach Moth (*Conogethes punctiferalis*) and suppression of Fruit-Spotting Bug (*Amblypelta nitida*), Banana-Spotting Bug (*Amblypelta lutescens* ssp. *lutescens*), Green Vegetable Bug (*Nezara viridula*) & Lychee Stink Bug (*Lyramorpha rosea*). Apply as a foliar spray when pest is present in sufficient numbers to cause economic damage. Do not spray during flowering when bees are foraging. Use a minimum retreatment interval of 7-10 days. Maximum of 6 applications per season.	H Bee:H	R2
Bacillus thuringiensis subsp Kurstaki Strain HD-1 (DiPel)	11	Ingestion / Biological	NR	P-A	ALL	Registered in fruit for control of Armyworm (*Spodoptera* spp.), Cotton Bollworm (*Helicoverpa armigera*), Native Budworm (*Helicoverpa punctigera*), Cabbage Moth (*Plutella xylostella*), Cabbage White Butterfly (*Pieris rapae*), Green Looper (*Chrysodeixis eriosoma*), Light Brown Apple Moth (*Epiphyas postvittana*), Pear Looper (*Ectropis excursaria*), Soybean Looper (*Thysanoplusia orichalcea*), Vine Moth (*Phalaenoides glycinae*, *Agarista agricola*) & Tobacco Looper (*Chrysodeixis argentifera*).	VL Bee:VL	-
Methoxyfenozide (Prodigy) Corteva PER91798	18	Ingestion	14 NG	P-A	ALL	Permitted in lychee for control of Mango Shoot Looper (*Perixera illepidaria*).	VL Bee:VL	-
Tetraniliprole (Vayego 200SC) Bayer PER92133	28	Ingestion	3 NG	P-A	NSW, NT & QLD	Permitted in lychee for control of Mango Shoot Looper (*Perixera illepidaria*).	L-M Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Emamectin (Proclaim) Syngenta	6	Ingestion		P		Registered for control of Diamondback Moth, Cabbage White Butterfly, Heliothis, Cluster Caterpillar & Loopers in brassica vegetables, root & tuber vegetables (except potato), leafy vegetables and brassica leafy vegetables, Heliothis & Fall Armyworm in sweet corn, Cluster Caterpillar, Heliothis, Light Brown Apple Moth & Loopers in strawberries, Heliothis & Cluster Caterpillar in lettuce & fruiting vegetables, Heliothis, Cluster Caterpillar & Cucumber Moth in cucurbits, Heliothis, Cluster Caterpillar & Loopers in legume vegetables, and Light Brown Apple Moth & Grapevine Moth in grapes.	M Bee:H	-
Indoxacarb (Avatar Evo) FMC	22A	Ingestion		P		Registered for control of Cabbage White Butterfly, Heliothis, Cluster Caterpillar, Centre Grub and Diamondback Moth in brassica vegetables, Heliothis & Lucerne Leafroller in leafy vegetables, Heliothis, Soybean Looper Cluster Caterpillar and Tomato Leaf Miner in fruiting vegetables, Beet Web Worm, Heliothis & Light Brown Apple Moth in celery, Heliothis & Cluster Caterpillar in cucurbits, Heliothis in sweet corn, Light Brown Apple Moth in blueberries & rubus, Codling Moth, Heliothis & Light Brown Apple Moth in pome fruit, Heliothis, Oriental Fruit Moth, Light Brown Apple Moth & Pear and Cherry Slug in stone fruit, and Grapevine Moth & Light Brown Apple Moth in grapes.	M Bee:H	R3
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Diamond Back Moth, Cabbage White Butterfly and suppression of Heliothis in brassica vegetables and brassica leafy vegetables, suppression of Onion Thrips and Plague Thrips in bulb vegetables, control of Two Spotted Mite and Cucumber Moth and suppression of Broad Mite, Bean Red Spider Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in cucurbits, and control of Two Spotted Mite and Broad Mite and suppression of Tomato Russet Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in fruiting vegetables.	H Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
White Louse Scale (*Unaspis citri*) **Soft Green Scale** (*Coccus viridis*) **Green Shield Scale** (*Chloropulvinaria psidii*) **Priority: High**								
Rated as a high priority in lychees. Direct physical damage to fruit, twigs and leaves is generally minor, but severe infestations can cause twig and stem dieback and deformation of new leaves. Scale covered fruit are unsaleable and contamination of fruit with honeydew encourages sooty mould.								
Acetamiprid + Pyriproxyfen (Trivor) Adama PER89943	4A+7C	Contact & Ingestion	28 NG	A	ALL (excl. VIC)	Permitted in lychee for control of Fruit Spotting Bugs (*Amblypelta nitida*, *Amblypelta lutescens*), Mealybugs (Pseudococcidae), **Scale Insects** (Coccoidea), Plant Hoppers (Fulgoroidea), Leafhoppers (*Empoasca* spp.) and suppression of Mediterranean Fruit Fly (*Ceratitis capitata*) and Queensland Fruit Fly (*Bactrocera tryoni*). Apply as a foliar spray when monitoring indicates the onset of crawler release. Use a minimum retreatment interval of 14 days. Maximum of 2 applications per season.	M Bee:H	R2
Buprofezin (Applaud) Corteva PER88401	16	Ingestion	14 NG	A	ALL (excl. VIC)	Permitted in lychee for control of **Scale Insects**, Mealybugs and Flatid Planthoppers. Apply as a foliar spray when nymph / crawler stages exceed threshold and are prevalent. Use a retreatment interval of 14-21 days. Maximum of 2 applications per crop. NOTE that this permit has expired at time of publication, pending consideration of renewal by APVMA.	M Bee:L	-
Petroleum Oil PER91168	-	Contact	1	A	ALL (excl. VIC)	Permitted in lychee for control of **Green Shield Scale** (*Pulvinaria psidii*), **Soft Green Scale** (*Coccus viridis*) & Soft Scales (Coccidae). Apply as a foliar spray before inflorescence emergence to when fruit is 15mm in diameter. Use a minimum retreatment interval of 21 days. Maximum of 4 applications per year.	L Bee:L	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	3	A	ALL	Registered in lychee for suppression of Citrus Snow (White Louse) Scale, **Soft Green Scale** & Mealybugs (*Planococcus* spp.) Apply as a foliar spray as part of a program targeting crawlers when they are exposed. Make 2 applications 14-21 days apart when crawlers are active.	M Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Sulfur PER91169	M2	Contact	NR	A	ALL (excl. VIC)	Permitted in lychee for control of Erinose Mite (*Acheria litchi*) and **White Louse Scale** (*Unaspis citri*). Apply as a foliar spray just before growth flush and repeat using a retreatment interval of 14-21 days until all new growth is damage free. Maximum of 4 applications per year.	L Bee:L	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion	3 NG	P-A	ALL	Registered in tropical & sub-tropical fruits, inedible peel (excluding bananas, pineapple) for control of Banana Spotting Bug (*Amblypelta lutescens*), Fruit Spotting Bug (*Amblypelta nitida*), Green Planthopper & Mango Planthopper. US registration for control of **Scale Insects** in citrus, pome fruit and stone fruit.	L Bee:L	-
Fenoxycarb (Insegar) Syngenta	7B	Contact & Ingestion		P		Registered for control of **Scale** in apples, pears and olives.	M Bee:L	-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered for control of various Scale insects in blueberries, citrus, grapes, mangoes, passionfruit, pome fruit and stone fruit.	M Bee:L	-
Erinose Mite (*Aceria litchii*) **Priority: High**								
Rated as a high priority in lychees. Erinose Mite can cause direct damage to leaves, flowers and fruit. Their seasonal cycle is tied to flushing. They also subject to US import restrictions.								
Abamectin	6	Contact	7	A	ALL	Registered in lychees for control of Two Spotted Mite (*Tetranychus urticae*) & **Litchi Erinose Mite** (*Aceria litchii*). Apply as a foliar spray when mites first appear during spring / summer. Use a minimum retreatment interval of 28 days. Maximum of 2 applications per season.	M Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Dimethoate	1B	Contact	NR	A	ALL	Registered in litchi as a pre-planting dip for control of **Litchi Erinose Mite**. Immerse seedlings in mixture for 1 minute and drain before planting into field.	H Bee:H	R2
			7			Registered in litchi for control of **Litchi Erinose Mite**. Apply as a foliar spray just before a growth flush and repeat at a retreatment interval of 14-21 days until all new growth is damage free. Maximum number of applications per season not specified.		
Sulfur PER91169	M2	Contact	NR	A	ALL (excl. VIC)	Permitted in lychee for control of **Erinose Mite** (*Acheria litchi*) and White Louse Scale (*Unaspis citri*). Apply as a foliar spray just before growth flush and repeat using a retreatment interval of 14-21 days until all new growth is damage free. Maximum of 4 applications per year.	L Bee:L	-
Petroleum Oil PER91168	-	Contact	1	P-A	ALL (excl. VIC)	Permitted in lychee for control of Green Shield Scale (*Pulvinaria psidii*), Soft Green Scale (*Coccus viridis*) & Soft Scales (Coccidae). Registered for control of Mites in apples, pears, apricots, cherries, almonds, peaches, nectarines, plums, prunes, pecans and ornamentals.	L Bee:L	-
Acequinocyl (Kanemite) UPL	20B	Contact & Ingestion		P		Registered for control of Two-Spotted Mite in pome fruit and stone fruit.	L Bee:L	-
Bifenazate (Acramite)	20D	Contact & Ingestion		P		Registered for control of Two-Spotted Mite, European Red Mite & Bryobia Mite in pome fruit and stone fruit, Two-Spotted Mite & Bryobia Mite in almonds, fruiting vegetables, cucurbits and strawberries, and Two-Spotted Mite in papaya.	L Bee:H	-
Cyflumetofen (Danisaraba) BASF	25A	Contact		P		Registered for control of Two Spotted Mite, European Red Mite & Bryobia Mite in pome fruit, almonds and ornamentals, Two-Spotted Mite, Citrus Red Mite & Oriental Spider Mite in citrus, Two-Spotted Mite in grapes, and Two-Spotted Mite & European Red Mite in strawberries and fruiting vegetables.	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Etoxazole (Paramite)	10B	IGR / Contact		P		Registered for control of Two-Spotted Mite, European Red Mite & Bryobia Mite in pome fruit, Tw0-Spotted Mite in grapes, tomato and capsicum, Oriental Spider Mite in citrus, Strawberry Mite in bananas, and Couch Mite in turf.	L Bee:VL	-
Fenbutatin Oxide (Torque) PER14097	12	Contact		P		Registered for control of Two-Spotted Mite, European Red Mite & Bryobia Mite in apples, pears, peaches and nectarines, Two-Spotted Mite in hops and strawberries, Tea Red Spider Mite & Six-Spotted Mite in avocados, Two-Spotted Mite & Banana Spider Mite in bananas, Citrus Rust Mite, Brown Citrus Rust Mite and Citrus Bud Mite in citrus, and Two-Spotted Mite & European Red Mite in ornamentals.	L Bee:L	R2
Hexythiazox (Calibre)	10A	IGR / Contact		P		Registered for control of Two-Spotted Mite & European Red Mite in apples, pears, stone fruit and ornamentals, and Two-Spotted Mite in strawberries.	L Bee:L	-
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Two-Spotted Mite and suppression of Broad Mite & Bean Spider Mite in cucurbits, and control of Tw0-Spotted Mite & Broad Mite and suppression of Tomato Russet Mite in fruiting vegetables.	H Bee:VH	-
Magnesium Hydroxide (Magnera) UPL	-	Contact		P		Registered for suppression of Two-Spotted Mite in tomatoes and cucurbits.	L Bee:L	-
Orange Oil (Prev-Am) Oro Agri	-	Contact		P		Registered for control of Two-Spotted Mite in tomato, eggplant, sugar snap peas, snow peas, raspberries, strawberries and cucurbits.	L Bee:L	-
Propargite	12C	Contact		P		Registered for control of Two-Spotted Mite & European Red Mite in stone fruit and apples, Two-Spotted Mites in strawberries, pears, bananas and hops, Passionvine Mite in passionfruit, Two-Spotted Mite & Spider Mites in beans, tomatoes and other vegetables, and Two-Spotted Mite, European Red Mite & False Spider Mites in ornamentals.	M Bee:L	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spiromesifen (Interrupt) Bayer	23	Ingestion		P		Registered for control of Two Spotted Mite in pome fruit and stone fruit.	M Bee:VL	-
Leafroller Moth (*Lobesia* sp., *Adoxophyes* sp., *Platypeplus aprobola*) **Fruit Piercing Moth** (*Eudocima* spp.) **Yellow Peach Moth** (*Conogethes punctiferalis*) **Leafminer** (*Conopomorpha litchiella*) **Priority: Moderate**								
Rated as a moderate priority in lychees. Leafrollers feed on leaves that they roll and fix together with silk. Some leafrollers will also feed on developing panicles and flowers. Fruit Piercing Moths cause damage when the adults feed on the skin of fruit and cause small circular holes. The feeding punctures provide entry for bacteria and yeasts leading to fermentation and mould development. Larvae are not found in lychee trees. Yellow Peach Moth damage is caused by larvae tunnelling inside the fruit and webbed frass that accumulates around the entry hole in the fruit skin. Leafminer larvae tunnel along the leaf midrib, causing the leaf tip to die. Panicles may also be damaged.								
Beta-Cyfluthrin (Bulldock) PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in lychee for control of Fruit Spotting Bug (*Amblypelta nitida*), Banana Spotting Bug (*Amblypelta lutescens*), Elephant or Rhino Beetle (*Xylotrupes gideon*), Red-Shouldered Leaf Beetle (*Monolepta australis*), Swarming Leaf Beetle (*Rhyparida* spp.), Longicorn Trunk Borer (*Acalolepta vastator*), Macadamia Nut Borer (*Cryptophlebia ombrodelta*), Mango Tip Borer (*Penicillaria jocosatrix*), Flatid Planthopper (Flatidae), Green Vegetable Bug (*Nezara viridula*), Lychee Stink Bug (*Tessaratoma papillosa*) and **Yellow Peach Moth** (*Conogethes punctiferalis*). Apply as a foliar spray when pest numbers are sufficient to cause economic damage. Do not use at flowering. Use a minimum retreatment interval of 21 days. Maximum of 4 applications per year.	VH Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Carbaryl (Bugmaster)	1A	Contact	NR	A	ALL	Registered in litchis (non-flowering, non-fruiting trees only) for control of Castor Oil Looper (*Achaea janata*), Leaf Eating Looper (Geometridae), Macadamia Nutborer (*Cryptophlebia ombrodelta*), Red Shouldered Leaf Beetle (*Monolepta australis*), Swarming Leaf Beetle (*Rhyparida* spp.), **Yellow Peach Moth** (*Conogethes punctiferalis*), **Leafroller Moth** (Tortricidae) & Wingless Grasshopper (*Phaulacridium vittatu*). Apply as a foliar spray at first sign of pest activity and repeat as necessary. Retreatment interval and maximum number of treatments per season not specified.	H Bee:H	R2
Spinetoram (Success Neo) Corteva	5	Ingestion	NR NG	A	ALL	Registered in tropical & sub-tropical fruits, inedible peel for control of Flower-Eating Caterpillars, **Leafrollers**, Loopers, **Yellow Peach Moth**, Red-Banded Thrips & Sorghum Head Caterpillar. Apply as a foliar spray when numbers exceed threshold, targeting mature eggs and newly hatched larvae. Use a retreatment interval of 7-14 days. Maximum of 4 applications per season.	M Bee:H	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	NR G:14	A	ALL	Registered in tropical & sub-tropical fruits, inedible peel for control of Flower-Eating Caterpillars, **Leafrollers**, Loopers, **Yellow Peach Moth**, Red-Banded Thrips & Sorghum Head Caterpillar. Apply as a foliar spray when numbers exceed threshold, targeting mature eggs and newly hatched larvae. Use a retreatment interval of 7-14 days. Maximum of number of applications per season nor specified.	L Bee:L	-
Bacillus thuringiensis subsp Kurstaki Strain HD-1 (DiPel)	11	Biological / Ingestion	NR	P-A	ALL	Registered in fruit for control of Armyworm (*Spodoptera* spp.), Cotton Bollworm (*Helicoverpa armigera*), Native Budworm (*Helicoverpa punctigera*), Cabbage Moth (*Plutella xylostella*), Cabbage White Butterfly (*Pieris rapae*), Green Looper (*Chrysodeixis eriosoma*), Light Brown Apple Moth (*Epiphyas postvittana*), Pear Looper (*Ectropis excursaria*), Soybean Looper (*Thysanoplusia orichalcea*), Vine Moth (*Phalaenoides glycinae*, *Agarista agricola*) and Tobacco Looper (*Chrysodeixis argentifera*).	VL Bee:VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Methoxyfenozide (Prodigy) Corteva	18	Ingestion	14 NG	P-A	ALL	Registered in lychee for control of Macadamia Nut Borer.	VL Bee:VL	-
Tebufenozide (Mimic)	18	Ingestion	14	P-A	ALL	Registered in lychee for control of Macadamia Nut Borer.	L Bee:L	-
Tetraniliprole (Vayego 200SC) Bayer PER92133	28	Ingestion	3 NG	P-A	NSW, NT & QLD	Permitted in lychee for control of Mango Shoot Looper (*Perixera illepidaria*).	L-M Bee:L	-
Emamectin (Proclaim) Syngenta	6	Ingestion		P		Registered for control of Diamondback Moth, Cabbage White Butterfly, Heliothis, Cluster Caterpillar & Loopers in brassica vegetables, root & tuber vegetables (except potato), leafy vegetables and brassica leafy vegetables, Heliothis & Fall Armyworm in sweet corn, Cluster Caterpillar, Heliothis, Light Brown Apple Moth & Loopers in strawberries, Heliothis & Cluster Caterpillar in lettuce & fruiting vegetables, Heliothis, Cluster Caterpillar & Cucumber Moth in cucurbits, Heliothis, Cluster Caterpillar & Loopers in legume vegetables, and Light Brown Apple Moth & Grapevine Moth in grapes.	M Bee:H	-
Indoxacarb (Avatar Evo) FMC	22A	Ingestion		P		Registered for control of Cabbage White Butterfly, Heliothis, Cluster Caterpillar, Centre Grub and Diamondback Moth in brassica vegetables, Heliothis & Lucerne Leafroller in leafy vegetables, Heliothis, Soybean Looper Cluster Caterpillar and Tomato Leaf Miner in fruiting vegetables, Beet Web Worm, Heliothis & Light Brown Apple Moth in celery, Heliothis & Cluster Caterpillar in cucurbits, Heliothis in sweet corn, Light Brown Apple Moth in blueberries & rubus, Codling Moth, Heliothis & Light Brown Apple Moth in pome fruit, Heliothis, Oriental Fruit Moth, Light Brown Apple Moth & Pear and Cherry Slug in stone fruit, and Grapevine Moth & Light Brown Apple Moth in grapes.	M Bee:H	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Diamond Back Moth, Cabbage White Butterfly and suppression of Heliothis in brassica vegetables and brassica leafy vegetables, suppression of Onion Thrips and Plague Thrips in bulb vegetables, control of Two Spotted Mite and Cucumber Moth and suppression of Broad Mite, Bean Red Spider Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in cucurbits, and control of Two Spotted Mite and Broad Mite and suppression of Tomato Russet Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in fruiting vegetables.	H Bee:VH	-
Two Spotted Mite (*Tetranychus urticae*) **Pacific Spider Mite** (*Tetranychus pacificus*) **Tea Red Spider Mite** (*Oligonychus coffeae*) **Priority: Moderate**								
Rated as a moderate priority in lychees. Mites feed on the underside of leaves, causing stippling and yellowing which can coalesce into larger dead patches. Mite abundance is favoured by hot, dry weather and populations can be flared by the use of broad-spectrum chemistry which disrupts beneficial species. An integrated pest management strategy should be employed, including preservation of beneficials, suppression of dust and general farm hygiene measures.								
Abamectin	6	Contact	7	A	ALL	Registered in lychees for control of **Two Spotted Mite** (*Tetranychus urticae*) & Litchi Erinose Mite (*Aceria litchii*). Apply as a foliar spray when mites first appear during spring / summer. Use a minimum retreatment interval of 28 days. Maximum of 2 applications per season.	M Bee:H	-
Potassium Salts of Fatty Acid (Natrasoap)	-	Contact	NR	A	ALL	Registered in fruit for control of Aphids, Thrips, Mealybug, **Two-Spotted Mite**, Spider Mite and Whitefly. Apply as a cover spray. Retreatment interval and maximum number of treatments not specified.	L Bee:L	-
Petroleum Oil PER91168	-	Contact	1	P-A	ALL (excl. VIC)	Permitted in lychee for control of Green Shield Scale (*Pulvinaria psidii*), Soft Green Scale (*Coccus viridis*) & Soft Scales (Coccidae). Registered for control of Mites in apples, pears, apricots, cherries, almonds, peaches, nectarines, plums, prunes, pecans and ornamentals.	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Acequinocyl (Kanemite) UPL	20B	Contact & Ingestion		P		Registered for control of Two-Spotted Mite in pome fruit and stone fruit.	L Bee:L	-
Bifenazate (Acramite)	20D	Contact & Ingestion		P		Registered for control of Two-Spotted Mite, European Red Mite & Bryobia Mite in pome fruit and stone fruit, Two-Spotted Mite & Bryobia Mite in almonds, fruiting vegetables, cucurbits and strawberries, and Two-Spotted Mite in papaya.	L Bee:H	-
Cyflumetofen (Danisaraba) BASF	25A	Contact		P		Registered for control of Two Spotted Mite, European Red Mite & Bryobia Mite in pome fruit, almonds and ornamentals, Two-Spotted Mite, Citrus Red Mite & Oriental Spider Mite in citrus, Two-Spotted Mite in grapes, and Two-Spotted Mite & European Red Mite in strawberries and fruiting vegetables.	L Bee:L	-
Etoxazole (Paramite)	10B	IGR / Contact		P		Registered for control of Two-Spotted Mite, European Red Mite & Bryobia Mite in pome fruit, Tw0-Spotted Mite in grapes, tomato and capsicum, Oriental Spider Mite in citrus, Strawberry Mite in bananas, and Couch Mite in turf.	L Bee:VL	-
Fenbutatin Oxide (Torque) PER14097	12	Contact		P		Registered for control of Two-Spotted Mite, European Red Mite & Bryobia Mite in apples, pears, peaches and nectarines, Two-Spotted Mite in hops and strawberries, Tea Red Spider Mite & Six-Spotted Mite in avocados, Two-Spotted Mite & Banana Spider Mite in bananas, Citrus Rust Mite, Brown Citrus Rust Mite and Citrus Bud Mite in citrus, and Two-Spotted Mite & European Red Mite in ornamentals.	L Bee:L	R2
Hexythiazox (Calibre)	10A	IGR / Contact		P		Registered for control of Two-Spotted Mite & European Red Mite in apples, pears, stone fruit and ornamentals, and Two-Spotted Mite in strawberries.	L Bee:L	-
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Two-Spotted Mite and suppression of Broad Mite & Bean Spider Mite in cucurbits, and control of Tw0-Spotted Mite & Broad Mite and suppression of Tomato Russet Mite in fruiting vegetables.	H Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Magnesium Hydroxide (Magnera) UPL	-	Contact		P		Registered for suppression of Two-Spotted Mite in tomatoes and cucurbits.	L Bee:L	-
Orange Oil (Prev-Am) Oro Agri	-	Contact		P		Registered for control of Two-Spotted Mite in tomato, eggplant, sugar snap peas, snow peas, raspberries, strawberries and cucurbits.	L Bee:L	-
Propargite	12C	Contact		P		Registered for control of Two-Spotted Mite & European Red Mite in stone fruit and apples, Two-Spotted Mites in strawberries, pears, bananas and hops, Passionvine Mite in passionfruit, Two-Spotted Mite & Spider Mites in beans, tomatoes and other vegetables, and Two-Spotted Mite, European Red Mite & False Spider Mites in ornamentals.	M Bee:L	R3
Spiromesifen (Interrupt) Bayer	23	Ingestion		P		Registered for control of Two Spotted Mite in pome fruit and stone fruit.	M Bee:VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Red-Shouldered Leaf Beetle (*Monolepta australis*) **Priority: Moderate**								
Rated as a moderate priority in lychees. Larvae live in the soil with the beetles usually emerging after rain. The adults skeletonise foliage, especially young leaf flush and will feed on emerging panicles and flowers, when present. Beetle swarms can invade the orchard and cause serious damage within 2 – 3 hours.								
Beta-Cyfluthrin (Bulldock) PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in lychee for control of Fruit Spotting Bug (*Amblypelta nitida*), Banana Spotting Bug (*Amblypelta lutescens*), Elephant or Rhino Beetle (*Xylotrupes gideon*), **Red-Shouldered Leaf Beetle** (*Monolepta australis*), Swarming Leaf Beetle (*Rhyparida* spp.), Longicorn Trunk Borer (*Acalolepta vastator*), Macadamia Nut Borer (*Cryptophlebia ombrodelta*), Mango Tip Borer (*Penicillaria jocosatrix*), Flatid Planthopper (Flatidae), Green Vegetable Bug (*Nezara viridula*), Lychee Stink Bug (*Tessaratoma papillosa*) and Yellow Peach Moth (*Conogethes punctiferalis*). Apply as a foliar spray when pest numbers are sufficient to cause economic damage. Do not use at flowering. Use a minimum retreatment interval of 21 days. Maximum of 4 applications per year.	VH Bee:H	-
Carbaryl (Bugmaster)	1A	Contact	NR	A	ALL	Registered in litchis (non-flowering, non-fruiting trees only) for control of Castor Oil Looper (*Achaea janata*), Leaf Eating Looper (Geometridae), Macadamia Nutborer (*Cryptophlebia ombrodelta*), **Red Shouldered Leaf Beetle** (*Monolepta australis*), Swarming Leaf Beetle (*Rhyparida* spp.), Yellow Peach Moth (*Conogethes punctiferalis*), Leafroller Moth (Tortricidae) & Wingless Grasshopper (*Phaulacridium vittatu*). Apply as a foliar spray at first sign of pest activity and repeat as necessary. Retreatment interval and maximum number of treatments per season not specified.	H Bee:H	R2
Tetraniliprole (Vayego 200SC) Bayer PER92133	28	Ingestion	3 NG	P-A	NSW, NT & QLD	Permitted in lychee for control of Mango Shoot Looper (*Perixera illepidaria*). Registered for control of various weevils, beetles and Lepidoptera in almonds, macadamias, pome and stone fruit.	L-M Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Indoxacarb (Avatar Evo) FMC	22A	Ingestion		P		Registered for control of various beetle species, including Garden Weevil in asparagus, strawberries and grapes, Vegetable Weevil in celery, Apple Weevil, Fuller's Rose Weevil and Garden Weevil in pome fruit and stone fruit, and Macadamia Seed Weevil in macadamia.	M Bee:H	R3
Terbufos (Counter)	1B	Contact	NR	A	ALL	Registered for control of wireworm in maize, sorghum, sunflower and sweet corn.	H Bee:H	R3
Citrus Mealybug (*Planococcus* spp.) **Priority: Low**								
Rated as a low priority in lychees. Direct physical damage to fruit, twigs and leaves is generally minor, but severe infestations can cause twig and stem dieback and deformation of new leaves. Contamination of fruit with honeydew encourages sooty mould.								
Acetamiprid + Pyriproxyfen (Trivor) Adama PER89943	4A+7C	Contact & Ingestion	28 NG	A	ALL (excl. VIC)	Permitted in lychee for control of Fruit Spotting Bugs (*Amblypelta nitida*, *Amblypelta lutescens*), **Mealybugs** (Pseudococcidae), Scale Insects (Coccoidea), Plant Hoppers (Fulgoroidea), Leafhoppers (*Empoasca* spp.) and suppression of Mediterranean Fruit Fly (*Ceratitis capitata*) and Queensland Fruit Fly (*Bactrocera tryoni*). Apply as a foliar spray when monitoring indicates the onset of crawler release. Use a minimum retreatment interval of 14 days. Maximum of 2 applications per season.	M Bee:H	R2
Buprofezin (Applaud) Corteva PER88401	16	Ingestion	14 NG	A	ALL (excl. VIC)	Permitted in lychee for control of Scale Insects, **Mealybugs** and Flatid Planthoppers. Apply as a foliar spray when nymph / crawler stages exceed threshold and are prevalent. Use a retreatment interval of 14-21 days. Maximum of 2 applications per crop. NOTE that this permit has expired at time of publication, pending consideration of renewal by APVMA.	M Bee:L	-
Petroleum Oil	-	Contact	NR	A	ALL	Registered in lychees for post-harvest control of **Citrus Mealybug**. Dip or flood fruit for at least 30 seconds to ensure complete wetness.	L Bee:L	-
Potassium Salts of Fatty Acid (Natrasoap)	-	Contact	NR	A	ALL	Registered in fruit for control of Aphids, Thrips, **Mealybug**, Two-Spotted Mite, Spider Mite and Whitefly. Apply as a cover spray. Retreatment interval and maximum number of treatments not specified.	L Bee:L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	3	A	ALL	Registered in lychee for suppression of Citrus Snow (White Louse) Scale, Soft Green Scale & **Mealybugs** (*Planococcus* spp.) Apply as a foliar spray as part of a program targeting crawlers when they are exposed. Make 2 applications 14-21 days apart when crawlers are active.	M Bee:VH	-
Flonicamid (Mainman) UPL	29	Ingestion		P		Registered for control of **Mealybugs** in apples, pears and nursery stock.	M Bee:VL	-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered for control of **Mealybugs** in citrus, grapes, mangoes, passionfruit, pineapple, pome fruit and stone fruit.	M Bee:L	-
Green Vegetable Bug (*Nezara viridula*) **Priority: Low**								
Rated as a low priority in lychees. Green Vegetable Bugs are a sporadic pest that cause sucking damage to young plant tissues, fruits and seeds. Feeding causes distortion in growth, drying or corkiness of fruit tissues. Control measures generally not warranted.								
Beta-Cyfluthrin (Bulldock) PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in lychee for control of Fruit Spotting Bug (*Amblypelta nitida*), Banana Spotting Bug (*Amblypelta lutescens*), Elephant or Rhino Beetle (*Xylotrupes gideon*), Red-Shouldered Leaf Beetle (*Monolepta australis*), Swarming Leaf Beetle (*Rhyparida* spp.), Longicorn Trunk Borer (*Acalolepta vastator*), Macadamia Nut Borer (*Cryptophlebia ombrodelta*), Mango Tip Borer (*Penicillaria jocosatrix*), Flatid Planthopper (Flatidae), **Green Vegetable Bug** (*Nezara viridula*), Lychee Stink Bug (*Tessaratoma papillosa*) and Yellow Peach Moth (*Conogethes punctiferalis*). Apply as a foliar spray when pest numbers are sufficient to cause economic damage. Do not use at flowering. Use a minimum retreatment interval of 21 days. Maximum of 4 applications per year.	VH Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Trichlorfon PER14743	1B	Contact	7	A	ALL (excl. VIC)	Permitted in lychee for control of Flatid Planthopper, Flower-Eating Caterpillar, Loopers, Yellow Peach Moth (*Conogethes punctiferalis*) and suppression of Fruit-Spotting Bug (*Amblypelta nitida*), Banana-Spotting Bug (*Amblypelta lutescens* ssp. *lutescens*), **Green Vegetable Bug** (*Nezara viridula*) & Lychee Stink Bug (*Lyramorpha rosea*). Apply as a foliar spray when pest is present in sufficient numbers to cause economic damage. Do not spray during flowering when bees are foraging. Use a minimum retreatment interval of 7-10 days. Maximum of 6 applications per season.	H Bee:H	R2
Flupyradifurone (Sivanto Prime) Bayer	4D	Contact & Ingestion	3 NG	P-A	ALL	Registered in tropical & sub-tropical fruits, inedible peel (excluding bananas, pineapple) for control of Banana Spotting Bug (*Amblypelta lutescens*), Fruit Spotting Bug (*Amblypelta nitida*), Green Planthopper & Mango Planthopper.	L Bee:L	-
Sulfoxaflor (Transform) Corteva	4C	Contact & Ingestion	3	P-A	ALL	Registered in assorted tropical & sub-tropical fruit, inedible peel (except banana, pineapple) for control of Banana Spotting Bug & Fruit Spotting Bug.	M Bee:VH	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Swarming Leaf Beetle (*Rhyparida* spp.) **Elephant Beetle** (*Xylotrupes gideon*) **Longicorn Trunk Borer** (*Acalolepta vastator*) **Stem Girdler** (*Orthorrhinus klugi*, *Eutyrhinus meditabundus*, *Asynonychus* sp.) **Borer** (*Carmenta chrysophanes*) **Citrus Branchborer** (*Uracanthus cryptophagus*) **Priority: Low**								
Rated as a low priority in lychees. Swarming Leaf Beetles are present in all regions but are more common in north Queensland. Adults can cause feeding damage to flowers, new leaves and young shoots. Young trees can be severely stunted if successive flushes are continually removed. Elephant Beetles occur throughout coastal Queensland and NSW and are more of a problem in un-netted or drape netted orchards. Beetles chew whole fruit and sometimes whole panicles of fruit are damaged. Larvae of a number of boring insects including Longicorn Beetles and Stem Girdler cause death to lychee branches. Affected branches can crack and fall off as a result of feeding by larvae.								
Beta-Cyfluthrin (Bulldock) PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in lychee for control of Fruit Spotting Bug (*Amblypelta nitida*), Banana Spotting Bug (*Amblypelta lutescens*), **Elephant or Rhino Beetle** (*Xylotrupes gideon*), Red-Shouldered Leaf Beetle (*Monolepta australis*), **Swarming Leaf Beetle** (*Rhyparida* spp.), **Longicorn Trunk Borer** (*Acalolepta vastator*), Macadamia Nut Borer (*Cryptophlebia ombrodelta*), Mango Tip Borer (*Penicillaria jocosatrix*), Flatid Planthopper (Flatidae), Green Vegetable Bug (*Nezara viridula*), Lychee Stink Bug (*Tessaratoma papillosa*) and Yellow Peach Moth (*Conogethes punctiferalis*). Apply as a foliar spray when pest numbers are sufficient to cause economic damage. Do not use at flowering. Use a minimum retreatment interval of 21 days. Maximum of 4 applications per year.	VH Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Carbaryl (Bugmaster)	1A	Contact	NR	A	ALL	Registered in litchis (non-flowering, non-fruiting trees only) for control of Castor Oil Looper (*Achaea janata*), Leaf Eating Looper (Geometridae), Macadamia Nutborer (*Cryptophlebia ombrodelta*), Red Shouldered Leaf Beetle (*Monolepta australis*), **Swarming Leaf Beetle** (*Rhyparida* spp.), Yellow Peach Moth (*Conogethes punctiferalis*), Leafroller Moth (Tortricidae) & Wingless Grasshopper (*Phaulacridium vittatu*). Apply as a foliar spray at first sign of pest activity and repeat as necessary. Retreatment interval and maximum number of treatments per season not specified.	H Bee:H	R2
Tetraniliprole (Vayego 200SC) Bayer PER92133	28	Ingestion	3 NG	P-A	NSW, NT & QLD	Permitted in lychee for control of Mango Shoot Looper (*Perixera illepidaria*). Registered for control of various weevils, beetles and Lepidoptera in almonds, macadamias, pome and stone fruit.	L-M Bee:L	-
Indoxacarb (Avatar Evo) FMC	22A	Ingestion		P		Registered for control of various beetle species, including Garden Weevil in asparagus, strawberries and grapes, Vegetable Weevil in celery, Apple Weevil, Fuller's Rose Weevil and Garden Weevil in pome fruit and stone fruit, and Macadamia Seed Weevil in macadamia.	M Bee:H	R3
Green Tree Ant (*Oecophylla smaragdina*) **Coastal Brown Ant** (*Pheidole megacephala*) **Priority: Low**								
Rated as a low priority in lychees. Ants do not cause direct damage but they will tend scale and mealybugs for the honeydew and interfere with natural control by parasites and predators. Ants transport scales and mealybugs from tree to tree, helping establish new colonies. Ant control should occur prior to fruit set.								
Pyriproxyfen (Distance Ant Bait) Sumitomo	7C	IGR / Bait	NR	A	ALL	Registered in fruit crops for control of invasive and nuisance **ants**. Apply baits in early spring or summer at first sign of ant activity. Do not exceed 3 applications per year and a minimum of 3 months between each treatment.	VL Bee:L	-
Broflanilide (Vedira) BASF	30	Contact & Ingestion		P		Registered for control of ants in non-crop situations.	-	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Metaflumizone (Siesta Ant Bait) BASF	22B	Ingestion		P		Registered for control of ants in non-crop situations.	-	-
Queensland Fruit Fly (*Bactrocera tryoni*) **Priority: Low**								
Rated as a low priority in lychees. Queensland Fruit Fly frequent lychee crops, but they cause limited economic damage in crop. Post-harvest treatments for Fruit Fly are required as a biosecurity measure for interstate and overseas exports.								
Acetamiprid + Pyriproxyfen (Trivor) Adama PER89943	4A+7C	Contact & Ingestion	28 NG	A	ALL (excl. VIC)	Permitted in lychee for control of Fruit Spotting Bugs (*Amblypelta nitida*, *Amblypelta lutescens*), Mealybugs (Pseudococcidae), Scale Insects (Coccoidea), Plant Hoppers (Fulgoroidea), Leafhoppers (*Empoasca* spp.) and suppression of Mediterranean Fruit Fly (*Ceratitis capitata*) and **Queensland Fruit Fly** (*Bactrocera tryoni*). Apply as a foliar spray when monitoring indicates fruit fly activity. Use a minimum retreatment interval of 14 days. Maximum of 2 applications per season.	M Bee:H	R2
Dimethoate PER13859	1B	Contact	NR	A	ALL	Permitted in fruit fly host crops for orchard clean-up of **Fruit Fly** following harvest. Do not apply more than 2 applications per host crop. Apply as a foliar and/or ground spray to both fallen and retained fruit. Produce treated must not be harvested, collected or supplied for human or animal consumption.	H Bee:H	R2
Malathion	1B	Bait / Contact	3	A	ALL	Registered in fruit trees as a bait for control of **Fruit Fly**. Apply as a foliar, strip or spot spray. Only apply to the leaves, trunk and lower limbs of trees. Do not apply directly to fruit. Apply weekly from 6 weeks before harvest to 2 weeks after harvest.	H Bee:H	R3
Pyrethrins (Pyganic)	3A	Contact	1	A	ALL	Registered in lychee as a clean up spray to control insects prior to harvest such as **Fruit Fly**, Rutherglen Bug and Spiders. Apply as a foliar spray.	VH Bee:H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spinosad (Naturalure) Corteva	5	Bait / Ingestion	NR	A	ALL	Registered in fruit for control of Fruit Flies including **Queensland Fruit Fly** and Mediterranean Fruit Fly. Apply as either a band or a spot spray to the lower canopy of fruiting plants. Begin applications 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. Avoid spraying the fruit as phytotoxicity may occur.	L Bee:H	-
Trichlorfon PER12450	1B	Contact	7 G:7	A	ACT, NSW, NT, QLD, SA & WA	Permitted in lychee for control of **Queensland Fruit Fly** (*Bactrocera tryoni*) & Mediterranean Fruit Fly (*Ceratitis capitata*). Apply as a cover spray. Repeat at half concentration every 7-10 days. Apply a maximum of 4 applications per season.	H Bee:H	R2
Fall Armyworm (*Spodoptera frugiperda*) **Priority: Low**								
Rated as a low priority in lychees. Larvae are voracious feeders on leaves, young shoots, stems and flowers. Lychee do not seem to be a preferred host for Fall Armyworm but it is a pest that should be monitored as its feeding patterns can change over time.								
Spinosad (Entrust Organic) Corteva PER89870	5	Ingestion	NR G:14	A	ALL (excl. VIC)	Permitted in tropical & sub-tropical fruit, inedible peel (excluding avocado, mango & banana) for control of **Fall Armyworm** (*Spodoptera frugiperda*). Apply as a foliar spray targeted against eggs and newly hatched instars before they become entrenched. Retreatment interval not specified. Maximum of 4 applications per season.	L Bee:L	-
Bacillus thuringiensis subsp Kurstaki Strain HD-1 (DiPel)	11	Biological / Ingestion	NR	P-A	ALL	Registered in fruit for control of Armyworm (*Spodoptera* spp.), Cotton Bollworm (*Helicoverpa armigera*), Native Budworm (*Helicoverpa punctigera*), Cabbage Moth (*Plutella xylostella*), Cabbage White Butterfly (*Pieris rapae*), Green Looper (*Chrysodeixis eriosoma*), Light Brown Apple Moth (*Epiphyas postvittana*), Pear Looper (*Ectropis excursaria*), Soybean Looper (*Thysanoplusia orichalcea*), Vine Moth (*Phalaenoides glycinae*, *Agarista agricola*) and Tobacco Looper (*Chrysodeixis argentifera*).	VL Bee:VL	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Methoxyfenozide (Prodigy) Corteva	18	Ingestion	14 NG	P-A	ALL	Registered in lychee for control of Macadamia Nut Borer.	VL Bee:VL	-
Tebufenozide (Mimic)	18	Ingestion	14	P-A	ALL	Registered in lychee for control of Macadamia Nut Borer.	L Bee:L	-
Tetraniliprole (Vayego 200SC) Bayer PER92133	28	Ingestion	3 NG	P-A	NSW, NT & QLD	Permitted in lychee for control of Mango Shoot Looper (*Perixera illepidaria*).	L-M Bee:L	-
Emamectin (Proclaim) Syngenta	6	Ingestion		P		Registered for control of Diamondback Moth, Cabbage White Butterfly, Heliothis, Cluster Caterpillar & Loopers in brassica vegetables, root & tuber vegetables (except potato), leafy vegetables and brassica leafy vegetables, Heliothis & Fall Armyworm in sweet corn, Cluster Caterpillar, Heliothis, Light Brown Apple Moth & Loopers in strawberries, Heliothis & Cluster Caterpillar in lettuce & fruiting vegetables, Heliothis, Cluster Caterpillar & Cucumber Moth in cucurbits, Heliothis, Cluster Caterpillar & Loopers in legume vegetables, and Light Brown Apple Moth & Grapevine Moth in grapes.	M Bee:H	-
Indoxacarb (Avatar Evo) FMC	22A	Ingestion		P		Registered for control of Cabbage White Butterfly, Heliothis, Cluster Caterpillar, Centre Grub and Diamondback Moth in brassica vegetables, Heliothis & Lucerne Leafroller in leafy vegetables, Heliothis, Soybean Looper Cluster Caterpillar and Tomato Leaf Miner in fruiting vegetables, Beet Web Worm, Heliothis & Light Brown Apple Moth in celery, Heliothis & Cluster Caterpillar in cucurbits, Heliothis in sweet corn, Light Brown Apple Moth in blueberries & rubus, Codling Moth, Heliothis & Light Brown Apple Moth in pome fruit, Heliothis, Oriental Fruit Moth, Light Brown Apple Moth & Pear and Cherry Slug in stone fruit, and Grapevine Moth & Light Brown Apple Moth in grapes.	M Bee:H	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Isocycloseram (Simodis) Syngenta	30	Ingestion		P		Registered for control of Diamond Back Moth, Cabbage White Butterfly and suppression of Heliothis in brassica vegetables and brassica leafy vegetables, suppression of Onion Thrips and Plague Thrips in bulb vegetables, control of Two Spotted Mite and Cucumber Moth and suppression of Broad Mite, Bean Red Spider Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in cucurbits, and control of Two Spotted Mite and Broad Mite and suppression of Tomato Russet Mite, Western Flower Thrips, Tomato Thrips, Melon Thrips, Plague Thrips and Heliothis in fruiting vegetables.	H Bee:VH	-

4.3 Weeds of Lychee

4.3.1 Weed priorities

Weeds	Priority
Flaxleaf Fleabane (*Conyza bonariensis*)	H

Weed priorities can vary substantially between regions, and weed management generally is guided more by cultural methods than by specific problem weed species. An integrated weed management program should be used to reduce the need for herbicides in crops. Our industry consultation identified Flaxleaf Fleabane as a high priority. This is an invasive species which is difficult to kill and must be managed using a sustained management program incorporating multiple control measures. The industry has also identified the need to incorporate more residual herbicides into their production system.

The risk of herbicide resistance should also be considered in devising a weed management program. Specific resistance management strategies for high resistance risk (1 and 2) and moderate resistance risk (3, 4, 6, 9, 10, 12, 13, 14, 15, 18, 19, 22, 23, 27, 29, 30 and 31) herbicide modes of action are available on the CropLife Australia webpage[7].

[7] https://www.croplife.org.au/resources/programs/resistance-management/

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 7)**	
		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
Flax-leaf Fleabane (*Conyza bonariensis*) **Priority: High**							
Rated as a high priority in lychees. Flaxleaf Fleabane is a widespread weed that is difficult to control with herbicides. It seeds prolifically and can germinate year-round. Weed control should be targeted at small, actively growing weeds and usually multiple applications will be required. A combination of residual and knockdown herbicides should form part of an integrated approach to managing Flaxleaf Fleabane.							
Glufosinate (Basta)	10**	Tropical & Sub-Tropical Fruits, Inedible Peel / directed or shielded spray	Registered in tropical & sub-tropical fruits, inedible peel for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR G:56	A	ALL	R3
Glyphosate (Roundup)	9**	Tropical & Sub-Tropical Fruits / directed spray, shielded spray or wick wiper	Registered in tropical & sub-tropical fruits for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk. Time application to flowering nutgrass. Multiple applications will be required.	NR	A	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk. NOTE: This use pattern is not supported under the current draft APVMA review.	1 G:7	A	ALL	R1
Paraquat + Amitrole (Guerilla) Imtrade	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual grass and broadleaf weeds, including **Flaxleaf Fleabane**. Apply as a directed spray and avoid contact with crop foliage. NOTE: This use pattern is not supported under the current draft APVMA review.	NR G:1	A	ALL	R1
Paraquat + Diquat (SpraySeed)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk. NOTE: This use pattern is not supported under the current draft APVMA review.	NR G:7	A	ALL	R1
Amitrole	34**		Registered for control of **Fleabane** in fallow and pine plantations.		P		-
Flumioxazin (Chateau) Sumitomo	14**		Registered for control of **Flaxleaf Fleabane** in grapes, pome fruit, stone fruit, citrus, nut trees, olives, avocados and berries.		P		-
Saflufenacil (Sharpen) BASF	14**		Registered for control of **Flaxleaf Fleabane** in citrus, pome fruit & almonds.		P		-
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for control of grass and broadleaf weeds in Brassica vegetables, Brassica leafy vegetables, sweet potatoes, spring onions, shallots, spinach, silverbeet, rhubarb, culinary herbs and beans.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
General Grass & Broadleaf Weed Control **Priority: Moderate**							
Rated as a high priority in QLD & VIC, as a moderate priority in SA & TAS, and as a low priority in NSW. Fast-growing, annual broadleaf weed that germinates from spring to autumn. Herbicide control can be difficult and targeting weeds at early growth stages is critical.							
Carfentrazone-Ethyl (Spotlight)	14**	Tropical & Sub-Tropical Fruit / directed spray or spot spray	Registered in tropical & sub-tropical fruit for control of grass & broadleaf weeds. If weeds are already present, use as a spike in a mixture with glyphosate or paraquat.	NR	A	ALL	-
Carfentrazone + Glufosinate (Hellcat) AgNova	14**+ 10**	Litchi / directed spray or shielded spray	Registered in litchi for control of grass & broadleaf weeds. Apply as a directed or shielded spray.	NR G:8	A	ALL	R3
Carfentrazone + Glyphosate (Broadway) FMC	14**+ 9**	Tropical & Sub-Tropical Fruit / directed spray or spot spray	Registered in tropical & sub-tropical fruit for control of grass & broadleaf weeds. Apply as a directed spray or spot spray.	NR G:14	A	ALL	R3
Clethodim (Select)	1***	Non-Bearing Fruit Trees	Registered in non-bearing fruit trees for control of grass weeds. Apply as a directed spray to young, actively growing weeds	NR	A	ALL	R3
Fluazifop-P (Fusilade)	1***	Lychee / directed spray	Registered in lychee for control of Barnyard Grass, Crowsfoot Grass, Giant Paspalum (seedling), Green Panic (seedling), Johnson Grass, Para Grass, Prairie Grass, Rhodes Grass, Stinkgrass & Summer Grass (Crabgrass). Direct the spray to the base of the tree.	14	A	NSW, QLD, NT & WA	-
Glufosinate (Basta)	10**	Tropical & Sub-Tropical Fruits, Inedible Peel / directed or shielded spray	Registered in tropical & sub-tropical fruits, inedible peel for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR G:56	A	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Glyphosate (Roundup)	9**	Tropical & Sub-Tropical Fruits / directed spray, shielded spray or wick wiper	Registered in tropical & sub-tropical fruits for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk. Time application to flowering nutgrass. Multiple applications will be required.	NR	A	ALL	R3
Haloxyfop (Verdict)	1***	Litchi / directed spray or spot spray	Registered in litchi for control of Couch Grass, Rhodes Grass, Slender Rats Tail Grass, Buffel Grass, Green Panic, Johnson Grass, Kikuyu, *Paspalum* spp., *Setaria* spp., Annual Ryegrass, Barley Grass, Barnyard Grass, Brome Grass, Crowsfoot Grass, Lesser Canary Grass, Liverseed Grass, Mossman River Grass, Paradoxa Grass, Summer Grass, Volunteer Cereals & Wild Oats. Apply as a directed spray to the base of the tree or a spot spray, avoiding contact with fruit and foliage of the crop.	NR	A	ALL	-
Isoxaben (Gallery)	29**	Tree Fruits / Non-Bearing / Residual weed control	Registered in tree fruits (non-bearing) for control of broadleaf weeds. Apply to bare soil prior to weed emergence. Moisture as rain or spray irrigation (>12.5mm) is required within 21 days to activate weed control.	NR	A	ALL	-
Oryzalin	3**	Litchi / Non-Bearing Fruit / directed spray	Registered in non-bearing litchi for control of grass and broadleaf weeds. Apply to bare soil using a directed spray at the base of the trees. Requires at least 15mm of irrigation or rain to activate.	NR	A	ALL	-
Oxyfluorfen (Goal)	14**	Lychee / Directed Spray	Registered in lychee for control of various grass and broadleaf weeds. If weeds are already present, use as a spike in a mixture with glyphosate or paraquat.	NR NG	A	ALL	-
Paraquat (Gramoxone)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk. NOTE: This use pattern is not supported under the current draft APVMA review.	1 G:7	A	ALL	R1

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Paraquat + Amitrole (Guerilla) Imtrade	22** + 34**	Orchards / Directed Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray and avoid contact with crop foliage. NOTE: This use pattern is not supported under the current draft APVMA review.	NR G:1	A	ALL	R1
Paraquat + Diquat (SpraySeed)	22**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of annual grass and broadleaf weeds. Apply as a directed spray or spot spray. Do not allow spray to contact any part of the tree, including the trunk. NOTE: This use pattern is not supported under the current draft APVMA review.	NR G:7	A	ALL	R1
Pendimethalin (Stomp)	3**	Lychees / Residual weed control	Registered in lychees for control of various grass and broadleaf weeds. Apply to soil surface that is free of weeds, surface litter and clods, and ensure incorporation by a minimum of 5mm of rainfall or spray irrigation within 10 days.	NR	A	ALL	-
Aclonifen (Emerger) Bayer	32**		Bayer is expected to seek registration for pre-emergent control of grass and broadleaf weeds in various crops. Registered in Europe for use in potatoes, legume vegetables and cereals.		P		-
Dimethenamid-P (Outlook)	15**		Registered for pre-emergent control of grass and broadleaf weeds in sweet corn, beans, peas, pumpkins and kabocha.		P		-
Flumioxazin (Chateau) Sumitomo	14**		Registered for pre-emergent control of various grass & broadleaf weeds in grapes, pome fruit, stone fruit, citrus, nut trees, olives, avocados and berries.		P		-
Norflurazon (Zoliar) AgNova	12**		Registered for pre-emergent control of nutgrass, various grass & broadleaf weeds in asparagus, citrus, grapes, nuts, pome fruit and stone fruit.		P		-
S-Metolachlor (Dual Gold) Syngenta	15**		Registered for pre-emergent control of grass and broadleaf weeds in brassica vegetables, brassica leafy vegetables, sweet potatoes, spring onions, shallots, spinach, silverbeet, rhubarb, culinary herbs and beans.		P		-

4.4 Plant Growth Regulators in Lychees

4.4.1 Plant Growth Regulator Priorities

Priority
Moderate
Restriction of Vegetative Growth
Low
Promote Fruit Retention

Plant Growth Regulators (PGR) do not play a significant role in the management of lychees. There were no high priority issues nominated for PGRs. Restriction of vegetative growth was identified as moderate priority.

4.4.2 Available and Potential Plant Growth Regulators

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

Availability		Regulatory risk (refer to Appendix 7)	
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

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use	WHP (days)	Availability	States	Regulatory risk
Restriction of Vegetative Growth **Priority: Moderate**							
Rated as a moderate priority in lychees.							
Ethephon PER95768	PGR	Lychee	Permitted in lychee to manage seasonal vegetative flushes to better synchronise flowering and fruit set (when conditions require such management). Apply initial foliar spray at early autumn vegetative fluish when more than 30% of terminals are flushing. Do not apply after the end of the autumn vegetative flush. Apply a second treatment only if trees flush again within 28 days of the initial application. Maximum of 2 applications per season.	NR	A	QLD & NSW	-
Paclobutrazol	PGR		Registered for reduction of vegetative growth in mango, stone fruit and apples.		P		-
Uniconazole-P	PGR		Registered for reduction of vegetative growth in avocados.		P		-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use	WHP (days)	Availability	States	Regulatory risk
Promote Fruit Retention **Priority: Low**							
Rated as a low priority in lychees.							
Triclopyr (Tops)	PGR	Lychee	Registered in lychee to reduce fruit drop. Apply as a foliar spray when majority of fruit is over 15-20mm in length. Maximum of 1 application per season.	NR	A	ALL	-

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/F2023L01350/latest/text
APVMA Permit search	Agricultural And Veterinary Permits Search - portal.apvma.gov.au
APVMA Product search	Public Chemical Registration Information System Search - portal.apvma.gov.au
Codex MRL database	http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/
Cotton Pest Management Guide 2023-24	https://www.cottoninfo.com.au/publications/cotton-pest-management-guide
CropLife Australia	https://www.croplife.org.au/
Hort Innovation	www.horticulture.com.au

5.2 Abbreviations and Definitions:

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

5.3 Acknowledgements:

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

6. Appendices

Appendix 1. Products available for disease control in lychee
Appendix 2. Products available for control of insects and other pests in lychee
Appendix 3. Products available for weed control in lychee
Appendix 4. Plant Growth Regulators available in lychee
Appendix 5. Current permits for use in lychee
Appendix 6. Lychee Maximum Residue Limits (MRLs)
Appendix 7. Lychee regulatory risk assessment

Appendix 1. Products available for disease control in lychees

Active Ingredient (Trade Name)	Chemical Group	Situation	Diseases / Comments	States	WHP Days	Regulatory Risk
Bacillus amyloliquefaciens strain QST713 (Serenade Opti) Bayer	BM02	Tropical Fruit / Excluding Banana	Anthracnose (*Colletotrichum* spp.) Suppression of: Stem End Rot	ALL	NR	-
Bacillus amyloliquefaciens Strain QST 713 (Serenade Prime Soil Ameliorant and Biofungicide) Bayer	BM02	Tropical Fruit / Excluding Banana	Anthracnose (*Colletotrichum* spp.) Suppression of: Stem End Rot	ALL	NR	-
Bromo Chloro Dimethyl Hydatoin (BCDMH)	-	Sanitiser / Post-Harvest Treatment	External Rot Causing Organisms	ALL	NR	-
Chlorine	-	Sanitiser / Post-Harvest Treatment	Bacteria and Fungi	ALL	NR	-
Chloropicrin + 1,3-Dichloropropene (Telone C-35)	8B	Soil Fumigant	Soil-borne diseases (including *Fusarium* & *Verticillium* Wilts, *Rhizoctonia*, *Pythium*)	ALL	NR	-
Copper as Cupric Hydroxide	M1	Tropical Fruit	Phytophthora Stem Canker	QLD & NSW	1	-
Copper as Tribasic Copper Sulphate Copper as Copper Ammonium Acetate Copper as Cuprous Oxide				ALL		
Copper PER94006	M1	Tropical Fruit Crops / Excluding mango, banana & avocado	Diplodia (*Diplodia phoenicum*) Pink Disease (*Erythricium salmonicolor*)	NSW, QLD, NT & WA	1 NG	-

Active Ingredient (Trade Name)	Chemical Group	Situation	Diseases / Comments	States	WHP Days	Regulatory Risk
Copper as Cupric Hydroxide Copper as Tribasic Copper Sulphate Copper as Copper Oxychloride	M1	Litchi	Parasitic Algae (*Cephaleuros virescens*)	QLD & NSW	1	-
Copper as Copper Ammonium Acetate	M1	Lychee	Parasitic Algae (Cephaleuros virescens)	QLD & NSW	1	-
			Lychee Pepper Spot (*Colletotrichum gloeosporioides*) Phytophthora Stem Canker	ALL		
Copper as Cupric Hydroxide Copper as Cuprous Oxide PER13660	M1	Lychees	Lychee Pepper Spot	ALL (excl. VIC)	1	-
Cyprodinil + Fludioxonil (Switch) PER82879	9+12	Lychee	Lychee Pepper Spot / Anthracnose (*Colletotrichum gloeosporioides*)	ALL	14	R3
Didecyl Dimethyl Ammonium Chloride	-	Sanitiser / Tropical & Sub-Tropical Fruit (inedible peel) / Post-Harvest	Control of post-harvest diseases	ALL	NR	-
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Litchis	Lychee Pepper Spot (*Colletotrichum gloeosporioides*)	ALL	3 NG	-
Iodine	-	Sanitiser / Tropical & Sub-Tropical Fruit	Bacteria & Fungi	ALL	NR	-
Mancozeb PER13659	M3	Lychee	Lychee Pepper Spot (*Colletotrichum gloeosporioides*)	NSW & QLD	7	R2
Peroxyacetic Acid	-	Sanitiser / Post-Harvest Treatment	Bacteria	ALL	NR	-
Prochloraz (Octave WP) PER80369	3	Lychee	Anthracnose / Pepper Spot (*Colletotrichum gloeosporioides*)	NSW, QLD, NT & WA	28	R3

Active Ingredient (Trade Name)	Chemical Group	Situation	Diseases / Comments	States	WHP Days	Regulatory Risk
Pyraclostrobin (Cabrio) BASF PER80367	11	Lychee / Field grown only	Anthracnose / Pepper Spot (*Colletotrichum gloeosporioides*)	NSW, QLD, NT & WA	3 NG	-
Streptomyces lydicus (Actinovate) Novozymes BioAg	BM02	All Crops	Biological soil amendment to stimulate soil organisms to make nutrients more available for plant growth	ALL	NR	-

Appendix 2. Products available for control of insects and other pests in lychees

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory Risk
1,3-Dichloropropene	-	Soil Fumigant	Plant parasitic nematodes	ALL	NR	-
Abamectin	6	Lychees	Two Spotted Mite (*Tetranychus urticae*) Litchi Erinose Mite (*Aceria litchii*)	ALL	7	-
Acetamiprid + Pyriproxyfen (Trivor) Adama PER89943	4A+7C	Lychee	Fruit Spotting Bugs (*Amblypelta nitida*, *Amblypelta lutescens*) Mealybugs (Pseudococcidae) Scale Insects (Coccoidea) Plant Hoppers (Fulgoroidea) Leaf Hoppers (*Empoasca* spp.) Suppression of: Mediterranean Fruit Fly (*Ceratitis capitata*) Queensland Fruit Fly (*Bactrocera tryoni*)	ALL (excl. VIC)	28 NG	R2
Bacillus thuringiensis subsp Kurstaki Strain HD-1 (DiPel)	11	Fruit	Armyworm (*Spodoptera* spp.) Cotton Bollworm (*Helicoverpa armigera*) Native Budworm (*Helicoverpa punctigera*) Cabbage Moth (*Plutella xylostella*) Cabbage White Butterfly (*Pieris rapae*) Green Looper (*Chrysodeixis eriosoma*) Light Brown Apple Moth (*Epiphyas postvittana*) Pear Looper (*Ectropis excursaria*) Soybean Looper (*Thysanoplusia orichalcea*) Vine Moth (*Phalaenoides glycinae*, *Agarista agricola*) Tobacco Looper (*Chrysodeixis argentifera*)	ALL	NR	-

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory Risk
Beta-Cyfluthrin (Bulldock) PER80374	3A	Lychee	Fruit Spotting Bug (*Amblypelta nitida*) Banana Spotting Bug (*Amblypelta lutescens*) Elephant or Rhino Beetle (*Xylotrupes gideon*) Red-Shouldered Leaf Beetle (*Monolepta australis*) Swarming Leaf Beetle (*Rhyparida* spp.) Longicorn Trunk Borer (*Acalolepta vastator*) Macadamia Nut Borer (*Cryptophlebia ombrodelta*) Mango Tip Borer (*Penicillaria jocosatrix*) Flatid Planthopper (Flatidae) Green Vegetable Bug (*Nezara viridula*) Lychee Stink Bug (*Tessaratoma papillosa*) Yellow Peach Moth (*Conogethes punctiferalis*)	NSW, NT, QLD, SA & WA	7	-
Buprofezin (Applaud) Corteva PER88401	16	Lychee	Scale Insects (Coccidae, Diaspididae & Ericoccidae) Mealybugs (Pseudococcidae) Flatid Planthoppers (Cicadellidae & Delphacidae) NOTE that this permit has expired at time of publication, pending consideration of renewal by APVMA.	ALL (excl. VIC)	14 NG	-
Carbaryl (Bugmaster)	1A	Litchis / Non-flowering, non-fruiting trees only	Castor Oil Looper (*Achaea janata*) Leaf Eating Looper (Geometridae) Macadamia Nutborer (*Cryptophlebia ombrodelta*) Red Shouldered Leaf Beetle (*Monolepta australis*) Swarming Leaf Beetle (*Rhyparida* spp.) Yellow Peach Moth (*Conogethes punctiferalis*) Leafroller Moth (Tortricidae) Wingless Grasshopper (*Phaulacridium vittatu*)	ALL	NR	R2
Chloropicrin + 1,3-Dichloropropene (Telone C-35)	8B	Soil Fumigant	Plant Parasitic Nematodes Symphylans Wireworms	ALL	NR	-

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory Risk
Deltamethrin (MagMed) PER92548	3A	Tropical Fruit	Mediterranean Fruit Fly (*Ceratitis capitata*)	WA	NR	-
Dimethoate	1B	Litchi / Pre-Planting Dip	Litchi Erinose Mite	QLD, NSW & WA	NR	R2
		Litchi / Established Trees			7	
Dimethoate PER13859	1B	Orchard Cleanup – Fruit Fly host crops following harvest	Fruit Fly	ALL	NR	R2
Flupyradifurone (Sivanto Prime) Bayer	4D	Tropical & Sub-Tropical Fruits (inedible peel) / Excluding bananas, pineapple	Banana Spotting Bug (*Amblypelta lutescens*) Fruit Spotting Bug (*Amblypelta nitida*) Green Planthopper Mango Planthopper	ALL	3 NG	-
Malathion	1B	Fruit Trees / Bait	Fruit Fly	ALL	3	R3
Metaldehyde	-	Horticultural Crops	Snails & Slugs	ALL	7	-
Methoxyfenozide (Prodigy) Corteva	18	Lychee	Macadamia Nut Borer	ALL	14 NG	-
Methoxyfenozide (Prodigy) Corteva PER91798	18	Lychee	Mango Shoot Looper (*Perixera illepidaria*)	ALL (excl. VIC)	14 NG	-
Petroleum Oil	-	Lychees	Citrus Mealybug	ALL	NR	-
Petroleum Oil PER91168	-	Lychee	Green Shield Scale (*Pulvinaria psidii*) Soft Green Scale (*Coccus viridis*) Soft Scales (Coccidae)	ALL (excl. VIC)	1	-

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory Risk
Potassium Salts of Fatty Acid (Natrasoap)	-	Fruit	Aphids Thrips Mealybug Two-Spotted Mite Spider Mite Whitefly	ALL	NR	-
Pyrethrins (Pyganic)	3A	Lychee	Clean up spray to control insects just prior to harvest such as: Fruit Fly Rutherglen Bug Spiders	ALL	1	-
Pyriproxyfen (Distance Ant Bait) Sumitomo	7C	Tropical Fruit	Invasive & Nuisance Ants	ALL	NR	-
Spinetoram (Success Neo) Corteva	5	Tropical & Sub-Tropical Fruit (inedible peel)	Flower-Eating Caterpillars Leafrollers Loopers Yellow Peach Moth Red-Banded Thrips Sorghum Head Caterpillar	ALL	NR NG	-
Spinosad (Entrust Organic) Corteva	5	Tropical & Sub-Tropical Fruit (inedible peel)	Flower-Eating Caterpillars Leafrollers Loopers Yellow Peach Moth Red-Banded Thrips Sorghum Head Caterpillar	ALL	NR G:14	-
Spinosad (Entrust Organic) Corteva PER89870	5	Tropical & Sub-Tropical Fruit (inedible peel) / Excluding avocado, mango & banana	Fall Armyworm (*Spodoptera frugiperda*)	ALL (excl. VIC)	NR G:14	-

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory Risk
Spinosad (Naturalure) Corteva	5	Tree, Fruit, Nut, Vine & Vegetable Crops / Fruit Fly Bait	Queensland Fruit Fly (*Bactrocera tryoni*) Mediterranean Fruit Fly (*Ceratitis capitata*)	ALL	NR	-
Sulfoxaflor (Transform) Corteva	4C	Assorted Tropical & Sub-Tropical Fruit (inedible peel)	Banana Spotting Bug Fruit Spotting Bug	ALL	3	-
		Lychee	Suppression of: Citrus Snow (White Louse) Scale Soft Green Scale Mealybugs (*Planococcus* spp.)			
Sulfur PER91169	M2	Lychee	Erinose Mite (*Aceria litchii*) White Louse Scale (*Unaspis citri*)	ALL (excl. VIC)	NR	-
Tebufenozide (Mimic)	18	Lychee	Macadamia Nut Borer	ALL	14	-
Tetraniliprole (Vayego 200SC) Bayer PER92133	28	Lychee	Mango Shoot Looper (*Perixera illepidaria*)	NSW, NT & QLD	3 NG	-
Trichlorfon PER14743	1B	Lychee	Flatid Planthopper Flower-Eating Caterpillar Loopers Yellow Peach Moth (*Conogethes punctiferalis*) Suppression of: Fruit-Spotting Bug (*Amblypelta nitida*) Banana-Spotting Bug (*Amblypelta lutescens* ssp. *lutescens*) Green Vegetable Bug (*Nezara viridula*) Lychee Stink Bug (*Lyramorpha rosea*)	ALL (excl. VIC)	7	R2

Active Ingredient (Trade Name)	Chemical group	Situation	Pests / Comments	States	WHP Days	Regulatory Risk
Trichlorfon PER12450	1B	Lychee	Queensland Fruit Fly (*Bactrocera tryoni*) Mediterranean Fruit Fly (*Ceratitis capitata*)	ACT, NSW, NT, QLD, SA & WA	7 G:7	R2

Appendix 3. Products available for weed control in lychees

Active ingredient (Trade Name)	Chemical Group	Situation	Comment / Use / Weed	WHP (days)	States	Regulatory Risk
Carfentrazone (Hammer)	14**	Tropical & Sub-Tropical Fruit	Australian Crassula / Stonecrop (*Crassula* sp.), Bifora (*Bifora testiculata*), Capeweed (*Arctotheca calendula*), Chickweed (*Stellaria media*), Common Storksbill (*Erodium cicutarium*), Spiny Emex (*Emex australis*), Marshmallow (*Malva parviflora*), Paterson's Curse (*Echium plantagineum*), Sub Clover (*Trifolium subterraneum*), Wild Radish (*Raphanus raphanistrum*)	NR G:14	ALL	-
Carfentrazone + Glufosinate (Hellcat) AgNova	14**+10**	Litchi	Grass & Broadleaf Weeds	NR G:8	ALL	R3
Carfentrazone + Glyphosate (Broadway) FMC	14**+9**	Tropical & Sub-Tropical Fruits	Australian Crassula / Stonecrop (*Crassula* spp.), Capeweed (*Arctotheca calendula*), Chickweed (*Stellaria media*), Common Storksbill (*Erodium cicutarium*), Spiny Emex (*Emex australis*), Marshmallow (*Malva parviflora*), Paterson's Curse (*Echium plantagineum*), Sub Clover (*Trifolium subterraneum*), Wild Radish (*Raphanus raphanistrum*)	NR G:14	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Situation	Comment / Use / Weed	WHP (days)	States	Regulatory Risk
Clethodim	1***	Fruit Trees / Non-Bearing	Annual Ryegrass (Lolium rigidum), Annual Phalaris (Phalaris minor), Barley Grass (Hordeum leporinum), Barnyard Grass (Echinochloa spp.), Blown Grass (Agrostis aveacea), Brome Grass (Bromus diandrus), Crowsfoot Grass (Eleusine indica), Feathertop Rhodes Grass (Chloris virgata), Liverseed Grass (Urochloa panicoides), Paradoxa Grass (Phalaris paradoxa), Red Sprangletop Grass (Leptochloa filiformis), Seedling Johnson Grass (Sorghum halepense), Silver Grass (Vulpia bromoides) – suppression only (not QLD, WA), Summer Grass (Digitaria spp.), Volunteer Sorghum (Sorghum spp.), Volunteer Wheat (Triticum aestivum), Volunteer Oats (Avena sativa), Volunteer Barley (Hordeum vulgare), Winter Grass (Poa annua)	NR	ALL	-
Fluazifop-P (Fusilade)	1***	Lychee	Barnyard Grass, Crowsfoot Grass, Giant Paspalum (seedling), Green Panic (seedling), Johnson Grass, Para Grass, Prairie Grass, Rhodes Grass, Stinkgrass, Summer Grass (Crabgrass)	14	NSW, QLD, NT & WA	-
Glufosinate	10**	Tropical & Sub-Tropical Fruits – Inedible Peel	Grass and Broadleaf Weeds	NR G:8	ALL	R3
Glyphosate	9**	Tropical & Sub-Tropical Fruits	Grass and Broadleaf Weeds	NR	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Situation	Comment / Use / Weed	WHP (days)	States	Regulatory Risk
Haloxyfop (Verdict)	1***	Litchi	Couch Grass, Rhodes Grass, Slender Rats Tail Grass, Buffel Grass, Green Panic, Johnson Grass, Kikuyu, *Paspalum* spp., *Setaria* spp., Annual Ryegrass, Barley Grass, Barnyard Grass, Brome Grass, Crowsfoot Grass, Lesser Canary Grass, Liverseed Grass, Mossman River Grass, Paradoxa Grass, Summer Grass, Volunteer Cereals, Wild Oats	NR	ALL	-
Isoxaben (Gallery)	29**	Tree Fruits / Non-Bearing	Broadleaf Weeds	NR	ALL	-
Oryzalin	3**	Litchi / Non-Bearing	Barnyard Grass, Guinea Grass, Love Grass, Paradoxa Grass, Pigeon Grass, Spiny Burr (Gentle Annie, Innocent Weed), Summer Grass, Crab Grass, Deadnettle, Fat Hen, Fumitory, Portulaca (Pigweed), Sowthistle, Wireweed (Hogweed), Brassica species, Blackberry Nightshade, Caltrop, Paddymelon, Silverleaf Nightshade	NR	ALL	
Oxyfluorfen (Goal)	14**	Lychee / directed spray	Grass & Broadleaf Weeds	NR NG	ALL	-
Paraquat (Gramoxone)	22**	Orchards / directed spray or spot spray	Annual Grass & Broadleaf Weeds	NR G:1	ALL	R1
Paraquat + Amitrole (Guerilla) Imtrade	22** + 34**	Orchards / Directed Spray	Annual grass and broadleaf weeds Flaxleaf Fleabane	NR G:1	ALL	R1
Paraquat + Diquat (SpraySeed)	22**	Orchards / directed spray or spot spray	Grass and Broadleaf Weeds	NR G:1	ALL	R1

Active ingredient (Trade Name)	Chemical Group	Situation	Comment / Use / Weed	WHP (days)	States	Regulatory Risk
Pendimethalin (Stomp)	3**	Lychees	Dwarf Amaranth, Green Amaranth, Annual Ryegrass, Asthma Plant (*Euphorbia hirta*), Barnyard Grass, Chickweed (*Stellaria media*), Crowsfoot Grass, Deadnettle (*Lamium amplexicaule*), Fat Hen (*Chenopodium album*), Pigeon Grass, Pigweed (*Portulaca oleracea*), Prickly Lettuce (*Lactuca serriola*), Sowthistle, Summer Grass, Winter Grass, Wireweed	NR	ALL	-

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

Appendix 4. Plant Growth Regulators available in lychees

Active ingredient (Trade Name)	Chemical Group	Situation	Comment / Use	WHP (days)	States	Regulatory risk
Ethephon PER95768	PGR	Lychee	To manage seasonal vegetative flushes to better synchronise flowering and fruit set (when conditions require such management)	NR	QLD & NSW	-
Triclopyr (Tops)	PGR	Lychee	To reduce fruit drop	NR	ALL	-

Appendix 5. Current permits for use in lychees

Permit ID	Description	Date Issued	Expiry Date	Permit holder
PER88401	Buprofezin (Applaud) / Lychee / Mealybug, Flatid Plant Hoppers and Scale Insects Note that this permit has expired at time of publication, pending consideration of renewal by APVMA	23-Jan-20	31-Jan-25	Hort Innovation
PER13859 Version 3	Dimethoate / Orchard Cleanup Fruit Fly Host Crops / Fruit Fly	09-Feb-15	30-Jun-25	Hort Innovation
PER89870 Version 2	Spinosad (Entrust Organic) / Tropical & Sub-Tropical Fruit / Fall Armyworm	21-Jul-20	31-Jul-25	Hort Innovation
PER80374 Version 3	Beta-Cyfluthrin (Bulldock) / Lychee / Various insect pests	01-Oct-15	31-Aug-25	Hort Innovation
PER92133	Tetraniliprole (Vayego) / Lychee / Mango Shoot Looper	10-Aug-22	31-Aug-25	Hort Innovation
PER92548	Deltamethrin (MagMed) / Tropical Fruit / Mediterranean Fruit Fly	07-Sep-22	30-Sep-25	Sustainable Ventures
PER80367 Version 2	Pyraclostrobin (Cabrio) / Lychee / Anthracnose or Pepper Spot	12-May-15	31-Oct-25	Hort Innovation
PER80369	Prochloraz (Octave WP) / Lychee / Anthracnose or Pepper Spot	17-Mar-15	31-Oct-25	Australian Lychee Growers Assn
PER89943 Version 2	Acetamiprid + Pyriproxyfen (Trivor) / Lychee / Various Insect Pests	29-Jan-21	30-Nov-25	Hort Innovation
PER12450 Version 7	Trichlorfon / Lychee / Fruit Fly	06-Oct-11	30-Nov-25	Hort Innovation
PER93053	Zinc Phosphide (RatOff) / Tropical & Sub-Tropical Fruits / Rats & Mice	06-Dec-23	30-Nov-25	Animal Control Technologies
PER91798 Version 2	Methoxyfenozide (Prodigy) / Lychee / Mango Shoot Looper	18-Nov-21	31-Dec-25	Hort Innovation
PER91169	Sulfur / Lychee / Lychee Erinose Mite & White Louse Scale	30-Aug-21	31-Aug-26	Hort Innovation
PER91168	Petroleum Oil / Lychee / Green Shield Scale, Soft Green & Soft Scales	24-Aug-21	31-Aug-26	Hort Innovation
PER13660 Version 3	Copper / Lychees / Lychee Pepper Spot	14-Aug-12	30-Apr-27	Hort Innovation
PER13659 Version 4	Mancozeb / Lychees / Pepper Spot	01-Oct-12	31-Sep-27	Hort Innovation
PER82879 Version 3	Cyprodinil + Fludioxonil (Switch) / Lychee / Pepper Spot	03-Nov-16	30-Jun-29	Hort Innovation
PER94006	Copper / Tropical Fruits / Diplodia & Pink Disease	07-Aug-24	31-Aug-29	NT Farmers Association
PER95768	Ethephon / Lychee / Manage unwanted autumn vegetative flush	12-Jan-25	31-Jan-30	Hort Innovation
PER14743 Version 4	Trichlorfon / Lychee / Various insect pests	01-Jun-14	28-Feb-30	Hort Innovation

Appendix 6. Lychee Maximum Residue Limits (MRLs)

CODEX commodity groupings of lychee and subgroups:

	Fruit
FI 0030	Assorted Tropical & Sub-Tropical Fruits – Inedible Peel
FI 2021	Assorted Tropical & Sub-Tropical, Inedible Peel, Small
FI 0343	Litchi

Note: Lychee production predominantly goes to the domestic market but the industry is focused on growing export volumes to accommodate production increases that are expected in the next ten years. The US market is the largest export destination and ongoing access is critical for expansion of export volumes. Available information indicates that in the absence of specific limits in legislation, that some 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	USA MRL mg/kg
Abamectin	FI 2021	Assorted Tropical & Sub-Tropical, Inedible Peel, Small	-	-	0.01
	FI 0343	Litchi	0.05	-	-
Acequinocyl	FI 2021	Assorted Tropical & Sub-Tropical, Inedible Peel, Small	-	-	2
Acetamiprid	FI 0030	Tropical & Subtropical fruit – Inedible Peel	0.2	-	-
Aldrin & Dieldrin		Fruits	E0.05	-	
Azoxystrobin	FI 0343	Litchi	-	-	2
Bifenazate	FI 0343	Litchi	-	-	5
Buprofezin	FI 0343	Litchi	T0.5	-	-
	FI 2021	Assorted Tropical & Sub-Tropical, Inedible Peel, Small	-	-	0.3
Carbaryl	FI 0343	Litchi	*0.01	-	-
Carfentrazone-ethyl	FI 0030	Tropical & Subtropical fruit – Inedible Peel	*0.05	-	-
	FI 0343	Litchi	-	-	0.1
Chlorantraniliprole	FI 0343	Litchi	-	-	2
Chlorothalonil	FI 0343	Litchi	-	-	15
Cyfluthrin	FI 0343	Litchi	T0.3	-	-
Cymoxanil	FI 0343	Litchi	-	-	1
Cypermethrin	FI 0343	Litchi	-	2	-
Cyprodinil	FI 0343	Litchi	T2	-	-
	FI 2021	Assorted Tropical & Sub-Tropical, Inedible Peel, Small	-	-	2
DDT		Fruits	E1	-	-
Deltamethrin	FI 0343	Litchi	-	-	0.2
Diazinon		Fruit	0.5	-	-
Dicofol		Fruit {except strawberry}	5	-	
Didecyl Dimethyl Ammonium Chloride	FI 0030	Tropical & Subtropical fruit – Inedible Peel	20	-	-
Dimethoate	FI 0343	Litchi	5	-	-

Chemical	Codex Code	Description	APVMA MRL mg/kg	Codex MRL mg/kg	USA MRL mg/kg
Diquat		Fruit	*0.05	-	-
Dithianon		Fruits {except blueberries}	2	-	-
Dithiocarbamates	FI 0343	Litchi	5	-	-
Endosulfan	FI 0343	Litchi	-	2	-
Ethephon	FI 0343	Litchi	T*0.05	-	-
Fenbutatin oxide	FI 0030	Tropical & Subtropical fruit – Inedible Peel	5	-	-
Fenpropathrin	FI 0343	Litchi	-	-	7
Fipronil	FI 0030	Tropical & Subtropical fruit – Inedible Peel {except Banana; Custard apple}	T*0.01	-	-
Fluazifop-p-butyl	FI 0030	Tropical & Subtropical fruit – Inedible Peel {except Avocado, Banana}	0.05	-	-
Fludioxonil	FI 0343	Litchi	T2	-	20
Fluopyram	FI 0030	Tropical & Subtropical fruit – Inedible Peel {except Banana, Pineapple}	2	-	-
Flupyradifurone	FI 0030	Tropical & Subtropical fruit – Inedible Peel {except Banana; Mango; Papaya; Pineapple }	1.5	-	-
Glufosinate-ammonium	FI 0030	Tropical & Subtropical fruit – Inedible Peel	0.2	-	-
	FI 0030	Tropical & Subtropical fruit – Inedible Peel {except banana, kiwifruit}	-	0.1	-
	FI 2021	Assorted Tropical & Sub-Tropical, Inedible Peel, Small	-	-	0.1
Glyphosate	FI 0343	Litchi	0.2	-	0.2
Haloxyfop	FI 0030	Tropical & Subtropical fruit – Inedible Peel	*0.05	-	-
Imidacloprid	FI 0343	Litchi	-	-	3
Indaziflam	FI 0030	Tropical & Subtropical fruit – Inedible Peel	-	-	0.01
Isocycloseram	FI 2021	Assorted Tropical & Sub-Tropical, Inedible Peel, Small	0.2	-	-
Isoxaben	FI 0030	Tropical & Subtropical fruit – Inedible Peel	*0.01	-	-
Lindane		Fruit {except Apple, Cherries, Cranberry, Grapes, Peach, Pineapple, Plums, Strawberry}	E0.5	-	-
Maldison		Fruits {except Berries and other small fruits; Citrus fruits; Dried fruits; Stone fruits}	2	-	-
Metaldehyde		Fruit	1	-	-
Methiocarb		Fruit {except citrus fruits, grapes}	T0.1	-	-
Methoxyfenozide	FI 0343	Litchi	2	-	-
	FI 2021	Assorted Tropical & Sub-Tropical, Inedible Peel, Small	-	-	2

Chemical	Codex Code	Description	APVMA MRL mg/kg	Codex MRL mg/kg	USA MRL mg/kg
Methyl bromide	FI 0343	Litchi	*0.05	-	-
	FI 0030	Tropical & Subtropical fruit – Inedible Peel	-	-	5
Novaluron	FI 2021	Assorted Tropical & Sub-Tropical, Inedible Peel, Small	-	-	9
Omethoate	FI 0343	Litchi	2	-	-
Oryzalin		Fruit	0.1	-	-
Oxyfluorfen	FI 0030	Tropical & Subtropical fruit – Inedible Peel	*0.01	-	-
Paclobutrazol	FI 0030	Tropical & Subtropical fruit – Inedible Peel {except Avocado, Mango}	*0.01	-	-
Paraquat		Fruits {except olives}	*0.05	-	-
	FI 0030	Tropical & Subtropical fruit – Inedible Peel	-	*0.01	-
	FI 0343	Litchi	-	-	0.05
Pendimethalin	FI 0030	Tropical & Subtropical fruit – Inedible Peel	*0.05	-	-
Phosphine	FI 0030	Tropical & Subtropical fruit – Inedible Peel	T*0.01	-	-
Piperonyl butoxide		Fruit	8	-	-
Pirimicarb		Fruit {except blackberries}	0.5	-	-
Prochloraz	FI 0343	Litchi	T1	-	-
	FI 0030	Tropical & Subtropical fruit – Inedible Peel	-	Po7	-
Pyraclostrobin	FI 0343	Litchi	T2	-	-
Pyrethrins		Fruit	1	-	-
Pyriproxyfen	FI 0030	Tropical & Subtropical fruit – Inedible Peel	0.3	-	-
	FI 0343	Litchi	-	-	0.3
Simazine		Fruit	*0.1	-	-
Spinetoram	FI 0030	Tropical & Subtropical fruit – Inedible Peel	0.3	-	-
	FI 0343	Litchi	-	0.01	0.3
Spinosad	FI 0030	Tropical & Subtropical fruit – Inedible Peel	0.3	-	-
			-	-	0.3
Spirotetramat	FI 0343	Litchi	-	15	13
Sulfoxaflor	FI 0030	Tropical & Subtropical fruit – Inedible Peel {except banana and pineapple}	0.5	-	-
Tebuconazole	FI 2021	Assorted Tropical & Sub-Tropical, Inedible Peel, Small	-	-	1.6
Tebufenozide	FI 0343	Litchi	2	-	-
Tetraniliprole	FI 0343	Litchi	T0.5	-	-
Trichlorfon	FI 0030	Tropical & Subtropical fruit – Inedible Peel	T3	-	-
Triclopyr	FI 0343	Litchi	0.1	-	-

Chemical	Codex Code	Description	APVMA MRL mg/kg	Codex MRL mg/kg	USA MRL mg/kg
Trifloxystrobin	FI 0030	Tropical & Subtropical fruit – Inedible Peel {except Banana; Pineapple}	2	-	-
Trifluralin		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: Available information indicates that in the absence of specific limits in legislation, some 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.

* 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 2023. Compilation 7. Prepared 6 December 2024.
CODEX MRLs: CODEX Alimentarius International Food Standards database (August 2024), http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/

Appendix 7. Lychee regulatory risk assessment

Litchi/Lychee
Agrichemical Regulatory
Risk Assessment

March 2024

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 almonds as well as current initiatives aimed at addressing identified pest management deficiencies.

Lychee Agrichemical Regulatory Risk Assessment

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

Active Constituents	Chemical Group	Problem	Comment
INSECT AND OTHER PESTS			
Abamectin	**6**	Litchi erinose mite	EU: Restricted use to permanent greenhouses
		Two-spotted spider mite	
Acetamiprid + pyriproxyfen	**4A + 7C**	Fruit flies–Suppression(PER89943)	Acetamiprid APVMA: Under review EU: Under review
		Fruit-spotting bug (PER89943)	
		Mealybugs (PER89943)	
		Plant hoppers (PER89943)	
Beta-cyfluthrin	**3A**	Banana-spotting bug (PER80374)	EU/UK: No authorisation in place
		Elephant/Rhinoceros beetle(PER80374)	
		Fig longicorn/ trunk borer (PER80374)	
		Fruit-spotting bug (PER80374)	
		Lychee stink bug (PER80374)	
		Macadamia nut borer(PER80374)	
		Mango shoot caterpillar(PER80374)	
		Red shouldered leaf beetle (PER80374)	
		Swarming leaf beetles(PER80374)	
		Yellow peach moth(PER80374)	
Buprofezin	**16**	Flatid planthoppers (PER88401)	EU: MRLs set to limit of quantification
		Mealybugs(PER88401)	
		Scale insects(PER88401)	
Carbaryl	**1A**	Macadamia nut borer	Canada: Reviewed, large number of uses deleted Codex: Review scheduled, support uncertain EU/UK: No authorisation USA: Under review
		Red shouldered leaf beetle	
		Swarming leaf beetles	
		Yellow peach moth	

Lychee Agrichemical Regulatory Risk Assessment

Active Constituents	Chemical Group	Problem	Comment
Dimethoate	**1B**	Litchi erinose mite	Codex: No MRL. EU/UK: Not authorised
		Fruit fly orchard clean-up following harvest (PER13859)	
Fatty acids: K salt	**UN**	Aphids	
Flupyradifurone	**4D**	Banana spotting bug/Fruit spotting bugs	EU: Under review
		Green plant hopper	
		Mango plant hopper	
Malathion	**1B**	Fruit flies (bait spray)	APVMA: Under review Codex: Re-evaluation scheduled for 2025/26 EU: Restricted use to permanent greenhouses
Methoxyfenozide	**18**	Macadamia nut borer	EU: Proposed restricted authorisation & Candidate for substitution
		Mango shoot looper (PER91798)	
Paraffinic oil/ petroleum oil	**UNM**	Citrus mealybug	
		Green shield scale (PER91168)	
		Scale insects	
		Soft scales (PER91168)	
Pyrethrins	**3A**	Fruit flies	Canada: Under review
Pyriproxyfen	**7C**	Ants	
Spinetoram	**5**	Flower eating caterpillars	EU: Approval expiry September 2024
		Leafroller caterpillars	
		Loopers	
		Redbanded thrips	
		Sorghum head caterpillar	
		Yellow peach moth	

Lychee Agrichemical Regulatory Risk Assessment

Active Constituents	Chemical Group	Problem	Comment
Spinosad	**5**	Flower eating caterpillars	
		Leafroller caterpillars	
		Loopers	
		Redbanded thrips	
		Sorghum head caterpillar	
		Yellow peach moth	
		Fall armyworm (PER89870)	
Sulfoxaflor	**4C**	Banana-spotting bug	USA: Pollinator concerns EU: Restricted to permanent glasshouses only
		Fruit-spotting bug	
		Mealybug	
		White louse scale	
Tebufenozide	**18**	Macadamia nut borer	
Tetraniliprole	**28**	Mango shoot looper (PER92133)	EU/UK: No authorisation
Trichlorfon	**1B**	Fruit flies (PER12450)	APVMA: nominated for review Codex: No MRLs EU/UK: No authorisations USA: No MRLs
		Fruit flies (Bait spray)	
		Banana-spotting bug (PER14743)	
		Flower eating caterpillars (PER14743)	
		Fruit-spotting bug (PER14743)	
		Loopers (PER14743)	
		Yellow peach moth (PER14743)	

Lychee Agrichemical Regulatory Risk Assessment

Active Constituents	Chemical Group	Problem	Comment
DISEASES			
Copper	**M1**	Algal spot	EU: Candidates for substitution
		Anthracnose/Pepper spot (PER13660)	
		Phytophthora	
		Trunk (stem) canker	
DDAC		Sanitizer	EU/UK: No authorisation
Cyprodinil + fludioxonil	**9 + 12**	Anthracnose/Pepper spot (PER88197)	Cyprodinil Canada: Under review EU: Candidate for substitution Fludioxonil EU: Under review, & candidate for substitution
Fluopyram + trifloxystrobin	**7 + 11**	Anthracnose/Pepper spot	Trifloxystrobin Canada: Under review
Mancozeb	**M3**	Anthracnose/Pepper spot (PER13659)	APVMA: nominated for review Canada: Many uses cancelled Codex: To be reviewed EU/UK: No authorisation
Prochloraz	**3**	Anthracnose/Pepper spot (PER80369)	Codex: Periodic re-evaluation scheduled EU: No authorisation
Pyraclostrobin	**11**	Anthracnose/Pepper spot (PER80367)	Canada: Under review

Active Constituents	Chemical Group	Comment
WEEDS		
Carfentrazone-ethyl	**14**	
Clethodim (non-bearing)	**1**	Codex: MRLs proposed for deletion
Diquat	**22**	APVMA: Currently under review EU/UK: No authorisation in place
Fluazifop	**1**	
Glufosinate	**10**	Canada: Review proposed EU/UK: No authorisation in place
Glyphosate	**9**	Ongoing issues internationally
Haloxyfop-P	**1**	EU: No authorisation in place
Isoxaben (non-bearing)	**29**	
Oxyfluorfen	**14**	EU: Candidate for substitution USA: Interim decision Label amendments proposed
Paraquat	**22**	APVMA: Currently under review Canada: Review initiated EU/UK: No authorisation in place Rotterdam Convention - nomination
Pendimethalin	**3**	EU: Candidate for substitution
PLANT GROWTH REGULATORS		
Triclopyr (Drop prevention)		

Funding statement: MT20007–Regulatory Support & Response Co-ordination. This *multi-industry* project has been funded by Hort Innovation, using *industry research and development levies* and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

Lychee Agrichemical Regulatory Risk Assessment

Communications Manager
Hort Innovation
Level 7, 141 Walker Street
North Sydney NSW 2060
Australia
Email: communications@horticulture.com.au
Phone: 02 8295 2300