



Lychee

Strategic Agrichemical Review Process
(SARP)

October 2020

Hort Innovation
Project – MT19008

Hort Innovation Project Number:

MT19008 – Strategic Agrichemical Review Process (SARP) - Updates

SARP Service Provider:

AGK Services

Purpose of the report:

This report was funded by Hort Innovation to investigate the pest problem, agrichemical usage and pest management alternatives for the 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:

October 2020

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**Hort
Innovation**
Strategic levy investment

**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

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1. Summary

The Strategic Agrichemical Review Process (SARP) - Updates (MT19008) project is a strategic levy investment of the Hort Innovation Lychee Fund. A Strategic Agrichemical Review Process (SARP), through the process of a desktop audit and industry liaison;

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

Alternative pesticides should ideally be selected for benefits of:

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

The results of this process will provide the 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 of lychee are:

Common name	Scientific name
Pepper Spot (Anthracnose)	<i>Colletotrichum gloeosporioides</i>

1.2 Insects and mites

The high priority insect and mite pests of lychee are:

Common name	Scientific name
Fruit Spotting Bug	<i>Amblypelta nitida</i>
Banana Spotting Bug	<i>Amblypelta lutescens</i>
Macadamia Nutborer	<i>Cryptophlebia ombrodelta</i>
Loopers	<i>Geometridae</i>
Flatid Planthoppers	<i>Flatidae</i>
Flower-Eating Caterpillars	<i>Homoeosoma vagella</i> & <i>Xanthodes congenita</i>
White Louse Scale	<i>Unaspis citri</i>
Soft Green Scale	<i>Coccus viridis</i>
Green Shield Scale	<i>Chloropulvinaria psidii</i>

1.3 Weeds

The high priority weeds of lychee are:

Common Name	Scientific Name
Flaxleaf Fleabane	<i>Conyza bonariensis</i>

1.4 Plant Growth Regulators

There are no high priority Plant Growth Regulator issues for lychee, but the following was rated as a moderate priority:

Issue
Restriction of Vegetative Growth

2. The Australian Lychee Industry

The lychee industry is one of Australia’s leading sunrise industries. There are over 250 lychee growers whose farms extend down the east coast of Australia for almost 2500 kilometres from Cooktown in Far North Queensland to Coffs Harbour in New South Wales.

Production occurs over an extended summer harvest season, starting in mid-October in Far North Queensland and ending in late March in Northern New South Wales.

For the year ending June 2019, Australia produced 2,733 tonnes of fresh lychee, of which 484 tonnes (18%) was exported. The total value of production was \$34.4 million while the wholesale value of the fresh supply was \$33 million.

The major export market for lychee is Hong Kong, with lesser volumes going to United Arab Emirates, New Zealand, Singapore, Canada and United States.

Fresh Lychee Seasonality by State¹

State	18/19 Tonnes	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
New South Wales	27												
Queensland	2,706												
Availability Legend			High		Medium		Low						None

Being a labour-intensive industry, it currently provides thousands of full time and casual jobs, which greatly benefit regional and rural communities. This income and employment are critical to these communities due to the current long-term decline of many rural and regional industries.

The Australian lychee industry is currently based on supplying fresh fruit. Some sectors of the industry are exploring processing as a means of value adding.

Lychee are a significant new crop from Mossman to Ingham, the Proserpine-Mackay districts and in the Childers-Bundaberg districts. Significant plantings are also occurring in central Queensland including areas west of Rockhampton. Similar increases in plantings are occurring on the Atherton Tablelands as farmers venture into new crops.

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

3. Introduction

3.1 Background

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

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

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

In combination with cultural practices, pesticides are important tools in 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 undertook a review of the pesticide requirements via a Strategic Agrichemical Review Process (SARP) in 2014. The current project is to update the SARP with the latest information and progress.

The SARP process identifies diseases, insect pests and weeds of major concern to the 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. A biosecurity plan has 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 the link below.

<https://www.planthealthaustralia.com.au/industries/lychees/>

3.2 Minor use permits and registration

From a pesticide access perspective, the APVMA classifies lychee as a minor crop. The crop fits within the APVMA crop group Crop Group 006: Assorted tropical and sub-tropical fruits – inedible peel, within the Subgroup 006A, Assorted tropical and sub-tropical, Inedible Peel, Small. Therefore, access to minor use permits can be relatively straight forward as long as a reasonable justification is provided in accordance to the APVMA’s minor use guidance (<https://apvma.gov.au/node/10931>).

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 update of the Lychee Strategic Agrichemical Review Process (SARP), which was last updated in 2014, was conducted by desktop audit and included an online industry survey. The process included gathering, collating and confirming information. The steps in the process were:

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

3.4 Results and discussions

3.4.1 Detail

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

3.4.2 Appendices

Refer to additional information in the appendices:

- Appendix 1. Products available for disease control in lychee
- Appendix 2. Products available for control of insects and mites 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 Agrichemical 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.

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

Information on regulatory risk derived from project MT17019 (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.

4.1 Diseases of lychee

4.1.1 Disease priorities

Common name	Scientific name
High	
Pepper Spot (Anthracnose)	<i>Colletotrichum gloeosporioides</i>
Moderate	
Pepper Spot - Post-harvest	<i>Colletotrichum gloeosporioides</i>
Low	
Trunk (Stem) Canker	<i>Phytophthora</i> spp.
Phytophthora Root Rot / Stem Rot	<i>Phytophthora</i> spp.
Lychee Dieback / Tree Decline	Isolated organisms include: <i>Phytophthora</i> spp., <i>Phytophthora</i> spp. and <i>Fusarium</i> spp.
Algal spot	<i>Cephaleuros virescens</i>

Pepper Spot (Anthracnose) is the only high priority disease of lychee. There are no diseases of moderate priority. This has not changed since the last SARP report in 2014. Management of Pepper Spot requires the use of cultural controls in conjunction with a protectant fungicide program from flowering to fruit set.

In controlling fungal and bacterial diseases, the industry should be mindful of resistance management. CropLife Australia has a resistance management strategy and users must refer to it before using any product².

² www.croplife.org.au/resources/programs/resistance-management/fungicide-resistance-management-strategies1/fungicide-resistance-management-strategies1-draft/

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

4.1.2 Available and potential products for priority diseases

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

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

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Pepper Spot (Anthracnose) (<i>Colletotrichum gloeosporioides</i>)							
Priority: High							
Anthracnose is rated as a high priority in all regions except Central QLD and NSW, where it is rated as a moderate priority. It is favoured by warm, moist weather. 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. Commonly observed on mature fruit of the variety Kwai Mai Pink (B3 or Bosworth 3)							
Copper (Cu) as copper ammonium complex	M1	Protectant	1	A	ALL	Registered in lychee for control of Parasitic Algae, Pepper Spot and Phytophthora Stem Canker. Apply as a protectant spray from end of flowering through to harvest. Spray every 14 days in extended wet weather. Take care not to overuse copper as excessive soil build-up can affect plant health.	-
Cupric hydroxide or cuprous oxide PER13660	M1	Protectant	1	A	ALL (excl. VIC)	Permitted in lychee for control of Pepper Spot . The use of cuprous oxide in the later stages of fruit development is recommended to avoid staining of fruit. Where possible avoid the use of copper products from early to late anthesis (flower opening and early fruit set). It is recommended to alternate this use pattern with approved mancozeb sprays	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Cyprodinil + Fludioxonil (Switch) Syngenta PER88197	9+12	Protectant	14	A	ALL	Permitted in lychee for control of Lychee Pepper Spot / Anthracnose . Apply a maximum of four foliar applications per season. Make the first application during early flowering and repeat 7-14days later if conditions remain favourable for disease development. After two applications alternate with another fungicide with a different mode of action for two applications.	R3
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Curative / Protectant	3	A	ALL	Registered in lychee for control of Pepper Spot . Apply as a foliar spray when conditions favour disease development. Do not exceed 3 treatments per year.	-
Mancozeb PER13659	M3	Protectant	7	A	NSW, QLD	Permitted in lychee for control of Pepper Spot . Apply on a 3 to 4 week schedule throughout the flowering period. - Use shorter interval when weather conditions favour disease development. - Apply mixture using high volume spray equipment. Ensure thorough coverage of blossoms.	R2
Prochloraz PER80369	3	Protectant	28	A	NSW, QLD, NT & WA	Permitted in lychee for control of Anthracnose or Pepper Spot . Use as a preventative fungicide only. Apply only during flowering to early fruit set. DO NOT apply to developing fruit. Prochloraz is known to cause tainting of produce if applied to developing fruit.	R3
Pyraclostrobin (Cabrio) BASF PER80367	11	Protectant	3	A	NSW, QLD, NT & WA	Permitted in lychee for control of Anthracnose or Pepper Spot . DO NOT apply more than three (3) foliar applications per year as part of a complete disease control program. DO NOT make more than two (2) sequential applications with a retreatment interval of 10-14 days of Pyraclostrobin before alternating to other registered or permitted fungicides with a different mode of action. APPLY as required from early fruit development to harvest, but no later than 3 days before harvest.	-
<i>Aureobasidium pullulans</i> Strain DSM 14940 & DSM 14941 (Botector) Nufarm	-	Biological / Protectant	NR	P		Registered in berries for suppression of Anthracnose . No MRLs required for a biological product.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
<i>Bacillus amyloliquefaciens</i> Strain QST 713 (Serenade Opti) Bayer	44	Biological / Protectant	NR	P		Registered in avocados and mangos for control of Anthracnose . No MRLs required for a biological product.	-
Florypicoxamid (Adavelt) Corteva	21	Curative / Protectant		P		New Mode of Action fungicide being developed for AU, activity claimed on Anthracnose . Due for registration in 2023.	-
Fluopyram + Tebuconazole (Luna Experience) Bayer	7+3	Curative / Protectant		P		Hort Innovation project ST16006 generating data to register in Tropical & Subtropical Fruit (inedible peel) for control of Alternaria, Anthracnose and Septoria. Submission expected in November 2020 and registration in mid to late 2021. Fluopyram: AU MRL T2 mg/kg. No Codex MRL. Tebuconazole: No MRLs for AU or Codex.	-
Isofetamid (Kenja) ISK	7	Protectant		P		Not currently registered in AU but has activity on Colletotrichum spp. and has US registration for berries.	-
Pydiflumetofen + Fludioxonil (Miravis Prime) Syngenta	7+12	Curative / Protectant		P		Registration pending in Australia for control of Botrytis, Alternaria, Powdery Mildew & Anthracnose in berries. Registered in the US for control of Anthracnose in various crops.	R3
Pepper Spot – Post-Harvest (<i>Colletotrichum gloeosporioides</i>)							
Priority: Moderate							
Pepper Spot is rated as a moderate priority in all regions except South East QLD, where it is rated as a low priority. Control is not required for fruit sold to the domestic market. Exports require fruit to retain fruit quality for 30+ days.							
Bromo Chloro Dimethyl Hydantoin (BCDMH)		Sanitiser	NR	A	ALL	Registered in fruit & vegetables for control of bacteria and fungi by post-harvest surface sterilisation of fruit using spray or dip. Minimum contact 60 seconds.	-
Chlorine		Sanitiser	NR	A	ALL	Registered in fruit & vegetables for control of bacteria and fungi as a post-harvest spray. Minimum contact 30 seconds.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Fludioxonil (Scholar) Syngenta	12	Post-Harvest Treatment		P		Registered for control of Anthracnose in mango.	R3
Prochloraz (Sportak)	3	Post-Harvest Treatment		P		Registered for post-harvest control of Anthracnose in avocado, banana, mango and pawpaw. Exported fruit needs a tool to retain fruit quality for 30+ days. Codex MRL Po7 mg/kg.	R3
Thiabendazole (Tecto) Syngenta	1	Post-Harvest Treatment		P		Registered for post-harvest control of Anthracnose in banana.	-
Trunk (Stem) Canker (<i>Phytophthora</i> spp.)							
Priority: Low							
Trunk Canker is rated as a moderate priority in South East QLD and a low priority in all other regions. It 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 (Cu) as copper ammonium complex	M1	Protectant	1	A	ALL	Registered in lychee for control of Parasitic Algae, Pepper Spot and Phytophthora Stem Canker . Apply to trees wherever cankers appear, after removing dead tissue. Repeat applications up to a maximum of 5 per season until natural healing is commenced.	-
Copper (Cu) present as cupric hydroxide	M1	Protectant	1	A	QLD, NSW	Registered in lychee for control of Parasitic Algae and Phytophthora Stem Canker . Apply to trees wherever cankers appear, after removing dead tissue. Repeat applications up to a maximum of 5 per season until natural healing is commenced.	-
Copper (Cu) present as cuprous oxide	M1	Protectant	1	A	ALL	Registered in lychee for control of Phytophthora Stem Canker . Apply to trees wherever cankers appear, after removing dead tissue. Repeat applications up to a maximum of 5 per season until natural healing is commenced.	-
Copper (Cu) present as tribasic copper sulphate	M1	Protectant	1	A	ALL	Registered in lychee for control of Parasitic Algae and Phytophthora Stem Canker . Apply to trees wherever cankers appear, after removing dead tissue. Repeat applications up to a maximum of 5 per season until natural healing is commenced.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Mandipropamid (Revus) Syngenta	40	Curative / Protectant		P		US registrations for Phytophthora in various crops, including as a foliar application for protection of citrus from Phytophthora Root Rot .	-
Metalaxyl-M (Ridomil Gold 25G) Syngenta	4	Curative / Protectant		P		Registered for control of Phytophthora Trunk and Stem Canker in macadamia and peaches.	-
Oxathiapiprolin (Zorvec Enicade) Corteva	49	Curative / Protectant		P		Current AU registrations only for Downy Mildew but known to have broad activity in the oomycete group. Registered in the US for control of Phytophthora Canker and Brown Rot in citrus.	-
Phosphorous acid	33	Systemic		P		Phosphorous acid is registered for control of Phytophthora spp. in various crops. AU MRL T 100mg/kg.	-
Phytophthora Root Rot / Stem Rot (<i>Phytophthora</i> spp.)							
Priority: Low							
Phytophthora Root Rot is rated as a moderate priority in South East QLD and NSW, and a low priority in all other regions. It 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.							
<i>Bacillus amyloliquefaciens</i> Strain QST 713 (Serenade Prime) Bayer	44	Biological	NR	P-A	ALL	Registered in tree crops for application to soil to improve bioavailability of soil resources to horticultural crops. Provides suppression of soil-borne diseases such as Black Scurf in potatoes and Pineapple Disease in sugarcane.	-
Mandipropamid (Revus) Syngenta	40	Curative / Protectant		P		US registrations for Phytophthora in various crops, including as a foliar application for protection of citrus from Phytophthora Root Rot .	-
Metalaxyl-M (Ridomil Gold 25G) Syngenta	4	Curative / Protectant		P		Registered for control of Phytophthora Root Rot in avocados and macadamias.	-

Disease / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Regulatory risk
Oxathiapiprolin (Zorvec Enicade) Corteva	49	Curative / Protectant		P		Current AU registrations only for Downy Mildew but known to have broad activity in the oomycete group. US registration for control of Phytophthora Canker and Brown Rot in citrus.	-
Phosphorous acid	33	Systemic		P		Phosphorous acid is registered for control of Phytophthora spp. in various crops. AU MRL T 100mg/kg.	-
Lychee Dieback / Tree Decline (Isolated organisms include: <i>Phytophthora</i> spp., <i>Phytophythium</i> spp. and <i>Fusarium</i> spp.)							
Priority: Low							
Lychee Dieback is rated as a high priority in South East QLD and NSW, and a low priority in all other regions. Causes rapid tree death in young trees, and a slow decline in health in older trees. Slow decline symptoms in older trees have been predominantly observed on the variety Kwai Mai Pink in southern growing regions. Trees on poorly drained soils may be more prone to slow decline symptoms. Some success has been achieved by pruning when symptoms first appear and boosting nutrition with the addition of urea. No control options are available.							
No control measures available.							
Parasitic Algae (<i>Cephaleuros virescens</i>)							
Priority: Low							
Parasitic Algae is rated as a moderate priority in Far North QLD and a low priority in all other regions. Copper sprays are effective in managing the disease.							
Copper (Cu) as copper ammonium complex	M1	Protectant	1	A	ALL	Registered in lychee for control of Parasitic Algae , Pepper Spot and Phytophthora Stem Canker. Apply at affected trunk and limbs until runoff occurs. Apply monthly during the wet season.	-
Copper (Cu) as copper oxychloride	M1	Protectant	1	A	QLD, NT, WA, ACT & NSW	Registered in lychee for control of Parasitic Algae . Apply at affected trunk and limbs until runoff occurs. Apply monthly during the wet season.	-
Copper (Cu) present as cupric hydroxide	M1	Protectant	1	A	QLD, NSW	Registered in lychee for control of Parasitic Algae and Phytophthora Stem Canker. Apply at affected trunk and limbs until runoff occurs. Apply monthly during the wet season.	-
Copper (Cu) present as tribasic copper sulphate	M1	Protectant	1	A	ALL	Registered in lychee for control of Parasitic Algae and Phytophthora Stem Canker. Apply at affected trunk and limbs until runoff occurs. Apply monthly during the wet season.	-

4.2 Insect and mite pests of lychee

4.2.1 Insect and mite pest priorities

Common name	Scientific name
High	
Fruit Spotting Bug	<i>Amblypelta nitida</i>
Banana Spotting Bug	<i>Amblypelta lutescens</i>
Macadamia Nutborer	<i>Cryptophlebia ombrodelta</i>
Loopers	<i>Geometridae</i>
Flatid Planthoppers	<i>Flatidae</i>
Flower-Eating Caterpillars	<i>Homoeosoma vagella</i> & <i>Xanthodes congenita</i>
White Louse Scale	<i>Unaspis citri</i>
Soft Green Scale	<i>Coccus viridis</i>
Green Shield Scale	<i>Chloropulvinaria psidii</i>
Moderate	
Leafhoppers / Jassids	<i>Cicadellidae</i>
Leafroller Moth	<i>Tortricidae</i>
Mealybugs	<i>Planococcus</i> spp.
Two Spotted Mite	<i>Tetranychus urticae</i>
Pacific Spider Mite	<i>Tetranychus pacificus</i>
Erinose Mite	<i>Aceria litchii</i>
Green Vegetable Bug	<i>Nezara viridula</i>
Fruit Piercing Moth	<i>Eudocima</i> spp.
Swarming Leaf Beetle	<i>Rhyparida</i> spp.
Yellow Peach Moth	<i>Conogethes punctiferalis</i>
Red-Shouldered Leaf Beetle	<i>Monolepta australis</i>
Ants	<i>Formicidae</i>
Queensland Fruit Fly	<i>Bactrocera tryoni</i>
Elephant Beetle	<i>Xylotrupes gideon</i>
Longicorn Trunk Borer	<i>Acalolepta vastator</i>
Aphids	<i>Aphidae</i>

Common name	Scientific name
Low	
Wingless Grasshopper	<i>Phaulacridium vittatum</i>
Plague Thrips	<i>Thrips imaginis</i>
Redbanded Thrips	<i>Selenothrips rubrocinctus</i>
Western Flower Thrips	<i>Frankliniella occidentalis</i>
Silverleaf Whitefly	<i>Bemisia tabaci</i>

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

Common Name	Scientific name
Fall Armyworm	<i>Spodoptera frugiperda</i>

High priority insect and mite pests in lychee have been identified in the above table. Fruit Spotting Bug and Banana Spotting Bug have increased in priority to be the number one issue for lychee growers, having previously rated as moderate priority in the 2014 SARP. Other high priority pests are the same as those identified in the previous SARP.

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

Bees also play an important role as pollinators of lychee. Extra care should be taken with insect control measures used at flowering time, to avoid impacting on pollinators. Always refer to the pesticide label for guidance about preserving bees. Flowering sprays should be applied when bees after bees have stopped foraging in the crop, in the late afternoon and into the evening.

The diverse range of invertebrate pests in lychee necessitates careful planning with resistance management. Pest strategies are available on the CropLife website³.

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

4.2.2 Available and potential products for priority insects and mites

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

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

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Fruit Spotting Bug (<i>Amblypelta nitida</i>) Banana Spotting Bug (<i>Amblypelta lutescens</i>) Priority: High Fruit Spotting Bug is rated as a high priority in all regions. Banana Spotting Bug is rated as a high priority in Far North QLD and Central QLD, and a moderate priority in all other regions. Both species are found in all QLD and NSW growing areas. These are serious pests which sting the fruit at all stages from fruit set until picking. Damage caused affects the marketability of fruit. An insecticide program is required to protect the developing fruit.								
Beta-Cyfluthrin (Bulldock) Bayer PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in lychee for control of Fruit-Spotting Bug, Banana-Spotting Bug, Elephant or Rhino Beetle, Red-shouldered Leaf Beetle, Swarming Leaf Beetle, Longicorn Trunk Borer, Macadamia Nutborer, Mango Tip Borer, Flatid Planthopper, Green Vegetable Bug, Lychee Stink Bug and Yellow Peach Moth. DO NOT apply more than 4 applications per year with a minimum of 21 days between consecutive sprays. DO NOT use at flowering.	VH Bee H	-
Methidathion (Suprathion) PER14099	1B	Contact	21	A	NSW, Qld	Note: Suprathion Registration Cancelled by ADAMA and the use of Suprathion will not be permitted after 4-Feb-21. Control of Mealybug, Nutborer, Planthopper, Scale, Leafhoppers and Fruit Spotting Bug. DO NOT apply more than 2 applications per season with a minimum retreatment interval of 14 days between consecutive applications.	H Bee H	R1

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Sulfoxaflor (Transform) Corteva PER85397	4C	Ingestion	7	A	NSW, NT, QLD & WA	Permitted in lychee for control of Fruit Spotting Bug and Banana Spotting Bug . Apply when the pest is present and active in sufficient numbers to cause economic damage. Do not use more than 2 applications per year with a minimum of 14 days between consecutive treatments. Hort Innovation project ST17000 - Data generation project for a Sulfoxaflor label extension in Tropical & Sub-Tropical Fruits (inedible peel) will include various pests including; Fruit Spotting Bug, Banana Spotting Bug, Scale and Mealybug. Label extension submission expected November 2020.	M Bee VH	-
Trichlorfon PER14743	1B	Contact	7	A	ALL (excl. VIC)	Permitted in lychee for control of Flatid Planthopper, Flower Eating Caterpillar, Looper and Yellow Peach Moth and suppression of Fruit-Spotting Bug, Banana Spotting Bug , Green Vegetable Bug and Lychee Stink Bug. Apply only when monitoring of the crop indicates that the pest is present in sufficient numbers to cause economic damage. DO NOT apply more than 6 applications per crop with a minimum re-treatment interval of 7-10 days between consecutive applications.	H Bee H	R2
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Ingestion/IGR		P		Hort Innovation project ST16006 generating data to enable registration in Tropical and Sub-Tropical Fruits (inedible peel) for control of Spotting Bugs , Hoppers, Scale and Mealybug. Interim permit application submitted by Hort Innovation and is pending APVMA assessment by February 2021. Permit application requested various pests under permit, including: Fruit Spotting Bugs , Planthoppers, Leafhoppers, Mealybug and Scale.	M Bee H	R2
Flupyradifurone (Sivanto Prime) Bayer	4D	Ingestion		P		ST19020 data generation (AgVet Grant) for label registration to control Fruit Spotting Bugs in Tropical & Sub-Tropical Fruits (inedible peel). Registered for control of Fruit Spotting Bugs in macadamia.	L Bee L	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and Thrips.		-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.		-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Macadamia Nutborer (<i>Cryptophlebia ombrodelta</i>)								
Priority: High								
Macadamia Nutborer is rated as a high priority in all regions. Larvae bore into the fruit, which causes fruit to drop when it is green or causes spoilage and weeping onto other fruit when it occurs in mature fruit.								
Beta-cyfluthrin (Bulldock) Bayer PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in lychee for control of Fruit-spotting Bug, Banana-spotting Bug, Elephant or Rhino Beetle, Red-shouldered Leaf Beetle, Swarming Leaf Beetle, Longicorn Trunk Borer, Macadamia Nutborer , Mango Tip Borer, Flatid Planthopper, Green Vegetable Bug, Lychee Stink Bug and Yellow Peach Moth. DO NOT apply more than 4 applications per year with a minimum of 21 days between consecutive sprays. DO NOT use at flowering.	VH Bee H	-
Carbaryl	1A	Contact	NR	A	ALL	Registered in lychee for control of Castor Oil Looper, Leaf Eating Looper, Macadamia Nutborer , Redshouldered Leaf Beetle, Swarming Leaf Beetle, Yellow Peach Moth, Monolepta Beetles, Rhyparida Beetles, Leafroller Moths and Wingless Grasshopper. Apply at first sign of pest activity and repeat as necessary. Application during the period 7 days prior to flowering and 30 days post flowering may result in fruit thinning. Do not apply during this period.	H Bee H	R3
Methidathion (Suprathion) PER14099	1B	Contact	21	A	NSW, QLD	Note: Suprathion Registration Cancelled by ADAMA and the use of Suprathion will not be permitted after 4-Feb-21. Previously permitted in lychee for control of Mealybug, Nutborer , Planthopper, Scale, Leafhoppers and Fruit Spotting Bug. DO NOT apply more than 2 applications per season with a minimum retreatment interval of 14 days between consecutive applications.	H Bee H	R1
Methoxyfenozide (Prodigy) Corteva	18	Ingestion and Ovicidal	14	A	ALL	Registered in lychee for control of Macadamia Nutborer . Target eggs and early-instar larvae. DO NOT use more than 3 sprays per season.	VL Bee VL	-
Tebufenozide (Mimic) Corteva	16A	Ingestion	14	A	ALL	Registered in lychee for control of Macadamia Nutborer . Apply 2 sprays 6 and 12 weeks prior to harvest.	L Bee L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
DC-163 Bayer		Ingestion		P		Hort Innovation project ST17000 in progress to generate data in Tropical & Sub-Tropical Fruit (inedible peel) for control of lepidoptera and borers, including Macadamia Nut Borer and Longicorn Trunk Borer in lychee. Project completion expected in March 2022.	L-M Bee VH	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and Thrips.		-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.		-
<p>Castor Oil Looper (<i>Achaea janata</i>) Leafeating Looper (<i>Oxyodes scrobiculata</i>) Priority: High</p> <p>Loopers are rated as a high priority in all regions except NSW, where they are rated as a moderate priority. They are sporadic in incidence but can cause serious leaf damage to lychee. Severe outbreaks can cause complete defoliation of trees.</p>								
Carbaryl	1A	Contact	NR	A	ALL	Registered in lychee for control of Castor Oil Looper, Leaf Eating Looper, Macadamia Nutborer, Redshouldered Leaf Beetle, Swarming Leaf Beetle, Yellow Peach Moth, Monolepta Beetles, Rhyparida Beetles, Leafroller Moths and Wingless Grasshopper . Apply at first sign of pest activity and repeat as necessary. Application during the period 7 days prior to flowering and 30 days post flowering may result in fruit thinning. Do not apply during this period.	H Bee H	R3
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in fruit trees for control of Ants, Aphids, Cabbage Moth, Caterpillars , Earwigs, White Fly, Thrips and Leafhoppers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee H	-
Spinetoram (Success Neo) Corteva	5	Ingestion	NR	A	ALL	Registered in lychee for control of Flower-eating Caterpillars, Leafrollers, Loopers , Yellow Peach Moth, Red-banded Thrips and Sorghum Head Caterpillar. Target sprays against mature eggs and newly-hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur.	M Bee VH	-

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	A	ALL	Registered in lychee for control of Flower-Eating Caterpillars, Leafrollers, Loopers , Yellow Peach Moth, Red-banded Thrips and Sorghum Head Caterpillar. Target sprays against mature eggs and newly-hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur	L Bee H	-
Trichlorfon PER14743	1B	Contact	7	A	ALL (excl. VIC)	Permitted in lychee for control of Flatid Planthopper, Flower Eating Caterpillar, Looper and Yellow Peach Moth and suppression of Fruit-Spotting Bug, Banana Spotting Bug, Green Vegetable Bug and Lychee Stink Bug. Apply only when monitoring of the crop indicates that the pest is present in sufficient numbers to cause economic damage. DO NOT apply more than 6 applications per crop with a minimum re-treatment interval of 7-10 days between consecutive applications.	H Bee H	R2
DC-163 Bayer		Ingestion		P		Hort Innovation project ST17000 in progress to generate data in Tropical & Sub-Tropical Fruit (inedible peel) for control of lepidoptera and borers, including Macadamia Nut Borer and Longicorn Trunk Borer in lychee. Project completion expected in March 2022.	L-M Bee VH	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.		-
Flatid Planthopper (<i>Flatidae</i>)								
Priority: High								
Flatid Planthoppers are rated as a high priority in all regions. Damage results from adults feeding on fruit petioles causing sap leakage onto the fruit. This can lead to sooty mould infestation.								
Beta-cyfluthrin (Bulldock) Bayer PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in lychee for control of Fruit-spotting Bug, Banana-spotting Bug, Elephant or Rhino Beetle, Red-shouldered Leaf Beetle, Swarming Leaf Beetle, Longicorn Trunk Borer, Macadamia Nutborer, Mango Tip Borer, Flatid Planthopper , Green Vegetable Bug, Lychee Stink Bug and Yellow Peach Moth. DO NOT apply more than four (4) applications per year with a minimum of 21 days between consecutive sprays. DO NOT use at flowering.	VH Bee H	-
Buprofezin (Applaud) Corteva PER88401	16	Contact & Ingestion	H:14 NG	A	ALL (excl. VIC)	Permitted in lychee for control of Scale Insects, Mealybugs and Flatid Planthoppers . Apply a maximum of 2 sprays per crop, 14-21 days apart, when nymph/crawler stages exceed threshold levels and are prevalent.	M Bee L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Methidathion (Suprathion) PER14099	1B	Contact	21	A	NSW, Qld	Note: Suprathion Registration Cancelled by ADAMA and the use of Suprathion will not be permitted after 4-Feb-21. Previously permitted in lychee for control of Mealybug, Nutborer, Planthopper , Scale, Leafhoppers and Fruit Spotting Bug. DO NOT apply more than 2 applications per season with a minimum retreatment interval of 14 days between consecutive applications.	H Bee H	R1
Trichlorfon PER14743	1B	Contact	7	A	ALL (excl. VIC)	Permitted in lychee for control of Flatid Planthopper , Flower Eating Caterpillar, Looper and Yellow Peach Moth and suppression of Fruit-Spotting Bug, Banana Spotting Bug, Green Vegetable Bug and Lychee Stink Bug. Apply only when monitoring of the crop indicates that the pest is present in sufficient numbers to cause economic damage. DO NOT apply more than 6 applications per crop with a minimum re-treatment interval of 7-10 days between consecutive applications.	H Bee H	R2
Carbaryl	1A	Contact	NR	P-A	ALL	Registered in lychee for control of Castor Oil Looper, Leaf Eating Looper, Macadamia Nutborer, Redshouldered Leaf Beetle, Swarming Leaf Beetle, Yellow Peach Moth, Monolepta Beetles, Rhyparida Beetles, Leafroller Moths and Wingless Grasshopper. Registered for control of Planthopper in mango. Application during the period 7 days prior to flowering and 30 days post flowering may result in fruit thinning. Do not apply during this period.	H Bee H	R3
Sulfoxaflor (Transform) Corteva PER85397	4C	Ingestion	7	P-A	NSW, NT, QLD & WA	Permitted in lychee for control of Fruit-Spotting Bug and Banana-Spotting Bug. US registrations for control of Leaf Hoppers in various crops. ST17000 data generation will enable registration in Tropical & Sub-Tropical Fruits (inedible peel) including control of Fruit Spotting Bug, Banana Spotting Bug, Scale and Mealybug in lychee. Label submission expected November 2020.	M Bee VH	-
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Ingestion/IGR		P		Hort Innovation project ST16006 generating data to enable registration in Tropical and Sub-Tropical Fruits (inedible peel) for control of Spotting Bugs, Hoppers , Scale and Mealybug. Interim permit application submitted by Hort Innovation and is pending APVMA assessment by February 2021. Permit application requested various pests under permit, including: Fruit Spotting Bugs, Planthoppers , Leafhoppers, Mealybug and Scale.	M Bee H	R2

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Flupyradifurone (Sivanto Prime) Bayer	4D	Ingestion		P		ST19020 data generation (AgVet Grant) for label registration to control Fruit Spotting Bugs in Tropical & Sub-Tropical Fruits (inedible peel). Also has activity on Planthoppers .	L Bee L	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and Thrips.		-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.		-
Flower-Eating Caterpillar (<i>Homoeosoma vagella</i> & <i>Xanthodes congenita</i>) Priority: High								
Flower-Eating Caterpillars are rated as a high priority in all regions except NSW, where they are rated as a low priority. The larvae feed on flowers and can cause reduced fruit set when present in high numbers.								
Spinetoram (Success Neo) Corteva	5	Ingestion	NR	A	ALL	Registered in lychee for control of Flower-Eating Caterpillars , Leafrollers, Loopers, Yellow Peach Moth, Red-banded Thrips and Sorghum Head Caterpillar. Target sprays against mature eggs and newly-hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur.	M Bee VH	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	NR	A	ALL	Registered in lychee for control of Flower-Eating Caterpillars , Leafrollers, Loopers, Yellow Peach Moth, Red-banded Thrips and Sorghum Head Caterpillar. Target sprays against mature eggs and newly-hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur	L Bee H	-
Trichlorfon PER14743	1B	Contact	7	A	ALL (excl. VIC)	Permitted in lychee for control of Flatid Planthopper, Flower Eating Caterpillar , Looper and Yellow Peach Moth and suppression of Fruit-Spotting Bug, Banana Spotting Bug, Green Vegetable Bug and Lychee Stink Bug. Apply only when monitoring of the crop indicates that the pest is present in sufficient numbers to cause economic damage. DO NOT apply more than 6 applications per crop with a minimum re-treatment interval of 7-10 days between consecutive applications.	H Bee H	R2
Tebufenozide (Mimic) Corteva	18	Ingestion	14	P-A	ALL	Registered in lychee for control of Macadamia Nutborer. Registered for control of Flower Eating Caterpillars in macadamia.	L Bee L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
DC-163 Bayer		Ingestion		P		Hort Innovation project ST17000 in progress to generate data in Tropical & Sub-Tropical Fruit (inedible peel) for control of lepidoptera and borers, including Macadamia Nut Borer and Longicorn Trunk Borer in Lychee. Project completion expected in March 2022.	L-M Bee VH	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and Thrips.		-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.		-
Scale Insects including White Louse Scale (<i>Unaspis citri</i>), Soft Green Scale (<i>Coccus viridis</i>) and Green Shield Scale (<i>Chloropulvinaria psidii</i>)								
Priority: High								
White Louse Scale and Soft Green Scale are rated as a high priority in South East QLD and Far North QLD, and as moderate priority in all other regions. Green Shield Scale is rated as a high priority in South East QLD, a moderate priority in Far North QLD and Central QLD, and a low priority in NSW. Adults and nymphs suck the sap of shoots, leaves, fruit stalks and fruit. They excrete sugar-rich material over the plant which can lead to the development of sooty mould.								
Buprofezin (Applaud) Corteva PER88401	16	Contact & Ingestion	14	A	ALL (excl. VIC)	Permitted in lychee for control of Scale Insects , Mealybugs and Flatid Planthoppers. Apply a maximum of 2 sprays per crop, 14-21 days apart, when nymph/crawler stages exceed threshold levels and are prevalent.	M Bee L	-
Methidathion (Suprathion) PER14099	1B	Contact	21	A	NSW, QLD	Note: Suprathion Registration Cancelled by ADAMA and the use of Suprathion will not be permitted after 4-Feb-21. Previously permitted in lychee for control of Mealybug, Nutborer, Planthopper, Scale , Leafhoppers and Fruit Spotting Bug. DO NOT apply more than 2 applications per season with a minimum retreatment interval of 14 days between consecutive applications.	H Bee H	R1
Petroleum Oil (Summer Oil) PER14507	-	Contact	1	A	ALL (excl. VIC)	Permitted in lychee for control of Green Shield Scale , Soft Green Scale and Soft Scales . DO NOT apply more than 4 sprays per year with a minimum retreatment interval of 21 days between applications. Apply from before inflorescence emergence to when the fruit is 15 mm in diameter.	L Bee L	-
Sulphur PER14508	-	Contact	1	A	ALL (excl. VIC)	Permitted in lychee for control of Erinose Mite and White Louse Scale . Use with petroleum oil (summer oil). Apply late in the day to avoid crop phytotoxicity.		-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Sulfoxaflor (Transform) Corteva PER85397	4C	Ingestion	7	P-A	NSW, NT, QLD & WA	Permitted in lychee for control of Fruit-Spotting Bug and Banana-Spotting Bug. Registered for control of Scale in citrus. Hort Innovation project ST17000 - Data generation project for a Sulfoxaflor label extension in Tropical & Sub-Tropical Fruits (inedible peel) will include various pests including; Fruit Spotting Bug, Banana Spotting Bug, Scale and Mealybug. Label extension submission expected November 2020.	M Bee VH	-
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Ingestion/IGR		P		Hort Innovation project ST16006 generating data to enable registration in Tropical and Sub-Tropical Fruits (inedible peel) for control of Spotting Bugs, Hoppers, Scale and Mealybug. Interim permit application submitted by Hort Innovation and is pending APVMA assessment by February 2021. Permit application requested various pests under permit, including: Fruit Spotting Bugs, Planthoppers, Leafhoppers, Mealybug and Scale .	M Bee H	R2
NUL3145 Nufarm	TBC			P		New product in development from Nufarm with activity on Scale, Nematodes, Mealybug and Whitefly.		-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered for control of Scale in various crops. Codex MRL 15 mg/kg.	M Bee L	-
Leafhoppers / Jassids (<i>Cicadellidae</i>)								
Priority: Moderate								
Leafhoppers are rated as a high priority in Far North QLD and Central QLD, a moderate priority in South East QLD, and a low priority in NSW. They are widespread but sporadic in incidence. Large numbers can impact plant health by causing feeding damage to foliage.								
Methidathion (Suprathion) PER14099	1B	Contact	21	A	NSW, QLD	Note: Suprathion Registration Cancelled by ADAMA and the use of Suprathion will not be permitted after 4-Feb-21. Previously permitted in lychee for control of Mealybug, Nutborer, Planthopper, Scale, Leafhoppers and Fruit Spotting Bug. DO NOT apply more than 2 applications per season with a minimum retreatment interval of 14 days between consecutive applications.	H Bee H	R1

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Sulfoxaflor (Transform) Corteva PER85397	4C	Ingestion	7	P-A	NSW, NT, QLD & WA	Permitted in lychee for control of Fruit-Spotting Bug and Banana-Spotting Bug. US registration for control of Leaf Hoppers in various crops. Hort Innovation project ST17000 - Data generation project for a Sulfoxaflor label extension in Tropical & Sub-Tropical Fruits (inedible peel) will include various pests including; Fruit Spotting Bug, Banana Spotting Bug, Scale and Mealybug. Label extension submission expected November 2020.	M Bee VH	-
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Ingestion/IGR		P		Hort Innovation project ST16006 generating data to enable registration in Tropical and Sub-Tropical Fruits (inedible peel) for control of Spotting Bugs, Hoppers , Scale and Mealybug. Interim permit application submitted by Hort Innovation and is pending APVMA assessment by February 2021. Permit application requested various pests under permit, including: Fruit Spotting Bugs, Planthoppers, Leafhoppers , Mealybug and Scale.	M Bee H	R2
Flupyradifurone (Sivanto Prime) Bayer	4D	Ingestion		P		ST19020 data generation (AgVet Grant) for label registration to control Fruit Spotting Bugs in Tropical & Sub-Tropical Fruits (inedible peel). Also has activity on Leafhoppers .	L Bee L	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and Thrips.		-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.		-
Leafroller Moth (Tortricidae)								
Priority: Moderate								
Leafroller Moths are rated as a high priority in NSW, and a moderate priority in all other regions. They damage leaves by causing leaf distortion and can impact on flower initiation. Timely chemical control is important.								
Carbaryl	1A	Contact	NR	A	ALL	Registered in lychee for control of Castor Oil Looper, Leaf Eating Looper, Macadamia Nutborer, Redshouldered Leaf Beetle, Swarming Leaf Beetle, Yellow Peach Moth, Monolepta Beetles, Rhyparida Beetles, Leafroller Moths and Wingless Grasshopper. Apply at first sign of pest activity and repeat as necessary. Application during the period 7 days prior to flowering and 30 days post flowering may result in fruit thinning. Do not apply during this period.	H Bee H	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spinetoram (Success Neo) Corteva	5	Ingestion	NR	A	ALL	Registered in lychee for control of Flower-Eating Caterpillars, Leafrollers , Loopers, Yellow Peach Moth, Red-banded Thrips and Sorghum Head Caterpillar. Target sprays against mature eggs and newly-hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur.	M Bee VH	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	NR	A	ALL	Registered in lychee for control of Flower-Eating Caterpillars, Leafrollers , Loopers, Yellow Peach Moth, Red-banded Thrips and Sorghum Head Caterpillar. Target sprays against mature eggs and newly-hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur	L Bee H	-
DC-163 Bayer		Ingestion		P		Hort Innovation project ST17000 in progress to generate data in Tropical & Sub-Tropical Fruit (inedible peel) for control of lepidoptera and borers, including Macadamia Nut Borer and Longicorn Trunk Borer in lychee. Project completion expected in March 2022.	L-M Bee VH	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and Thrips.		-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.		-
Mealybug (<i>Planococcus</i> spp.)								
Priority: Moderate								
Mealybugs are rated as a high priority in South East QLD and a moderate priority in all other regions. They cause damage by feeding on foliage and excreting honey dew. This impacts general plant health and severe infestations can lead to leaf and fruit drop in the plant.								
Buprofezin (Applaud) Corteva PER88401	16	Contact & Ingestion	14	A	ALL (excl. VIC)	Permitted in lychee for control of Scale Insects, Mealybugs and Flatid Planthoppers. Apply a maximum of 2 sprays per crop, 14-21 days apart, when nymph/crawler stages exceed threshold levels and are prevalent.	M Bee L	-
Fatty Acids – Potassium Salt (Natrasoap)		Contact	NR	A	ALL	Soft option registered in fruit trees for control of aphids, thrips, mealybug , spider mite and whitefly. Apply as a cover spray.	L Bee L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Methidathion (Suprathion) PER14099	1B	Contact	21	A	NSW, QLD	Note: Suprathion Registration Cancelled by ADAMA and the use of Suprathion will not be permitted after 4-Feb-21. Previously permitted in lychee for control of Mealybug , Nutborer, Planthopper, Scale, Leafhoppers and Fruit Spotting Bug. DO NOT apply more than 2 applications per season with a minimum retreatment interval of 14 days between consecutive applications.	H Bee H	R1
Paraffinic Oil (Prospect Post Harvest Fruit Treatment)		Contact / Post-Harvest	NR	A	ALL	Registered in lychee for post-harvest control of Citrus Mealybug . Dip or flood spray fruit for a minimum of 30 seconds.	L Bee L	-
Sulfoxaflor (Transform) Corteva PER85397	4C	Ingestion	7	P-A	NSW, NT, QLD & WA	Permitted in lychee for control of Fruit-Spotting Bug and Banana-Spotting Bug. Registered for control of Mealybug in citrus, grapes and pome fruit. Hort Innovation project ST17000 - Data generation project for a Sulfoxaflor label extension in Tropical & Sub-Tropical Fruits (inedible peel) will include various pests including; Fruit Spotting Bug, Banana Spotting Bug, Scale and Mealybug . Label extension submission expected November 2020.	M Bee VH	-
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Ingestion/IGR		P		Hort Innovation project ST16006 generating data to enable registration in Tropical and Sub-Tropical Fruits (inedible peel) for control of Spotting Bugs, Hoppers, Scale and Mealybug . Interim permit application submitted by Hort Innovation and is pending APVMA assessment by February 2021. Permit application requested various pests under permit, including: Fruit Spotting Bugs, Planthoppers, Leafhoppers, Mealybug and Scale.	M Bee H	R2
Flonicamid (Mainman) ISK, UPL	9C			P		Registered for control of Longtailed Mealy Bug in pears.	M Bee VL	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Ingestion		P		ST19020 data generation (AgVet Grant) for label registration to control Fruit Spotting Bugs in Tropical & Sub-Tropical Fruits (inedible peel). Also has activity on Mealybug .	L Bee L	-
NUL3145 Nufarm	TBC			P		New product in development from Nufarm with activity on Scale, Nematodes, Mealybug and Whitefly.		-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered for control of Mealybugs in various crops. Codex MRL 15 mg/kg.	M Bee L	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.		-
Mites, including Two-Spotted Mite (<i>Tetranychus urticae</i>), Pacific Spider Mite (<i>Tetranychus pacificus</i>) and Erinose Mite (<i>Aceria litchii</i>)								
Priority: Moderate								
Mites are rated as a high priority in South East QLD and a moderate priority in all other regions. Feeding by nymphs and adults can cause extensive leaf, flower and fruit damage in lychee. An IPM approach is useful in managing mites.								
Abamectin	6	Contact and Ingestion	7	A	ALL	Registered in lychee for control of Two Spotted Mite and Litchi Erinose Mite . Apply as a foliar treatment when mites first appear during spring / summer. Use a maximum of 2 applications per season, with a minimum retreatment interval of 28 days.	M Bee H	-
Dimethoate	1B	Contact and Systemic	7	A	QLD, NSW & WA	Registered in lychee for control of Erinose Mite . Apply as a pre-planting dip or as a cover spray in established trees. Apply just before a growth flush and repeat at 14-21 day intervals until all new growth is damage free.	H Bee H	R1
Fatty Acids – Potassium Salt (Natrasoap)		Contact	NR	A	ALL	Soft option registered in fruit trees for control of aphids, thrips, mealybug, spider mite and whitefly. Apply as a cover spray.	L Bee L	-
Sulphur PER14508		Contact	1	A	ALL (excl. VIC)	Permitted in lychee for control of Erinose Mite and White Louse Scale. Use with petroleum oil (summer oil). Apply late in the day to avoid crop phytotoxicity.		-
<i>Beauveria bassiana</i> (Velifer) BASF	UN	Biological	NR	P		Registered for suppression of Onion Thrips and Western Flower Thrips in protected vegetables and ornamentals and has activity on Thrips, Aphids, Whitefly and Mites. No MRLs required for a biological product.	L Bee L	-
Bifenazate (Acramite) UPL	20D	Contact and Ingestion		P		Registered for control of Mites in various crops.	L Bee H	-
Cyflumetofen (Danisaraba) BASF	25A	Contact		P		BASF is seeking registration in Australia for the control of Spider Mites in various crops. Will not control mite species other than Spider Mites.	L Bee L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Etoxazole (Paramite) Sumitomo	10B	Ingestion		P		Registered for control of Mites in various crops. No MRLs in place for AU and Codex.	L Bee VL	-
Spiromesifen (Oberon) Bayer	23	Ingestion		P		New Australian Registration pending for control of Mites. Hort Innovation is undertaking data generation projects across multiple commodities for a new label registration in Australia.	M Bee VL	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.		-
Green Vegetable Bug (<i>Nezara viridula</i>)								
Priority: Moderate								
Green Vegetable Bug is rated as a high priority in Far North QLD and a moderate priority in all other regions. They are a sporadic pest that will cause damage to fruit by stinging it and sucking nutrients when present in large numbers.								
Beta-cyfluthrin (Bulldock) Bayer PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in lychee for control of Fruit-spotting Bug, Banana-spotting Bug, Elephant or Rhino Beetle, Red-shouldered Leaf Beetle, Swarming Leaf Beetle, Longicorn Trunk Borer, Macadamia Nutborer, Mango Tip Borer, Flatid Planthopper, Green Vegetable Bug , Lychee Stink Bug and Yellow Peach Moth. DO NOT apply more than 4 applications per year with a minimum of 21 days between consecutive sprays. DO NOT use at flowering.	VH Bee H	-
Trichlorfon PER14743	1B	Contact	7	A	ALL (excl. VIC)	Permitted in lychee for control of Flatid Planthopper, Flower Eating Caterpillar, Looper and Yellow Peach Moth and suppression of Fruit-Spotting Bug, Banana Spotting Bug, Green Vegetable Bug and Lychee Stink Bug. Apply only when monitoring of the crop indicates that the pest is present in sufficient numbers to cause economic damage. DO NOT apply more than 6 applications per crop with a minimum re-treatment interval of 7-10 days between consecutive applications.	H Bee H	R2
Flupyradifurone (Sivanto Prime) Bayer	4D	Ingestion		P		ST19020 data generation (AgVet Grant) for label registration to control Fruit Spotting Bugs in Tropical & Sub-Tropical Fruits (inedible peel). Also has activity on Green Vegetable Bug .	L Bee L	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and Thrips.		-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.		-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Fruit-Piercing Moth (<i>Eudocima</i> spp.)								
Priority: Moderate								
Fruit-Piercing Moth is rated as a high priority in South East QLD, a low priority in NSW, and a moderate priority in all other regions. They are a sporadic pest that can cause major damage, particularly in wet seasons. Moths feed at night on ripe or ripening fruit, sucking the juice and bruising the flesh beneath the skin. Secondary rots develop at the puncture site. Chemical control options have been ineffective. There are cultural control options available such as netting trees, bagging fruit or early harvest.								
DC-163 Bayer		Ingestion		P		Hort Innovation project ST17000 in progress to generate data in Tropical & Sub-Tropical Fruit (inedible peel) for control of lepidoptera and borers, including Macadamia Nut Borer and Longicorn Trunk Borer in lychee. Project completion expected in March 2022.	L-M Bee VH	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.		-
Swarming Leaf Beetle (<i>Rhyparida</i> spp.)								
Priority: Moderate								
Swarming Leaf Beetle is rated as a high priority in Far North QLD, a moderate priority in Central QLD and a low priority in all other regions. They are a significant pest in tropical areas. Swarms of the beetle can cause severe damage to the new terminal growth of lychee.								
Beta-cyfluthrin (Bulldock) Bayer PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in lychee for control of Fruit-spotting Bug, Banana-spotting Bug, Elephant or Rhino Beetle, Red-shouldered Leaf Beetle, Swarming Leaf Beetle , Longicorn Trunk Borer, Macadamia Nutborer, Mango Tip Borer, Flatid Planthopper, Green Vegetable Bug, Lychee Stink Bug and Yellow Peach Moth. DO NOT apply more than 4 applications per year with a minimum of 21 days between consecutive sprays. DO NOT use at flowering.	VH Bee H	-
Carbaryl	1A	Contact	NR	A	ALL	Registered in lychee for control of Castor Oil Looper, Leaf Eating Looper, Macadamia Nutborer, Redshouldered Leaf Beetle, Swarming Leaf Beetle , Yellow Peach Moth, Monolepta Beetles, Rhyparida Beetles, Leafroller Moths and Wingless Grasshopper. Apply at first sign of pest activity and repeat as necessary. Application during the period 7 days prior to flowering and 30 days post flowering may result in fruit thinning. Do not apply during this period.	H Bee H	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
DC-163 Bayer		Ingestion		P		Hort Innovation project ST17000 in progress to generate data in Tropical & Sub-Tropical Fruit (inedible peel) for control of lepidoptera and borers, including Macadamia Nut Borer and Longicorn Trunk Borer in Lychee. Project completion expected in March 2022.	L-M Bee VH	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and Thrips.		-
Yellow Peach Moth (<i>Conogethes punctiferalis</i>)								
Priority: Moderate								
Yellow Peach Moth is rated as a moderate priority in Far North QLD and Central QLD, and a low priority in all other regions. Larvae bore into the fruit and feed on the pulp and seed, which can lead to premature fruit drop.								
Beta-cyfluthrin (Bulldock) Bayer PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in lychee for control of Fruit-spotting Bug, Banana-spotting Bug, Elephant or Rhino Beetle, Red-shouldered Leaf Beetle, Swarming Leaf Beetle, Longicorn Trunk Borer, Macadamia Nutborer, Mango Tip Borer, Flatid Planthopper, Green Vegetable Bug, Lychee Stink Bug and Yellow Peach Moth . DO NOT apply more than 4 applications per year with a minimum of 21 days between consecutive sprays. DO NOT use at flowering.	VH Bee H	-
Carbaryl	1A	Contact	NR	A	ALL	Registered in lychee for control of Castor Oil Looper, Leaf Eating Looper, Macadamia Nutborer, Redshouldered Leaf Beetle, Swarming Leaf Beetle, Yellow Peach Moth , Monolepta Beetles, Rhyparida Beetles, Leafroller Moths and Wingless Grasshopper. Apply at first sign of pest activity and repeat as necessary. Application during the period 7 days prior to flowering and 30 days post flowering may result in fruit thinning. Do not apply during this period.	H Bee H	R3
Spinetoram (Success Neo) Corteva	5	Ingestion	NR	A	ALL	Registered in lychee for control of Flower-Eating Caterpillars, Leafrollers, Loopers, Yellow Peach Moth , Red-banded Thrips and Sorghum Head Caterpillar. Target sprays against mature eggs and newly-hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur.	M Bee VH	-

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	A	ALL	Registered in lychee for control of Flower-Eating Caterpillars, Leafrollers, Loopers, Yellow Peach Moth , Red-banded Thrips and Sorghum Head Caterpillar. Target sprays against mature eggs and newly-hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur	L Bee H	-
Trichlorfon PER14743	1B	Contact	7	A	ALL (excl. VIC)	Permitted in lychee for control of Flatid Planthopper, Flower Eating Caterpillar, Looper and Yellow Peach Moth and suppression of Fruit-Spotting Bug, Banana Spotting Bug, Green Vegetable Bug and Lychee Stink Bug. Apply only when monitoring of the crop indicates that the pest is present in sufficient numbers to cause economic damage. DO NOT apply more than 6 applications per crop with a minimum re-treatment interval of 7-10 days between consecutive applications.	H Bee H	R2
DC-163 Bayer		Ingestion		P		Hort Innovation project ST17000 in progress to generate data in Tropical & Sub-Tropical Fruit (inedible peel) for control of lepidoptera and borers, including Macadamia Nut Borer and Longicorn Trunk Borer in lychee. Project completion expected in March 2022.	L-M Bee VH	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and Thrips.		-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.		-
Red Shouldered Leaf Beetle (<i>Monolepta australis</i>)								
Priority: Moderate								
Red Shouldered Leaf Beetle is rated as a moderate priority in Far North QLD and Central QLD, and a low priority in all other regions. Larvae feed and pupate in the soil and adults emerge from the soil after rain and can cause severe foliar damage to trees.								
Beta-cyfluthrin (Bulldock) Bayer PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in lychee for control of Fruit-spotting Bug, Banana-spotting Bug, Elephant or Rhino Beetle, Red-shouldered Leaf Beetle , Swarming Leaf Beetle, Longicorn Trunk Borer, Macadamia Nutborer, Mango Tip Borer, Flatid Planthopper, Green Vegetable Bug, Lychee Stink Bug and Yellow Peach Moth. DO NOT apply more than 4 applications per year with a minimum of 21 days between consecutive sprays. DO NOT use at flowering.	VH Bee H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Carbaryl	1A	Contact	NR	A	ALL	Registered in lychee for control of Castor Oil Looper, Leaf Eating Looper, Macadamia Nutborer, Redshouldered Leaf Beetle , Swarming Leaf Beetle, Yellow Peach Moth, Monolepta Beetles, Rhyparida Beetles, Leafroller Moths and Wingless Grasshopper. Apply at first sign of pest activity and repeat as necessary. Application during the period 7 days prior to flowering and 30 days post flowering may result in fruit thinning. Do not apply during this period.	H Bee H	R3
DC-163 Bayer		Ingestion		P		Hort Innovation project ST17000 in progress to generate data in Tropical & Sub-Tropical Fruit (inedible peel) for control of lepidoptera and borers, including Macadamia Nut Borer and Longicorn Trunk Borer in lychee. Project completion expected in March 2022.	L-M Bee VH	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and Thrips.		-
Ants (<i>Formicidae</i>)								
Priority: Moderate								
Ants are rated as a high priority in Far North QLD, a moderate priority in Central QLD, and a low priority in all other regions. They can promote proliferation of sap feeding insects such as mealybug and scale. They can also feed on foliage and fruit.								
Pyriproxyfen (Distance Ant Bait) Sumitomo	7C	IGR / Bait	NR	A	ALL	Registered in Tropical Fruit Plantations 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	-
Metaflumizone (Siesta Ant Bait) BASF	22B	Ingestion		P		Registration pending in Australia.	-	-
Queensland Fruit Fly (<i>Bactrocera tryoni</i>)								
Priority: Moderate								
Queensland Fruit Fly is rated as a high priority in Far North QLD, a moderate priority in Central QLD, and a low priority in all other regions. Fruit that is exported overseas or interstate requires treatment to ensure it is free of Fruit Fly.								
4-(P Acetoxyphenyl) -2-Butanone + Maldison	1B	Contact	NR	A	ALL	Registered in fruit trees for use as a trap for Queensland Fruit Fly . Used to detect the presence of Fruit Fly in the orchard to assist with making decisions about control.	H Bee H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
4-(P Acetoxyphenyl)-2-Butanone + Fipronil	2B	Contact	NR	A	ALL	Registered in fruit crops for population reduction and population monitoring of Queensland Fruit Fly and Lesser Queensland Fruit Fly. Single stations can be used for population monitoring. Control of fruit fly required placement of 16 stations per hectare and should be used in conjunction with regular insecticide cover sprays.	M Bee VH	R3
Dimethoate	1B	Contact	NR	A	QLD, NSW & WA	Registered in lychee as a post-harvest treatment for Queensland Fruit Fly . Dip the fruit for 1 minute.	H Bee H	R1
Trichlorfon PER12450	1B	Contact	7	A	ALL (excl. VIC)	Permitted in lychee for control of Queensland Fruit Fly and Mediterranean Fruit Fly. Apply as a cover spray to the point of runoff via air-blast sprayer or equivalent. Repeat at half concentration every 7-10 days. Apply a maximum of 4 applications per season.	H Bee H	R2
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Ingestion/IGR		P		Hort Innovation project ST16006 generating data to enable registration in Tropical and Sub-Tropical Fruits (inedible peel) for control of Spotting Bugs, Hoppers, Scale and Mealybug. Interim permit application submitted by Hort Innovation and is pending APVMA assessment by February 2021. Permit application requested various pests under permit, including: Fruit Spotting Bugs, Planthoppers, Leafhoppers, Mealybug and Scale.	M Bee H	R2
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and Thrips.		-
Elephant (or Rhino) Beetle (<i>Xylotrupes gideon</i>)								
Priority: Moderate								
Elephant Beetle is rated as a moderate priority in Far North QLD and Central QLD, and a low priority in all other regions. It is widespread in coastal regions although incidence can be sporadic. Causes direct feeding damage to the fruit.								
Beta-cyfluthrin (Bulldock) Bayer PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in lychee for control of Fruit-spotting Bug, Banana-spotting Bug, Elephant or Rhino Beetle , Red-shouldered Leaf Beetle, Swarming Leaf Beetle, Longicorn Trunk Borer, Macadamia Nutborer, Mango Tip Borer, Flatid Planthopper, Green Vegetable Bug, Lychee Stink Bug and Yellow Peach Moth. DO NOT apply more than 4 applications per year with a minimum of 21 days between consecutive sprays. DO NOT use at flowering.	VH Bee H	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Carbaryl	1A	Contact	NR	P-A	ALL	Registered in lychee for control of Castor Oil Looper, Leaf Eating Looper, Macadamia Nutborer, Redshouldered Leaf Beetle, Swarming Leaf Beetle, Yellow Peach Moth, Monolepta Beetles, Rhyparida Beetles, Leafroller Moths and Wingless Grasshopper. Apply at first sign of pest activity and repeat as necessary. Application during the period 7 days prior to flowering and 30 days post flowering may result in fruit thinning. Do not apply during this period.	H Bee H	R3
DC-163 Bayer		Ingestion		P		Hort Innovation project ST17000 in progress to generate data in Tropical & Sub-Tropical Fruit (inedible peel) for control of lepidoptera and borers, including Macadamia Nut Borer and Longicorn Trunk Borer in lychee. Project completion expected in March 2022.	L-M Bee VH	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and Thrips.		-
Longicorn Trunk Borer (<i>Acalolepta vastator</i>)								
Priority: Moderate								
Longicorn Trunk Borer is rated as a moderate priority in Far North QLD, and a low priority in all other regions. Larvae feed on the wood of the tree and pupate in the trunk and branches. Adults cut round exit holes to emerge from the wood.								
Beta-cyfluthrin (Bulldock) Bayer PER80374	3A	Contact	7	A	NSW, NT, QLD, SA & WA	Permitted in lychee for control of Fruit-spotting Bug, Banana-spotting Bug, Elephant or Rhino Beetle, Red-shouldered Leaf Beetle, Swarming Leaf Beetle, Longicorn Trunk Borer , Macadamia Nutborer, Mango Tip Borer, Flatid Planthopper, Green Vegetable Bug, Lychee Stink Bug and Yellow Peach Moth. DO NOT apply more than 4 applications per year with a minimum of 21 days between consecutive sprays. DO NOT use at flowering.	VH Bee H	-
DC-163 Bayer		Ingestion		P		Hort Innovation project ST17000 in progress to generate data in Tropical & Sub-Tropical Fruit (inedible peel) for control of lepidoptera and borers, including Macadamia Nut Borer and Longicorn Trunk Borer in lychee. Project completion expected in March 2022.	L-M Bee VH	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and Thrips.		-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.		-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Aphids (<i>Aphidae</i>)								
Priority: Moderate								
Aphids are rated as a moderate priority in Far North QLD and Central QLD, and a low priority in all other regions. They can infest leaves and fruit. Honeydew excreted by aphids coats the outside of fruits and leaves and promotes the growth of sooty mould.								
Afidopyropen (Versys) BASF	9D	Ingestion		P		ST18001 (AgVet funded project) data generation to enable registration in lychee for control of aphids . Due for completion January 2023.	L Bee L	-
<i>Beauveria bassiana</i> (Velifer) BASF	UN			P		Registered for suppression of various aphids in protected vegetables and ornamentals. No MRLs required for a biological product.	L Bee L	-
Flupyradifurone (Sivanto Prime) Bayer	4D	Ingestion		P		ST19020 data generation (AgVet Grant) for label registration to control Fruit Spotting Bugs in Tropical & Sub-Tropical Fruits (inedible peel). Also has activity on aphids .	L Bee L	-
Sulfoxaflor (Transform) Corteva PER85397	4C	Ingestion	7	P-A	NSW, NT, QLD & WA	Permitted in lychee for control of Fruit-Spotting Bug and Banana-Spotting Bug. Registered for control of Mealybug in citrus, grapes and pome fruit. Hort Innovation project ST17000 - Data generation project for a Sulfoxaflor label extension in Tropical & Sub-Tropical Fruits (inedible peel) will include various pests including; Fruit Spotting Bug, Banana Spotting Bug, Scale and Mealybug. Label extension submission expected November 2020. Registered for control of aphids in various crops.	M Bee VH	-
Wingless Grasshopper (<i>Phaulacridium vittatum</i>)								
Priority: Low								
Wingless Grasshoppers are rated as a moderate priority in NSW, and a low priority in all other regions. They are sporadic but can cause substantial foliar damage when present in large numbers.								
Carbaryl	1A	Contact	NR	A	ALL	Registered in lychee for control of Castor Oil Looper, Leaf Eating Looper, Macadamia Nutborer, Redshouldered Leaf Beetle, Swarming Leaf Beetle, Yellow Peach Moth, Monolepta Beetles, Rhyparida Beetles, Leafroller Moths and Wingless Grasshopper . Apply at first sign of pest activity and repeat as necessary. Application during the period 7 days prior to flowering and 30 days post flowering may result in fruit thinning. Do not apply during this period.	H Bee H	R3

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Redbanded Thrips (<i>Selenothrips rubrocinctus</i>), Plague Thrips (<i>Thrips imaginis</i>), Western Flower Thrips (<i>Frankliniella occidentalis</i>) Priority: Low								
Red Banded Thrips and Plague Thrips are rated as a moderate priority in Far North QLD, and a low priority in all other regions. Western Flower Thrips are rated as a low priority in all regions. They can cause rasping damage to fruit but are rarely a problem in lychee.								
Fatty Acids – Potassium Salt (Natrasoap)		Contact	NR	A	ALL	Soft option registered in fruit trees for control of aphids, thrips , mealybug, spider mite and whitefly. Apply as a cover spray. Spray when insects are noticed. Apply morning or evening when temperatures are cooler. Re-apply 5 to 7 days later or as necessary.	L Bee L	-
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in fruit trees for control of Ants, Aphids, Cabbage Moth, Caterpillars, Earwigs, White Fly, Thrips and Leafhoppers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee H	-
Spinetoram (Success Neo) Corteva	5	Ingestion	NR	A	ALL	Registered in lychee for control of Flower-Eating Caterpillars, Leafrollers, Loopers, Yellow Peach Moth, Red-banded Thrips and Sorghum Head Caterpillar. Target sprays against mature eggs and newly-hatched nymphs. Apply repeat applications at 7-14 day intervals as new infestations occur.	M Bee VH	-
Spinosad (Entrust Organic) Corteva	5	Ingestion	NR	A	ALL	Registered in lychee for control of Flower-Eating Caterpillars, Leafrollers, Loopers, Yellow Peach Moth, Red-Banded Thrips and Sorghum Head Caterpillar. Target sprays against mature eggs and newly-hatched larvae when numbers exceed spray threshold. Apply repeat applications at 7-14 day intervals as new infestations occur	L Bee H	-
Acetamiprid + Pyriproxyfen (Trivor) Adama	4A+7C	Ingestion/IGR		P		Hort Innovation project ST16006 generating data to enable registration in Tropical and Sub-Tropical Fruits (inedible peel) for control of Spotting Bugs, Hoppers, Scale and Mealybug. Interim permit application submitted by Hort Innovation and is pending APVMA assessment by February 2021. Permit application requested various pests under permit, including: Fruit Spotting Bugs, Planthoppers, Leafhoppers, Mealybug and Scale.	M Bee H	R2
<i>Beauveria bassiana</i> (Velifer) BASF	UN	Biological	NR	P		Registered for suppression of Onion Thrips and Western Flower Thrips in protected vegetables and ornamentals and has activity on Thrips , Aphids, Whitefly and Mites. No MRLs required for a biological product.	L Bee L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
Flupyradifurone (Sivanto Prime) Bayer	4D	Ingestion		P		ST19020 data generation (AgVet Grant) for label registration to control Fruit Spotting Bugs in Tropical & Sub-Tropical Fruits (inedible peel). US registration for control of Blueberry Thrips in berries and Scirtothrips in fruiting vegetables.	L Bee L	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and Thrips.		-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered for control of Plague Thrips and Western Flower Thrips in various crops. Codex MRL 15 mg/kg.	M Bee L	-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.		-
Silverleaf Whitefly (<i>Bemisia tabaci</i>)								
Priority: Low								
Silverleaf Whitefly are rated as a moderate priority in Far North QLD, and a low priority in all other regions. Adults and nymphs excrete honeydew which can promote the growth of sooty mould and can reduce the quality of fruit.								
Fatty Acids – Potassium Salt (Natrasoap)		Contact	NR	A	ALL	Soft option registered in fruit trees for control of aphids, thrips, mealybug, spider mite and whitefly . Apply as a cover spray. Spray when insects are noticed. Apply morning or evening when temperatures are cooler. Re-apply 5 to 7 days later or as necessary.	L Bee L	-
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Contact	1	A	ALL	Registered in fruit trees for control of Ants, Aphids, Cabbage Moth, Caterpillars, Earwigs, White Fly , Thrips and Leafhoppers. Apply as a cover spray and re-apply as necessary every 2-3 weeks.	VH Bee H	-
Buprofezin (Applaud) Corteva PER88401	16	Contact & Ingestion	14	P-A	ALL (excl. VIC)	Permitted in lychee for control of Scale Insects, Mealybugs and Flatid Planthoppers. Registered for control of Silverleaf Whitefly in tomato.	M Bee L	-
<i>Beauveria bassiana</i> (Velifer) BASF	UN	Biological	NR	P		Registered for suppression of Onion Thrips and Western Flower Thrips in protected vegetables and ornamentals and has activity on Thrips, Aphids, Whitefly and Mites. No MRLs required for a biological product.	L Bee L	-

Pest / Active Ingredient (Trade Name)	Chemical group	Activity	WHP, days	Availability	States	Comments	Impact on beneficials	Regulatory risk
<i>Clitoria ternatea</i> Extract (Sero-X) Growth Agriculture		Biological / Ingestion	NR	P		Registered in cotton for control of <i>Helicoverpa</i> spp., Green Mirids and Silverleaf Whitefly and in brassica leafy vegetables for control of Diamondback Moth. No MRLs required for biological product.		-
Flonicamid (Mainman) ISK, UPL	9C			P		Registered for control of Silverleaf Whitefly in cucurbits.	M Bee VL	-
NUL3145 Nufarm	TBC			P		New product in development from Nufarm with activity on Scale, Nematodes, Mealybug and Whitefly.		-
Spirotetramat (Movento) Bayer	23	Ingestion		P		Registered for control of Silverleaf Whitefly in various crops. Codex MRL 15 mg/kg.	M Bee L	-
Fall Armyworm (<i>Spodoptera frugiperda</i>)								
Priority: Unknown								
Fall Armyworm has recently been detected in Australia for the first time. It has not been seen in lychee crops and the potential impact is currently unknown.								
Spinetoram (Success Neo) Corteva PER89241	5	Ingestion	NR	A	ALL (excl. VIC)	Permitted in Tropical and Sub-Tropical Fruits (Inedible Peel) for control of Fall Armyworm . Target treatment to eggs at hatch or small larvae (prior to third instar stage) before the pest becomes entrenched. Do not use more than 4 applications per season.	M Bee VH	-
Spinosad (Entrust Organic) Corteva PER89870	5	Ingestion	NR	A	ALL (excl. VIC)	Permitted in Tropical and Sub-Tropical Fruits (Inedible Peel) for control of Fall Armyworm . Target treatment to eggs at hatch or small larvae (prior to third instar stage) before the pest becomes entrenched. Do not use more than 4 applications per season.	L Bee H	-
DC-163 Bayer		Ingestion		P		Hort Innovation project ST17000 in progress to generate data in Tropical & Sub-Tropical Fruit (inedible peel) for control of lepidoptera and borers, including Macadamia Nut Borer and Longicorn Trunk Borer in lychee. Project completion expected in March 2022.	L-M Bee VH	-
NUL3445 Nufarm	TBC			P		New product in development from Nufarm with activity on Lepidoptera, Bugs, Beetles/Weevils, Fruit Fly and Thrips.		-
SYNFOI21 Syngenta	New			P		SYNFOI21 is not registered but the first global application is proposed for 2020/21 for various pests including Thrips, Bugs, Mites and Caterpillars.		-

4.3 Weeds in lychee

4.3.1 Weed priorities

Common Name	Scientific Name
High	
Flaxleaf Fleabane	<i>Conyza bonariensis</i>

Flaxleaf Fleabane was identified as a high priority. An integrated weed management program incorporating mulch, inter-row grass cover and regular slashing will reduce reliance on herbicides in orchards.

Growers should ensure that they are using herbicides with different modes of action and not overusing any of the herbicide groups to reduce the risk of herbicide resistance.

Specific resistance management strategies for high resistance risk (A and B) and moderate resistance risk (C, D, F, G, I, J, K, L, M, N, Q and Z) herbicide modes of action are available on the CropLife Australia webpage⁴.

⁴ www.croplife.org.au/resources/programs/resistance-management/herbicide-resistance-management-strategies-2/

4.3.2 Available and potential products for weed control

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

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

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Flaxleaf Fleabane (<i>Conyza bonariensis</i>)							
Priority: High							
Flaxleaf Fleabane is difficult to control with herbicides. Key to management is cultural controls such as maintaining ground cover and destruction of plants prior to seed set.							
Glufosinate (Basta)	N**	Lychee / Directed or Shielded Spray	Registered in lychee for control of various grass and broadleaf weeds, including Flaxleaf Fleabane . Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Grass and Broadleaf Weeds							
Priority: Low							
An integrated weed management program incorporating mulch and inter-row grass cover will reduce reliance on herbicides in orchards.							
Diquat and Paraquat (SpraySeed)	L**	Lychee / Directed Spray or Spot Spray	Registered in lychee for control of various annual grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	H:1 G:7	A	ALL	R3

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use / Weed	WHP (days)	Availability	States	Regulatory risk
Fluazifop – P (Fusilade)	A***	Lychee / Directed Spray	Registered in lychee for control of grass weeds. Apply as a directed spray.	14	A	NSW, QLD, NT & WA	-
Glufosinate (Basta)	N**	Lychee / Directed or Shielded Spray	Registered in lychee for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Glyphosate (Roundup)	M**	Lychee / Directed Spray, Shielded Spray or Wick Wiper	Registered in lychee for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	R3
Haloxypop (Verdict)	A***	Lychee / Directed Spray or Spot Spray	Registered in lychee for control of grass weeds. Apply as a directed spray.	NR	A	ALL	-
Oryzalin	D**	Lychee / Non-Bearing Trees Only / Directed Spray	Registered in non-fruit bearing lychee for control of various grass and broadleaf weeds. Apply as a directed spray.	NR	A	ALL	-
Oxyfluorfen (Goal)	G**	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.	H:NR NG	A	ALL	-
Paraquat (Gramoxone)	L**	Orchards / Directed Spray or Spot Spray	Registered in orchards for control of various annual grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	H:1 G:7	A	ALL	R3
Pendimethalin (Stomp)	D**	Lychee / Directed Spray, Requires Incorporation	Registered in lychee for control of various grass and broadleaf weeds. Do not allow spray to contact any part of the tree, including the trunk.	NR	A	ALL	-

4.4 Plant Growth Regulators in lychee

4.4.1 Plant Growth Regulator Priorities

Priority
Moderate
Restriction of Vegetative Growth
Low
Initiation of Flowering
Promote Vegetative Growth
Promote Fruit Ripening

No Plant Growth Regulator (PGR) issues have been nominated as a high priority. Restriction of Vegetative Growth has been identified as a 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
Restrict Vegetative Growth							
Priority: Moderate							
Restrict Vegetative Growth is rated as a moderate priority. Ethephon can be used to reduce seasonal growth flushes and enable more even flowering and fruit ripening.							
Ethephon PER81753	Plant Growth Regulator	Lychee	Permitted in lychee to manage seasonal vegetative flushes to better synchronise flowering and fruit set. Apply foliar treatment at early autumn vegetative flush (<10cm) when more than 30% of the terminals are flushing. Do not apply after the end of the autumn vegetative flush. Use no more than 2 applications per season. Apply a second treatment only if trees flush again with 4 weeks of the initial treatment.	NR	A	QLD, NSW	-

Active ingredient (Trade Name)	Chemical Group	Crop/ Situation	Comment / Use	WHP (days)	Availability	States	Regulatory risk
Promote Fruit Ripening							
Priority: Low							
Restrict Vegetative Growth is rated as a moderate priority. Ethephon can be used to reduce seasonal growth flushes and enable more even flowering and fruit ripening.							
Ethephon PER81753	Plant Growth Regulator	Lychee	Permitted in lychee to manage seasonal vegetative flushes to better synchronise flowering and fruit set. Apply foliar treatment at early autumn vegetative flush (<10cm) when more than 30% of the terminals are flushing. Do not apply after the end of the autumn vegetative flush. Use no more than 2 applications per season. Apply a second treatment only if trees flush again with 4 weeks of the initial treatment.	NR	A	QLD, NSW	-
Triclopyr (Tops) Campbells	Plant Growth Regulator	Lychee	Registered in lychee for reducing fruit drop. Apply when majority of the fruit is over 15-20mm in length. Apply once 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/Details/F2020C00713
APVMA Permit search	https://productsearch.apvma.gov.au/permits
APVMA Product search	https://productsearch.apvma.gov.au/products
Codex MRL database	http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/
Cotton Pest Management Guide 2020-21	https://www.cottoninfo.com.au/publications/cotton-pest-management-guide
CropLife Australia	https://www.croplife.org.au/
Growcom – Infopest Database	www.infopest.com.au
Hort Innovation	www.horticulture.com.au
Ausveg	https://ausveg.com.au/
Agriculture and Food - WA	https://www.agric.wa.gov.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 mites 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 Agrichemical Regulatory Risk Assessment

Appendix 1. Products available for disease control in lychee

Active Ingredient (Trade Name)	Chem. group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Bromo Chloro Dimethyl Hydantoin (BCDMH)		Fruit & Vegetables / Sanitiser / Post-Harvest Wash	External Rot-Causing Organisms	ALL	NR	-
Chlorine		Fruit & Vegetables / Sanitiser / Post-Harvest Wash	Bacteria and Fungi	ALL	NR	-
Copper (Cu) as copper ammonium complex	M1	Lychee	Parasitic Algae (<i>Cephaleuros virescens</i>)	QLD, NSW	1	-
			Pepper Spot (<i>Colletotrichum gloeosporioides</i>) Phytophthora Stem Canker	ALL	1	-
Copper (Cu) present as copper oxychloride	M1	Lychee	Parasitic Algae (<i>Cephaleuros virescens</i>)	QLD, NT, WA, ACT & NSW	1	-
Copper (Cu) present as cupric hydroxide	M1	Lychee	Parasitic Algae (<i>Cephaleuros virescens</i>), Phytophthora Stem Canker	QLD, NSW	1	-
Copper (Cu) present as cuprous oxide	M1	Lychee	Phytophthora Stem Canker	ALL	1	-
Copper (Cu) present as tribasic copper sulfate	M1	Lychee	Parasitic Algae (<i>Cephaleuros virescens</i>)	QLD, NSW	1	-
			Phytophthora Stem Canker	ALL	1	-
Copper hydroxide & cuprous oxide PER13660	M1	Lychee	Pepper Spot (<i>Colletotrichum gloeosporioides</i>)	ALL (excl. VIC)	1	-
Cyprodinil and Fludioxonil (Switch) Syngenta PER88197	9+12	Lychee	Lychee Pepper Spot/ Anthracnose (<i>Colletotrichum gloeosporioides</i>)	ALL	14	R3

Active Ingredient (Trade Name)	Chem. group	Situation	Diseases / Comments	States	WHP Days	Regulatory risk
Fluopyram + Trifloxystrobin (Luna Sensation) Bayer	7+11	Litchi	Litchi Pepper Spot (<i>Colletotrichum gloeosporioides</i>)	ALL	3	-
Mancozeb PER13659	M3	Lychee	Pepper Spot (<i>Colletotrichum gloeosporioides</i>)	NSW, QLD	7	R2
Prochloraz (Octave WP) PER80369	3	Lychee	Anthracnose or Pepper Spot (<i>Colletotrichum gloeosporioides</i>)	NSW, QLD, NT & WA	H:28 G:NR	-
Pyraclostrobin (Cabrio) BASF PER80367	11	Lychee	Anthracnose or Pepper Spot (<i>Colletotrichum gloeosporioides</i>)	NSW, QLD, NT & WA	H:3 NG	-

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

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
4-(P-Acetoxyphenyl) -2- Butanone + Maldison	1B	Fruit Trees / Fruit Fly Trap	Queensland Fruit Fly	ALL	NR	-
4-(P-Acetoxyphenyl) -2- Butanone + Fipronil	2B	Fruit Trees / Fruit Fly Trap	Queensland Fruit Fly Lesser Queensland Fruit Fly	ALL	NR	R3
Abamectin	6	Lychee	Two Spotted Mite (<i>Tetranychus urticae</i>) Litchi Erinose Mite (<i>Aceria litchii</i>)	ALL	7	-
Abamectin PER87717	6	Lychee	Two Spotted Mite (<i>Tetranychus urticae</i>) Litchi Erinose Mite (<i>Aceria litchii</i>)	ALL (excl. VIC)	14	-
Azinphos-Methyl (Gusathion)	1B	Lychee	Macadamia Nutborer Fruitspotting Bugs	QLD, NSW & WA	1	R2
<i>Bacillus thuringiensis</i> (DiPel)	11	Fruit	Armyworm (<i>Spodoptera</i> spp.) Cotton Bollworm (<i>Helicoverpa armigera</i>) Native Budworm (<i>Helicoverpa punctigera</i>) Cabbage Moth (<i>Plutella xylostella</i>) Cabbage White Butterfly (<i>Pieris rapae</i>) Green Looper (<i>Chrysodeixis eriosoma</i>) Light Brown Apple Moth (<i>Epiphyas postvittana</i>) Pear Looper (<i>Ectropis excursaria</i>) Soybean Looper (<i>Thysanoplusia orichalcea</i>) Vine Moth (<i>Phalaenoides glycinae</i> , <i>Agarista agricola</i>) Tobacco Looper (<i>Chrysodeixis argentifera</i>)	ALL	NR	-

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Beta-Cyfluthrin (Bulldock) Bayer PER80374	3A	Lychee	Fruit-spotting Bug (<i>Amblypelta nitida</i>) Banana-spotting Bug (<i>Amblypelta lutescens</i>) Elephant or Rhino Beetle (<i>Xylotrupes gideon</i>) Red-shouldered Leaf Beetle (<i>Monolepta australis</i>) Swarming Leaf Beetle (<i>Rhyparida spp.</i>) Longicorn Trunk Borer (<i>Acalolepta vastator</i>) Macadamia Nutborer (<i>Cryptophlebia ombrodelta</i>) Mango Tip Borer (<i>Penicillaria jocosatrix</i>) Flatid Planthopper (Family: Flatidae) Green Vegetable Bug (<i>Nezara viridula</i>) Lychee Stink Bug (<i>Tessaratomia papillosa</i>) Yellow Peach Moth (<i>Conogethes punctiferalis</i>)	NSW, NT, QLD, SA & WA	7	-
Buprofezin (Applaud) Corteva PER88401	16	Lychee	Scale Insects (Coccidae, Diaspididae & Ericoccidae) Mealybugs (Pseudococcidae) Flatid Planthoppers (Cicadellidae & Delphacidae)	ALL (excl. VIC)	H:14 NG	-
Carbaryl	1B	Lychee / Non-Flowering, Non-Fruiting Trees Only	Castor Oil Looper Leaf Eating Looper Macadamia Nutborer Redshouldered Leaf Beetle Swarming Leaf Beetle Yellow Peach Moth Monolepta Beetles Rhyparida Beetles Leafroller Moths Wingless Grasshopper	ALL	NR	R3
Dimethoate	1B	Lychee	Erinose Mite / Pre-Plant Dip or In-Crop Spray	QLD, NSW & WA	7	R1
Dimethoate	1B	Lychee	Queensland Fruit Fly / Post Harvest Dip	QLD, NSW & WA	NR	R1

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Dimethoate PER13859	1B	Fruit Fly Host Crops	Fruit Fly	ALL	NR	R1
Dimethoate PER87164	1B	Lychee / Post-Harvest Treatment	Queensland Fruit Fly Lesser Queensland Fruit Fly Northern Territory or Darwin Fruit Fly Mediterranean Fruit Fly	ALL	NR	R1
Fatty Acids – Potassium Salt (Natrasoap)		Lychee	Soft control option with activity on aphids, thrips, mealybug, spider mite and whitefly.	ALL	NR	-
Garlic + Chilli + Pyrethrins + Piperonyl Butoxide	3A	Lychee	Suitable for organic growers. Broad spectrum activity including ants, aphids, caterpillars, earwigs, whitefly, thrips and leafhopper.	ALL	1	-
Methidathion (Suprathion) PER14099	1B	Lychee	Mealybug Nutborer Planthopper Scale Leafhoppers Fruit Spotting Bug	NSW, QLD	21	R1
Methoxyfenozide (Prodigy) Corteva	18	Lychee	Macadamia Nutborer	ALL	14	-
Paraffinic Oil (Prospect Post Harvest Fruit Treatment)		Lychee / Post Harvest Dip	Citrus Mealybug	ALL	NR	-
Petroleum Oil (Summer Oil) PER14507		Lychee	Green Shield Scale (<i>Pulvinaria psidii</i>) Soft Green Scale (<i>Coccus viridis</i>) Soft Scales (Coccidae)	ALL (excl. VIC)	1	-
Pyriproxyfen (Distance Ant Bait) Sumitomo	7C	Tropical Fruit Plantation / Ant Bait	Invasive and Nuisance Ants	ALL	NR	-

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Spinetoram (Success Neo) Corteva	5	Lychee	Flower-Eating Caterpillars Leafrollers Loopers Yellow Peach Moth Red-Banded Thrips Sorghum Head Caterpillar	ALL	NR	-
Spinetoram (Success Neo) Corteva PER89241	5	Tropical and Sub-Tropical Fruits (Inedible Peel)	Fall Armyworm (<i>Spodoptera frugiperda</i>)	ALL (excl. VIC)	NR	-
Spinosad (Entrust Organic) Corteva	5	Lychee	Flower-Eating Caterpillars Leafrollers Loopers Yellow Peach Moth Red-Banded Thrips Sorghum Head Caterpillar	ALL	NR	-
Spinosad (Entrust Organic) Corteva PER89870	5	Tropical and Sub-Tropical Fruits (Inedible Peel)	Fall Armyworm (<i>Spodoptera frugiperda</i>)	ALL (excl. VIC)	NR	-
Sulfoxaflor (Transform) Corteva PER85397	4C	Lychee	Fruit-spotting bug (<i>Amblypelta nitida</i>) Banana-spotting bug (<i>Amblypelta lutescens</i>)	NSW, NT, QLD & WA	7	-
Sulphur PER14508	Unknown	Lychee	Erinose Mite (<i>Aceria litchii</i>) White Louse Scale (<i>Unaspis citri</i>)	ALL (excl. VIC)	1	-
Tebufenozide (Mimic) Corteva	16A	Lychee	Macadamia Nutborer	ALL	14	-

Active Ingredient (Trade Name)	Chem. group	Situation	Pests / Comments	States	WHP Days	Regulatory risk
Trichlorfon (Lepidex) PER14743	1B	Lychee	Flatid Planthopper Flower Eating Caterpillar Looper Yellow Peach Moth Suppression only: Fruit-Spotting Bug Banana Spotting Bug Green Vegetable Bug Lychee Stink Bug	ALL (excl. VIC)	7	R2
Trichlorfon (Lepidex) PER12450	1B	Lychee	Queensland Fruit Fly (<i>Bactrocera tryoni</i>) Mediterranean Fruit Fly (<i>Ceratitis capitata</i>)	ACT, NSW, NT, QLD, SA & WA	H:7 NG	R2

Appendix 3. Products available for weed control in lychee

Active ingredient (Trade Name)	Chem. Group	Situation	Comment / Use / Weed	WHP (days)	States	Regulatory risk
Diquat and Paraquat (SpraySeed)	L**	Lychee / Directed Spray or Spot Spray	Grass and broadleaf weeds	H:1 G:7	ALL	R3
Fluazifop – P (Fusilade)	A***	Lychee / Directed Spray	Grass weeds	14	NSW, QLD, NT & WA	-
Glufosinate (Basta)	N**	Lychee / Directed or Shielded Spray	Grass and broadleaf weeds	NR	ALL	R3
Glyphosate (Roundup)	M**	Lychee / Directed Spray, Shielded Spray or Wick Wiper	Grass and broadleaf weeds	NR	ALL	R3
Haloxyfop (Verdict)	A***	Lychee / Directed Spray or Spot Spray	Grass weeds	NR	ALL	-
Oryzalin	D**	Lychee / Non-Bearing Trees Only / Directed Spray	Grass and broadleaf weeds	NR	ALL	-
Oxyfluorfen (Goal)	G**	Lychee / Directed Spray	Grass and broadleaf weeds	H:NR NG	ALL	-
Pendimethalin (Stomp)	D**	Lychee / Directed Spray, Requires Incorporation	Grass and broadleaf weeds	NR	ALL	-

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

Appendix 4. Plant Growth Regulators available in lychee

Active ingredient (Trade Name)	Chemical Group	Situation	Comment / Use / Weed	WHP (days)	States	Regulatory risk
Ethephon PER81753	Plant Growth Regulator	Lychee	To manage seasonal vegetative flushes to better synchronise flowering and fruit set	NR	QLD, NSW	-
Triclopyr (Tops) Campbells	Plant Growth Regulator	Lychee	Reducing Fruit Drop	NR	ALL	-

Appendix 5. Current permits for use in lychee

Permit No.	Description	Issued Date	Expiry Date	Permit Holder
PER12450 Version 6	Trichlorfon / Specified Fruit Crops / Fruit Fly (ACT, NSW, NT, QLD, SA, WA)	6-Oct-11	31-Jan-21	Growcom
PER13659 Version 2	Mancozeb / Lychee / Pepper Spot (NSW, QLD)	1-Oct-12	30-Sep-22	ALGA c/- Hort Innovation
PER13660 Version 2	Copper Hydroxide & Cuprous Oxide / Lychee / Lychee Pepper Spot	14-Aug-12	30-Jun-22	ALGA c/- Hort Innovation
PER14099 Version 2	Methidathion / Lychee / Mealybug, Nutborer, Planthopper, Scale, Leafhoppers and Fruit Spotting Bug (QLD, NSW)	1-Jul-13	4-Feb-21	ALGA c/- Hort Innovation
PER14507 Version 2	Petroleum Oil / Lychee / Green Shield Scale, Soft Green & Soft Scales	21-Mar-14	30-Nov-21	ALGA c/- Hort Innovation
PER14508 Version 2	Sulfur / Lychee / Lychee Erinose Mite & White Louse Scale	21-Mar-14	30-Nov-21	ALGA c/- Hort Innovation
PER14743 Version 3	Trichlorfon / Custard Apple, Lychee, Mango & Persimmon / Various Insect Pests	1-Jun-14	30-Jun-25	Hort Innovation
PER80367	Pyraclostrobin (Cabrio) / Lychee / Anthracnose or Pepper Spot (NSW, QLD, NT, WA)	12-May-15	31-Oct-25	ALGA
PER80369	Prochloraz (Octave WP) / Lychee / Anthracnose or Pepper Spot (NSW, QLD, NT, WA)	17-Mar-15	31-Oct-25	ALGA
PER80374 Version 2	Beta-cyfluthrin / Custard Apple, Lychee, Mango, Persimmon / Various Insect Pests (NSW, NT, QLD, SA, WA)	1-Oct-15	31-Aug-22	ALGA
PER81753 Version 2	Ethephon (Ethrel 720) / Lychee / Remove/Burn Unwanted Autumn Vegetative Flush (QLD, NSW)	5-Apr-16	31-Jan-24	Hort Innovation
PER85397	Sulfoxaflor (Transform) / Lychee, Mango, Papaya & Passionfruit / Fruit Spotting Bug and Banana Spotting Bug (NSW, QLD, NT, WA)	17-Apr-18	30-Apr-23	Hort Innovation
PER87717 Version 2	Abamectin / Lychee / Two-Spotted Mites	9-May-19	30-Nov-25	Hort Innovation
PER88197	Cyprodinil + Fludioxonil (Switch) / Lychee / Lychee Pepper Spot/Anthracnose	8-Nov-19	30-Nov-24	Hort Innovation
PER87164 Version 2	Dimethoate / Specified Citrus, Tropical Fruit Commodities / Various Fruit Fly Species	1-Mar-19	31-Mar-24	Hort Innovation
PER88401	Buprofezin (Applaud) / Lychee / Mealybug, Flatid Plant Hoppers and Scale Insects	23-Jan-20	31-Jan-25	Hort Innovation
PER13859 Version 2	Dimethoate / Orchard Cleanup Fruit Fly Host Crops / Fruit Fly	9-Feb-15	31-Jul-24	Hort Innovation
PER89241	Spinetoram (Success Neo) / Various Crops / Fall Armyworm Emergency Use Permit	06-Mar-20	31-Mar-23	Hort Innovation
PER89870	Spinosad (Entrust Organic) / Various Crops / Fall Armyworm Emergency Use Permit	21-Jul-20	31-Jul-23	Hort Innovation

Appendix 6. Lychee Maximum Residue Limits (MRLs)

CODEX commodity groupings of Lychee and subgroups:

FI 0343 Litchi
AO 20002 Fruits
FI 0030 Tropical - inedible peel

Note: The major export market for lychee is Hong Kong, with lesser volumes going to United Arab Emirates, New Zealand, Singapore, Canada and United States. Available information indicates that in the absence of specific limits in legislation, that most countries defer to Codex, followed by EU MRL standards, or apply a 0.01ppm default value. Food exported to New Zealand from Australia may be legally sold if it complies with Australian requirements. MRLs and legislation are subject to change; the values presented should not be relied on.

Chemical	Codex Code	Description	APVMA MRL mg/kg	Codex MRL mg/kg	US MRL mg/kg
Abamectin	FI 0030	Tropical - inedible peel	-	-	0.01
Acequinocyl	FI 0030	Tropical - inedible peel	-	-	2
Aldrin and Dieldrin		Fruits	E0.05	-	-
Azoxystrobin	FI 0343	Litchi	-	-	2
Bifenazate	FI 0343	Litchi	-	-	5
Bromide Ion		Fruits	-	20	-
Buprofezin	FI 0030	Tropical - inedible peel	-	-	0.3
Carfentrazone-ethyl	FI 0030	Tropical - inedible peel	*0.05	-	-
	FI 0343	Litchi	-	-	0.1
Chlorantraniliprole	FI 0343	Litchi	-	-	2
Chlorothalonil	FI 0343	Litchi	-	-	15
Cymoxanil	FI 0343	Litchi	-	-	1
Cypermethrins (including alpha- and zeta-cypermethrin)	FI 0343	Litchi	-	2	-
Cyprodinil	FI 0343	Litchi	-	-	2
DDT		Fruits	E1	-	-
Deltamethrin	FI 0343	Litchi	-	-	0.2
Diazinon		Fruits	0.5	-	-
Etofenprox		All food commodities	-	-	5
Dicofol		Fruits	5	-	-
Didecyldimethylammonium chloride	FI 0030	Tropical - inedible peel	20	-	-
Dimethoate see also Omethoate	FI 0030	Tropical - inedible peel	5	-	-
Diquat		Fruits	*0.05	-	-
Dithianon		Fruits	2	-	-
Endosulfan	FI 0343	Litchi	-	2	-
Ethephon	FI 0343	Litchi	*T0.05	-	-
Fenbutatin oxide	FI 0030	Tropical - inedible peel	5	-	-
Fenpropathrin	FI 0343	Litchi	-	-	7
Fipronil	FI 0030	Tropical - inedible peel	*T0.01	-	-
Fluazifop-p-butyl	FI 0030	Tropical - inedible peel	0.05	-	-
Fludioxonil	FI 0343	Litchi	-	-	20

Chemical	Codex Code	Description	APVMA MRL mg/kg	Codex MRL mg/kg	US MRL mg/kg
Fluopyram	FI 0030	Tropical - inedible peel	T2	-	-
Glufosinate and Glufosinate ammonium	FI 0030	Tropical - inedible peel	0.2	-	-
Glufosinate-Ammonium	FI 0030	Tropical - inedible peel	-	0.1	-
Glyphosate	FI 0343	Litchi	-	-	0.2
Haloxypop	FI 0030	Tropical - inedible peel	*0.05	-	-
Imidacloprid	FI 0343	Litchi	-	-	3
Indaziflam	FI 0030	Tropical - inedible peel	-	-	0.01
Inorganic bromide		Fruits	20	-	-
Isoxaben	FI 0030	Tropical - inedible peel	*0.01	-	-
Lindane		Fruits	E0.5	-	-
Maldison		Fruits	2	-	-
Metaldehyde		Fruits	1	-	-
Methiocarb		Fruits	T0.1	-	-
Methoxyfenozide	FI 0343	Litchi	-	-	2
Methyl Bromide	FI 0343	Litchi	-	-	5
Novaluron	FI 0030	Tropical - inedible peel	-	-	9
Omethoate		Fruits	2	-	-
Oryzalin		Fruits	0.1	-	-
Oxyfluorfen	FI 0030	Tropical - inedible peel	*0.01	-	-
Paclobutrazol	FI 0030	Tropical - inedible peel	*0.01	-	-
Paraquat		Fruits	*0.05	-	-
Paraquat	FI 0030	Tropical - inedible peel	-	*0.01	-
Paraquat dichloride	FI 0343	Litchi	-	-	0.05
Pendimethalin	FI 0030	Tropical - inedible peel	*0.05	-	-
Phosphine	FI 0030	Tropical - inedible peel	*T0.01	-	-
Phosphorous acid	FI 0030	Tropical - inedible peel	T100	-	-
Piperonyl butoxide		Fruits	8	-	-
Pirimicarb		Fruits	0.5	-	-
Prochloraz	FI 0030	Tropical - inedible peel	-	Po7	-
Pyrethrins		Fruits	1	-	-
Pyriproxyfen	FI 0343	Litchi	-	-	0.3
Simazine		Fruits	*0.1	-	-
Spinetoram	FI 0030	Tropical - inedible peel	0.3	-	-
Spinetoram	FI 0343	Litchi	-	0.01	0.3
Spinosad	FI 0030	Tropical - inedible peel	0.3	-	-
	FI 0343	Litchi	-	-	0.3
Spirotetramat	FI 0343	Litchi	-	15	13
Tebuconazole	FI 0030	Tropical - inedible peel	-	-	1.6
Trichlorfon	FI 0030	Tropical - inedible peel	T3	-	-
Trifloxystrobin	FI 0030	Tropical - inedible peel	T2	-	-
Trifluralin		Fruits	*0.05	-	-

NOTE: For the groups "Assorted tropical and sub-tropical fruits - inedible peel" and "Fruits" listed above, (Lychee) crop group exclusions (if any) have not been specified.

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

T = Temporary MRL

E = The MRL is based on extraneous residues

Po = The MRL accommodates post-harvest treatment of the commodity

Sources: APVMA MRLs: Agricultural and Veterinary Chemicals Code (MRL Standard) Instrument 2019. Compilation 4. Prepared 15 January 2020. CODEX MRLs: CODEX Alimentarius International Food Standards database (February 2020), <http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/>

Appendix 7. Lychee Agrichemical Regulatory Risk Assessment

Lychee Agrichemical Regulatory Risk Assessment

September 2020

Regulatory pressures on agrichemicals are increasing globally, with many being either restricted or withdrawn from use. For older agrichemicals these pressures are often the result of reconsiderations involving new or refined risk assessment methodologies that require the generation of new data. A consequence of which can be that many of these chemicals 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 farm chemicals 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 prohibiting the use in the exporting country to ensure compliance, as breaches of MRLs would adversely affect market access.

The effects of the above are greater pressure placed on the availability and use of individual chemicals 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 litchi 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

Problem	Active Constituents	Chemical Group	Comment	Actions
Ants				
Ants	Pyriproxyfen ⁵	7C	EU – Authorisation renewal process underway	
Aphids				
Aphids	Fatty acids – K salt			Data generation project ST18001 underway for Versys® (afidopyropen) label registration with BASF
Beetles				
Elephant/Rhinoceros beetle	Beta-cyfluthrin (PER80374)	3A	EU: Non-renewal of approval	
Fig longicorn/ trunk borer	Beta-cyfluthrin (PER80374)	3A	EU: Non-renewal of approval	
Red shouldered leaf beetle	Beta-cyfluthrin (PER80374)	3A	EU: Non-renewal of approval	
	Carbaryl	1A	Canada: Review recently completed, retained but with a large number of uses deleted Codex: Toxicology review scheduled 2020 EU: Authorisation not renewed	
Swarming leaf beetles	Beta-cyfluthrin (PER80374)	3A	EU: Non-renewal of approval	
	Carbaryl	1A	Canada: Review recently completed, retained but with a large number of uses deleted Codex: Toxicology review scheduled 2020 EU: Authorisation not renewed	

⁵ Includes Black ants, coastal brown ants, exotic yellow crazy ants, green tree ants, red imported fire ants, sugar ants, tramp ants and tropical fire ants.

Lychee Agrichemical Regulatory Risk Assessment

Problem	Active Constituents	Chemical Group	Comment	Actions
Fruit fly				
Fruit flies	Dimethoate (PER87164)	1B	Codex: MRL deletion recommended. EU proposing to set all MRLs to < 0.01 mg/kg	
	Trichlorfon (PER12450)	1B	APVMA – nominated for review Codex – No MRLs EU – Deregistered US – No MRLs	
	Maldison (bait)	1B	APVMA – Under review – chemistry Codex: Re-evaluation scheduled for 2022/23	
Caterpillars				
Fall armyworm	Spinetoram (PER89241)	5		Data generation project ST17000 underway for a Assorted tropical fruits-inedible peel crop group label registration with Bayer DC-163 for various pests including lepidopteran pests and borers in lychee.
	Spinosad (PER89870)	5		
Flower eating caterpillars	Spinetoram	5		
	Spinosad	5		
	Trichlorfon (PER14743)	1B	APVMA – nominated for review Codex – No MRLs EU – Deregistered US – No MRLs	
Leafroller caterpillars	Spinetoram	5		
	Spinosad	5		
Loopers	Spinetoram	5		
	Spinosad	5		
	Trichlorfon (PER14743)	1B	APVMA – nominated for review Codex – No MRLs EU – Deregistered US – No MRLs	

Lychee Agrichemical Regulatory Risk Assessment

Problem	Active Constituents	Chemical Group	Comment	Actions
Macadamia nut borer	Beta-cyfluthrin (PER80374)	3A	EU: Non-renewal of approval	Data generation project ST17000 underway for a Assorted tropical fruits-inedible peel crop group label registration with Bayer DC-163 for various pests. Lepidoptera & Borers, including Macadamia nut borer & Longicorn trunk borer
	Carbaryl	1A	Canada: Review recently completed, retained but with a large number of uses deleted Codex: Toxicology review scheduled 2020 EU: Authorisation not renewed	
	Methidathion (PER14099)	1B	APVMA: Use will not be permitted in AU after 4 February 2021. Registrant will remove from sale and all authorisations will be cancelled. EU – Deregistered USA - Deregistered Codex - To be reviewed 2019/20.	
	Methoxyfenozide	1B	EU: Proposed restricted authorisation & Candidate for substitution	
	Tebufenozide	1B	Canada: Review completed Jan 2019 – continued use acceptable	
Mango shoot caterpillar	Beta-cyfluthrin (PER80374)	3A	EU: Non-renewal of approval	
Sorghum head caterpillar	Spinetoram	5		
	Spinosad	5		
Yellow peach moth	Beta-cyfluthrin (PER80374)	3A	EU: Non-renewal of approval	
	Carbaryl	1A	Canada: Review recently completed, retained but with many uses deleted Codex: Toxicology review scheduled 2020 EU: Authorisation not renewed	
	Spinetoram	5		
	Spinosad	5		
	Trichlorfon (PER14743)	1B	APVMA – nominated for review Codex – No MRLs EU – Deregistered US – No MRLs	

Lychee Agrichemical Regulatory Risk Assessment

Problem	Active Constituents	Chemical Group	Comment	Actions
Mites				
Litchi erinose mite	Abamectin (PER87717)	6		
	Sulfur (PER14508)	UN		
Two-spotted spider mite	Abamectin (PER87717)	6		
Plant bugs and leaf hoppers				
Banana-spotting bug	Beta-cyfluthrin (PER80374)	3A	EU: Non-renewal of approval	Project ST16006 with Trivor® (acetamiprid + pyriproxyfen) data generation – registration Project ST19020 under development for Assorted tropical fruits- inedible peel crop group label registration with Bayer Sivanto (Flupyradiforone)
	Sulfoxaflor (PER86598)	4C	USA – Pollinator concerns	
	Trichlorfon (PER14743)	1B	APVMA – nominated for review Codex – No MRLs EU – Deregistered US – No MRLs	
Fruit-spotting bug	Beta-cyfluthrin (PER80374)	3A	EU: Non-renewal of approval	
	Methidathion (PER14099)	1B	APVMA: Use will not be permitted in AU after 4 February 2021. Registrant will remove from sale and all authorisations will be cancelled. EU – Deregistered USA - Deregistered Codex - To be reviewed 2019/20.	
	Sulfoxaflor (PER85397)	4C	USA – Pollinator concerns	
	Trichlorfon (PER14743)	1B	APVMA – nominated for review Codex – No MRLs EU – deregistered US – No MRLs	

Lychee Agrichemical Regulatory Risk Assessment

Problem	Active Constituents	Chemical Group	Comment	Actions
Flatid planthoppers	Beta-cyfluthrin (PER80374)	3A	EU: Non-renewal of approval	Project ST16006 with Trivor® (acetamiprid + pyriproxyfen) data generation for a label registration
	Buprofezin (PER88401)	16	EU – In the process of deleting MRLs	
	Trichlorfon (PER14743)	1B	APVMA – nominated for review Codex – No MRLs EU – deregistered US – No MRLs	
Green vegetable bug	Beta-cyfluthrin (PER80374)	3A	EU: Non-renewal of approval	
	Trichlorfon (PER14743)	1B	APVMA – nominated for review Codex – No MRLs EU – deregistered US – No MRLs	
Leafhoppers/planthoppers	Methidathion (PER14099)	1B	APVMA: Use will not be permitted in AU after 4 February 2021. Registrant will remove from sale and all authorisations will be cancelled. EU – Deregistered USA - Deregistered Codex - To be reviewed 2019/20.	
Litchi stink bug	Beta-cyfluthrin (PER80374)	3A	EU: Non-renewal of approval	
	Trichlorfon (PER14743)	1B	APVMA – nominated for review Codex – No MRLs EU: – deregistered US: No MRLs	

Lychee Agrichemical Regulatory Risk Assessment

Problem	Active Constituents	Chemical Group	Comment	Actions
Scale and mealybug				
Citrus mealybug	Paraffinic oil	-		Project ST16006 with Trivor® (acetamiprid + pyriproxyfen) data generation - registration
Mealybugs	Buprofezin (PER88401)	16	EU – In the process of deleting MRLs	
	Methidathion (PER14099)	1B	APVMA: Use will not be permitted in AU after 4 February 2021. Registrant will remove from sale and all authorisations will be cancelled. EU – Deregistered USA - Deregistered Codex - To be reviewed 2019/20.	
Green shield scale	Paraffinic oil	-		
Scale insects	Buprofezin (PER88401)	16	EU – In the process of deleting MRLs	
	Paraffinic oil/ petroleum oil	-		
	Methidathion (PER14099)	1B	APVMA: Use will not be permitted in AU after 4 February 2021. Registrant will remove from sale and all authorisations will be cancelled. EU – Deregistered USA - Deregistered Codex - To be reviewed 2019/20.	
Soft scales	Paraffinic oil / petroleum oil	-		
White louse scale	Sulfur (PER14508)	UN		
Thrips				
Redbanded thrips	Spinetoram	5		
	Spinosad	5		

Lychee Agrichemical Regulatory Risk Assessment

Problem	Active Constituents	Chemical Group	Comment	Actions
DISEASES				
Algal spot	Copper	M1	EU: Candidates for substitution and their uses to be phased out	
Anthracnose/Pepper spot	Copper (PER13660)	M1	EU: Candidates for substitution and their uses to be phased out	Data generation project ST16006 underway for a Assorted tropical fruits-inedible peel crop group label registration for Luna Experience & Luna Sensation *Luna Sensation registered 2020.
	Cyprodinil + fludioxonil (PER88197)	9 + 12	Cyprodinil Canada – Under review EU: Candidate for substitution Fludioxonil EU – Under review/ Candidate for substitution	
	Fludioxonil (PER88197)	12	EU – Under review/ Candidate for substitution	
	Fluopyram + trifloxystrobin	7 + 11		
	Mancozeb (PER13659)	M3	APVMA - Nominated for review Canada – Under review Codex - To be reviewed 2022/23 EU: Proposed non-renewal of authorisation	
	Prochloraz (PER80369)	3	Codex: Periodic re-evaluation scheduled for 2021/22 EU: Candidate for substitution	
	Pyraclostrobin (PER80367)	11		
Phytophthora	Copper	M1	EU: Candidates for substitution and their uses to be phased out	
Trunk (stem) canker	Copper	M1	EU: Candidates for substitution and their uses to be phased out	
Sanitizer	DDAC		EU: No authorisation in place	

Lychee Agrichemical Regulatory Risk Assessment

Problem	Active Constituents	Chemical Group	Comment	Actions
WEEDS				
Broadleaf weeds and grasses	Carfentrazone-ethyl	G		
	Diquat	L	APVMA - Currently under review EU: No authorisation in place	
	Fluazifop	A		
	Glufosinate	N	EU: No authorisation in place	
	Glyphosate	M	Ongoing issues internationally	
	Haloxifop-P	A		
	Oxyfluorfen	G	EU: Candidate for substitution	
	Paraquat	L	APVMA - Currently under review EU: No authorisation in place Rotterdam Convention - nominated	
	Pendimethalin	D	EU: Candidate for substitution	
PLANT GROWTH REGULATORS				
Plant growth regulators	Ethephon (PER81753)			
Drop prevention	Triclopyr			

MT17019 – Regulatory support and coordination. This multi-industry project has been funded by Hort Innovation using industry research and development levies and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.