



ONIONS

Strategic Agrichemical Review Process
2009

Horticulture Australia

AgAware Consulting

April 2009

Project leaders names:

Mr Peter Dal Santo
AgAware Consulting P/L
21 Rosella Avenue
Strathfieldsaye Victoria Australia 3551
Ph: +61 3 5439 5916
Fax: + 61 3 5439 3391
Email: pds@agaware.com.au

Purpose of the report:

This report was funded by Horticulture Australia and the Australian Onion Industry Association to investigate the pest problem, agrichemical usage and pest management alternatives for the onion industry across Australia. The information in this report will assist the onion industry with its agrichemical selection and usage into the future.

Funding sources:

- Horticulture Australia (HAL)
- Onion Australian (OA)

Date of report:

27 April 2009

Disclaimer:

While AgAware Consulting Pty Ltd has taken all care and responsibility in producing the information in this document, AgAware Consulting Pty Ltd makes no representations in respect of, and, to the extent permitted by law, excludes all warranties in relation to, the accuracy or completeness of the information. AgAware Consulting Pty Ltd, its officers, employees, directors and contractors exclude all liability whatsoever for any loss or damage, howsoever, arising out of reliance, in whole or in part, on the information.

Any recommendations contained in this publication do not necessarily represent current Horticulture Australia Ltd policy. No person should act on the basis of the contents of this publication without first obtaining independent professional advice on their specific situation.

Table of Contents

Media summary	iv
The Australian onion industry	1
Introduction	2
Minor-use permits and registration	3
Method	3
Results	4
Discussions	5
Diseases of onions	5
High priority diseases	6
Insects of onions	13
High priority insects	13
Herbicide use in onions	17
References, Acronyms, Acknowledgements and Disclaimers	19
Appendices	21

PUBLIC

Media Summary

A Strategic Agrichemical Review Process (SARP) assesses the importance of the disease, insects and weeds (plant pests) that can affect a horticultural industry; evaluates the availability and effectiveness of fungicides, insecticides and herbicides (pesticides) to control the plant pests; determines any 'gaps' in the pest control strategy and identifies suitable new or alternative pesticides to address the 'gaps'.

The selection of any alternative pesticide will have the benefit of:

- IPM compatibility, wherever possible
- Improved scope for resistance management
- Sound biological profile
- Residue and trade acceptance domestically and for export

This report relates to bulb onions only – *Allium cepa* var. *cepa*.

The SARP was conducted in November 2007, in Adelaide South Australia as part of an Onion Australia meeting. The results of the process will provide the onion industry with sound pesticide options for the future that the industry can pursue for registration with the manufacturer, or minor-use permits with APVMA.

The diseases identified as a high priority are:

Disease (common name)	Disease (scientific name)
Bacterial Rot	<i>Erwinia spp. & Pseudomonas spp</i>
Downy Mildew	<i>Peronospora destructor</i>
Neck and Bulb Rot	<i>Botrytis allii. and B. aclada</i>
Black mould	<i>Aspergillus niger</i>
White Rot	<i>Sclerotium cepivorum</i>

The insects identified as a high priority are:

Insect (common name)	Insect (scientific name)
Cutworms	<i>Agrotis spp.</i>
Onion thrips	<i>Thrips tabaci</i>

Currently most insecticides registered in onions for insect control are Group 1B insecticides. Continuing use of only Group 1B products could potentially lead to resistance developing and the complete loss of insect management.

Weeds identified as a high priority for control and registered herbicides are:

Weed (common name)	Weed (scientific name)	Herbicides registered
Fleabane	<i>Conyza spp.</i>	propachlor
annual ryegrass (Group A resistant)	<i>Lolium rigidum</i>	propachlor
Onion weed	<i>Asphodelus fistulosus</i>	no options currently available

Weed (common name)	Weed (scientific name)	Herbicides registered
White thistle	<i>Asteraceae</i> (<i>unidentified species</i>)	chlorthal-dimethyl cyanazine ioxynil linuron methabenzthiazuron oxyfluorfen propachlor
Wireweed	<i>Polygonum aviculare</i>	chlorthal-dimethyl ethofumesate ioxynil oxyfluorfen pendimethalin
Mexican poppy	<i>Argemone ochroleuca ssp.</i> <i>Ochroleuca</i>	no options currently available.
Fumitory	<i>Fumaria spp.</i>	ethofumesate ioxynil oxyfluorfen
Carrot weed	<i>Cotula australis</i>	methabenzthiazuron oxyfluorfen
Stinging nettle	<i>Urtica spp.</i>	linuron
Self sown potato	<i>Solanum tuberosum</i>	ethofumesate oxyfluorfen
Cleavers	<i>Galium aparine</i>	oxyfluorfen

All of these weeds can be controlled prior to crop establishment with glyphosate +/- oxyfluorfen or diquat + paraquat as a general weed control.

Onions are very susceptible to weed pressure due to the parallel growth phases with many weeds. As seedlings they are also very susceptible to herbicide damage.

The results of this process will provide the onion industry with sound pesticide options 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).

The Australian onion industry



The Australian dry bulb onion industry (*Allium cepa* var. *cepa*) is a mature, but resourceful and dynamic horticultural industry with a constant consumer demand for their product. The onion industry is a major horticultural industry, ranking as the 8th largest vegetable crop accounting for 5.8% of total vegetable production (AusVeg 2008). In 2002, there were 505 onion growers, however generally speaking the number of Australian vegetable growers has decreased since then. Australian Onion (AO) manages the interests of the industry nationally.

Dry bulb onions are grown in all states of Australia with production in order of significant being: South Australia; Tasmania; Queensland; New South Wales; Victoria; Western Australia (ABS 2003).

The main onion growing regions are:

1. Adelaide Plains (SA)
2. South East of South Australia
3. River Murray (SA)
4. Tasmania
5. Lockyer Valley (QLD)
6. Riverina (NSW)
7. Western Districts (VIC)
8. Gippsland (VIC)
9. Perth (WA)
10. Manjimup (WA)

The area planted to onions in 2005 was 5,974 ha (AusVeg 2008). This grew from 5,558 ha in 2004.

In 2006, the total onion production in Australia was ~227,000 tonnes. Production has grown steadily since 1998. Full production levels are expected to rise with a general increase in consumer demand for vegetables in Australia (AusVeg 2008). In 2006, the onion per capita consumption in Australia was 9.2 kg.

Total production varies with seasonal conditions:

- o Production (onions, white and brown):

Year	Total production (Tonnes)	Total hectares	Tonnes/ha (average)	Value (\$ mil farmgate)
2001	222,000	4,991	44.5	120
2002	282,000	5,513	51.2	163
2003	229,000	5,263	43.5	126
2004	233,000	5,558	41.9	152
2005	258,000	5,974	43.2	143
2006	227,000	4,740	47.9	154

Australian onions are also exported with major export countries including: Germany, France, Spain, Italy, United Kingdom, Belgium and Japan. The main competitors are other southern hemisphere producers, such as New Zealand, South Africa and Argentina (The Australian Horticultural Statistics Handbook 2003).

Introduction

Growers of horticultural crops frequently suffer from a lack of legal access to crop protection products (pesticides). The problem is that whilst their crops are valuable, they are considered too small individually for agchem manufacturers to bear the high cost of registering pesticides for use on them. It is also a problem in larger crops, such as bulb onions, where a problem may only be localised or spasmodic.

Growers are increasingly trapped in a situation where they face severe losses from diseases, pests and weeds if they do nothing to protect their crops, or face penalties if they use a product that is not registered or available via a permit. The onion industry is very aware of the possible consequences that can occur from the use of unregistered or non-permitted pesticides. These can include;

- Produce with unauthorised pesticide residues
- Rejection of produce from local markets
- Temporary exclusion from market access
- Rejection of produce from export markets
- Jeopardising of export trading arrangements
- Fines and penalties

Pesticides have always been an important tool in the production of onions. Fungicides and insecticides are used as a necessary tool to control plant pests, which can proliferate in ideal growing conditions. Herbicides are also used during establishment and plant development to minimize competition.

The onion industry has access to a range of pesticides to control the various diseases, insects and weeds that affect the crop, pre-seedling, during the establishment phase and during the development stage.

From a pesticide access perspective, the Australian Pesticides and Veterinary Medicines Authority (APVMA) classify onions as a major crop.

As a consequence of the issues facing the onion industry regarding pesticide access, AgAware Consulting Pty Ltd in association with Horticulture Australia Ltd and Onions Australia undertook a review of the pesticide requirements in onions via a Strategic Agrichemical Review Process (SARP). See Appendix 1 – the Strategic Agrichemical Review Process.

The aim of the process is to determine the current and future pesticide requirements to protect onion crops from diseases, insects and weeds. The project will undertake the assessment of pesticide suitability, resistance, IPM, residues and exports in its evaluations. By providing access to minor-use permits or registrations, onion growers will have pesticides legally available to address these needs.

SARP was conducted in November 2007, in Adelaide South Australia as part of an onion meeting. This assessment provided a list of key diseases, insects and weeds that are of major concern to the onion industry. Against these threats the pesticides, pesticide group, withholding period, registered/permitted uses and overall suitability (IPM, residues, efficacy, trade and environment) for these pests were identified. Any potential new risks to the industry were also identified.

The results will provide the onion industry with a clear picture of gaps in the existing pest control options, and note the potential to address gaps with effective IPM compatible pesticides.

The results of the process will provide the onion industry with sound pesticide options for the future that the industry can pursue for registration with the manufacturer, or minor-use permits with APVMA.

This report is not a comprehensive assessment of ALL pests and control methods of onions but attempts to prioritise the major problems.

Minor-use permits and registration

Onions are classified as a major crop by APVMA. Therefore access to minor-use permits can be difficult. Possible options for the onion industry are:

- For APVMA to change the criteria for major/minor use. This will require a change in the Federal legislation. These talks are currently taking place at the State level.
- Biological change in the pesticide or pests of onions, making current pesticides ineffective.
- For manufacturers to register new pesticides or uses.

Methods

The dry bulb onion SARP was conducted in November 2007 in Adelaide South Australia, as part of an onion meeting. The meeting included members of the Onion Australia Executive, the IAC, leading growers, consultants, government agencies and the Onion Australia Executive Officer.

- Participants were given a comprehensive list of most major pests of onions and asked to prioritise them into high, moderate and low categories.
- Participants were then asked to list the main pesticides and or other control agents used for each pest.
- Mostly pesticide trade names were used and the list provided was certainly not comprehensive but a starting point for further assessment.
- Pesticides that are under review by the Australian Pesticides and Veterinary Medicines Authority (APVMA) were listed.
- Information was collated onto Excel spreadsheets for diseases, insects and weeds.
- The information was circulated to participants for further comments and to ensure the accuracy of the information.
- An assessment was conducted for each of the diseases, insects and weeds of onions that required new or additional control options.
- Each alternative pesticide was assessed for:
 - IPM compatibility
 - Improved scope for resistance management
 - Sound biological profile
 - Residue and trade acceptance domestically and for export
- Final selections of proposed new pesticides for the onion industry to pursue were listed.

Results

The complete list of SARP worksheets is presented.

- Appendix 2 – results of the onion Strategic Agrichemical Review Process
 - currently available fungicides
- Appendix 3 – results of the onion Strategic Agrichemical Review Process
 - currently available nematicides
- Appendix 4 – results of the onion Strategic Agrichemical Review Process
 - currently available insecticides
- Appendix 5 – results of the onion Strategic Agrichemical Review Process
 - currently available herbicides

PUBLIC

Discussions

Diseases of Onions

Common name

Scientific name

HIGH PRIORITY

Bacterial rot/Bacterial blast	<i>Erwinia spp., Pseudomonas spp + others</i>
Downy mildew	<i>Peronospora destructor</i>
Neck and bulb rot	<i>Botrytis allii. and B. aclada</i>
Black mould	<i>Aspergillus niger</i>
White rot	<i>Sclerotium cepivorum</i>

MODERATE PRIORITY

Blue mould	<i>Penicillium spp.</i>
Nematodes	<i>Unidentified species (possibly Root-knot nematode - Meloidogyne spp.?)</i>
Purple blotch	<i>Alternaria porri</i>
Fusarium	<i>Fusarium spp.</i>
Stemphyllium	<i>Stemphyllium spp</i>
Onion Stunt Syndrome	<i>Rhizoctonia complex</i>

LOW PRIORITY

Anthracnose (Post-harvest)	<i>Colletotrichum sp. Glomerella sp.</i>
Sclerotinia	<i>Sclerotinia spp.</i>

BIOSECURITY RISK

For accurate information on the disease biosecurity risks to the onion industry, reference: Plant Health Australia.

Iris yellow spot	Tospovirus that is transmitted by onion thrips
Southern blight or Rolf's disease	<i>Sclerotinia rolfii</i>
Bacterial spot	<i>Pseudomonas syringae</i>
Onion smut	<i>Urocystis cepulae</i>
Phytophthora rot	<i>Phytophthora spp.</i>

High priority disease

Bacterial soft rot (*Erwinia spp.* & *Pseudomonas spp.*)



Infection takes place either at the time of harvesting the crop when the tops are cut or damaged, or otherwise through a wound made during the growing season.

Soft rot will develop during storage and onion flesh may appear darker in colour, when well rotted, a bad smelling liquid will ooze out of bulbs.

To assist prevention of this disease plant husbandry techniques and good management should be practiced to minimise the physical damage to the bulbs, which may allow the entry of the disease. The disease is also favoured by high temperatures above 30°C.

Bacterial rot can affect onions throughout its growing phase. But if Bacterial rot affects the crop early in its development, the plant dies. Therefore, the main aim is to control later infections.

- Bacterial rot is considered a:
 - Major problem in all states, especially when conditions are wet around harvest.
- No fungicides are registered or available via permits for the control of Bacterial rot in onions.

University of California recommendations

Cultural Control - Avoid overhead irrigation once onions start to bulb (bulbing occurs about the time the bulb is twice the diameter of the neck). Harvest only after onion tops are well matured. Provide for quick drying following topping, especially if temperatures are high.

Downy mildew (*Peronospora destructor*)



First seen as a fine, furry white/grey to purple growth on the surface of older leaves. Leaf tissue under the growth turns yellow and dies.

The disease can spread by air-borne spores if conditions are conducive.

Can cause considerable yield losses and is able to develop rapidly if the weather conditions are favourable (mild temperatures and humid conditions).

Leaves affected by downy mildew can die during growth.

- Downy mildew is considered a:
 - Major onion disease in all states.
 - Crops are regularly sprayed for this disease.
 - Management relies on protectant fungicides particularly mancozeb then moves to eradicant fungicides if needed (conditions favour disease).
 - In Tasmania it is a late season disease.
 - In Tasmania there is an over reliance on protectant products.
 - It is reported by some QLD growers that the use of some surfactants exacerbates the problem.

- There is a need to develop an integrated management strategy for the control of this disease.
- Fungicides listed for Downy mildew control in onions are:
 - Benalaxyl – Group D protectant/curative fungicide
 - Chlorothalonil – Group Y protectant fungicide
 - Copper - Group Y protectant fungicide
 - Dimethomorph – Group X protectant/curative fungicide
 - Mancozeb + metalaxyl-M – Group DY protectant/curative fungicide
 - Mancozeb – Group Y protectant fungicide
 - Propineb + oxadixyl – Group DY protectant/curative fungicide
 - Propineb – Group Y protectant fungicide
 - Zineb – Group Y protectant fungicide
- Of these products:
 - Benalaxyl - has no reported usage.
 - Chlorothalonil - some growers claim efficacy has decreased over past few years for this product. Resistance has not been confirmed.
 - Not used in some regions as there are reports that it does not work at all.
 - Copper – commonly used for Downy mildew and other diseases. It is used in combination with mancozeb and is known to be active against bacterial diseases.
 - Dimethomorph - commonly used but depends on the season. Extensively used and effective as a curative fungicide. Works best if applied early - preventative timing when conditions favour disease.
 - Mancozeb metalaxyl-M - commonly used but depending on the season. In Tasmania there has been an over reliance on this product. This has lead to this product not working in Tasmania.
 - Mancozeb - commonly used. It is used in combination with copper and is known to be active against bacterial diseases.
 - Propineb + oxadixyl - has no reported usage.
 - Propineb - has no reported usage.
 - Zineb - has no reported usage.
- A fungicide listed for Downy mildew control in onions via a permit is:
 - PER7905 - phosphorous acid / bulb onions / Downy mildew (suppression) – Group Y protectant/curative fungicide. Expires 30/9/12. Valid for all states (other than Vic).
 - Phosphorous acid is commonly used by some, but not all growers. There is a variety of perspectives amongst growers regarding the efficacy of this product. Some growers will not use as they believe it will not work on allium Downy mildew. Others believe it helps with suppression; others believe provides effective control.

University of California recommendations

Cultural Control

Use a 3-year rotation away from *Allium* crops in paddocks where the disease has occurred. Destroy volunteer *Allium* plants in and around the paddock and buildings. Locate onion paddocks where there is good air movement to promote rapid drying of foliage.

Chemical Control

Spray at the first sign of disease; fungicides may be applied on a 7-day schedule, if necessary. For all fungicides, thorough coverage of foliage is important in the control of downy mildew.

Neck and bulb rot (*Botrytis allii*. and *B. aclada*)



Bulb rot generally appears during storage, but the infection originates in the field. Field crops can appear normal and show no symptoms when harvested. Infection starts at the neck where the tissue softens, becomes water soaked and turns brown. A grey furry growth develops in infected areas.

In severe infections, the neck and often the entire bulb will become soft and develop a watery rot.

The growth of this disease is promoted by being in wet and moist conditions for a long period of time.

Neck and bulb rot infects all stages of onion development. The disease is seed borne.

- Neck and bulb rot is considered a:
 - Sporadic problem in all states.
 - No control available other than for NSW and Tas.
 - Increasing problem especially in long storage from infection in-crop.
 - In Tasmania, this disease is problematic across most crops. There are a few management options, but an integrated management strategy is needed.
- There are no fungicides registered for Neck and Bulb rot control in onions.
- Fungicides listed for Neck and Bulb rot control in onions via permits are:
 - PER10885 – boscalid, iprodione and chlorothalonil / onions / Neck rot – Group G, B & Y protectant/curative fungicides. Expires 31/3/10. Valid for NSW and Tas only.
 - Boscalid and/or iprodione + chlorothalonil – commonly used and works well in Tasmania and NSW only. Boscalid needs to be used in rotation with iprodione + chlorothalonil for resistance management strategy.
 - Other states see boscalid and/or iprodione + chlorothalonil as a priority.
 - PER10885 – boscalid / onion seed treatment / Neck rot – Group G protectant/curative fungicides. Expires 31/3/10. Valid for NSW and Tas only.
 - Boscalid – commonly used and works well in Tasmania and NSW only.
 - Other states see boscalid seed treatment as a priority.

University of California recommendations

During the growing season, minimize damage to bulbs caused by insects and diseases. Avoid heavy or late applications of nitrogen fertilizer. Harvest onions only when the crop is mature and necks are well cured. Handle the crop with a minimum of bruising or wounding. Avoid late-season irrigation to allow the tissue to dry before harvest. The neck tissue must be well-cured before the crop is stored. Healthy onions that are properly stored are seldom affected. Store bulbs at temperatures of 5°C or less with low relative humidity and good circulation.

Black mould (*Aspergillus niger*)



This is a soil borne disease also known as Aspergillus. The fungus is first evident at the top or sides of the bulb where disease or injury has caused an opening in the skin. The fungus develops between dry, dead outer scales and the first inner fleshy scales of the bulb. Invaded scales initially become water soaked. The disease is a weather dependent - high temperatures and relative humidity at harvest promote this disease. High nitrogen and late irrigation can contribute to the problem (NSW DPI 2008).

- Black mould is considered a:
 - Major problem in all states other than Tasmania where it is not a problem at all.
 - It is only a problem in years where weather conditions favour the disease, otherwise it is a minor problem.
 - The disease is seed and soil borne.
 - Most infection occurs at harvest.
- There are no fungicides registered for Black mould control in onions.
- There are no fungicides available for Black mould control in onions via permits.
- No fungicides could be identified for use in onions for Black mould or *Aspergillus sp.* control.

University of California recommendations

There are no chemicals for the direct control of black mould. Research indicates that a good fungicide control program for foliage diseases will reduce the incidence of black mould. Storage and transit temperatures below 12.8°C and as low as 0.6°C are recommended to suppress black mould development. Handling of bulbs to avoid bruising also reduces injury and invasion sites for the fungus.

White rot (*Sclerotium cepivorum*)



White rot causes the yellowing of leaves, with gradual dieback.

Wet rot develops on roots and at the bulb base. White mould and black sclerotia can be found on these parts of the plant as the disease develops.

Crop losses can be very severe and is determined by the level of soil infection from previous crops, soil conditions and temperature.

Crop rotations are often impractical, as the sclerotia of *Sclerotium cepivorum* can remain viable in the soil for up to 20 years.

White rot and infect onions throughout the growing phase.

To prevent build up of soil *Sclerotium cepivorum* sclerotia, infected plants should be removed, use clean planting material, do not store diseased bulbs, avoid introducing infested soil or planting material to areas free of the disease (NZ recommendation).

Controlling White rot to date has required an IPM approach by using the following: paddock selection based on disease history, timing of crop to minimise infection, use of Folicur and lime super at drilling (Onion Australia 2000).

Current research is also looking into the benefit of composted onion waste in the control of white rot (QLD PMS 2008).

- White rot is considered a:
 - Major problem in Tasmania, Vic, Qld (Lockyer Valley) and parts of SA.
 - Not a problem in NSW and WA.
 - There is a need for more management options which are currently being investigated by HAL with the onion industry.
- Soil fumigants listed for the control of diseases, nematodes, insects and weeds in vegetables are:
 - Chloropicrin (chloropicrin) – Group 8A insecticide/biocide
 - Dazomet (dazomet) – isothiocyanate biocide
 - Metham (metham as Na salt) – Group 1A insecticide/biocide
- Fungicides listed for White rot control in onions are:
 - Sumisclex (procymidone) – Group B seed treatment fungicide.
 - Sumisclex (procymidone) – Group B transplant dip fungicide.
 - Sumisclex (procymidone) – Group B protectant/curative fungicide.
 - Procymidone is registered in Vic, Qld, NSW, SA and Tas for in-furrow application. Registered for soil spray in Vic, Qld, NSW, SA and the NT. Registered as a seed treatment in Vic, Qld, NSW, SA, Tas and NT. Registered as a transplant dip in Vic, Qld, NSW and SA.
 - It is generally used once per crop.
 - Growers who use this product in Vic and SA (Mt Gambier) say it is very effective in controlling White rot.
 - In Tasmania, not as effective as tebuconazole. Also concerns with phytotoxicity and residues.
 - In New Zealand, there are reports of some resistance to procymidone.
 - Folicur (tebuconazole) – Group C protectant/curative fungicide.
 - Tebuconazole is used once per crop.
 - Registered in Tas only – ‘before sowing, apply tebuconazole onto lime super and ensure good coverage of all lime super particles. Sow with seed’.
 - In Tasmania 70-80% crop mixed with fertilizer. It is used in rotation with Sumisclex (procymidone) in SA (Mt Gambier).
 - Issues in Tas as lime super no longer available. Peracto (Tas) has conducted trials investigating alternative carriers. On-going discussions with APVMA regarding a permit.
 - In Tasmania, control does not last the full season.

University of California recommendations

The most effective controls for white rot are avoidance and sanitation. Once a paddock is infected, chemical treatments are necessary to produce onion crops.

Cultural Control

Do not move cull bulbs, litter, and soil from infested to non-infested paddocks. Always clean equipment before moving from one paddock to another. Onion seed is not likely to carry sclerotia. The most effective way to avoid introducing the disease this way is to plant only

clean stock from known origins that have no history of white rot. However, the fungus is vulnerable at temperatures above 44°C, thus dipping seed in hot water will greatly reduce the amount of pathogen and is a good preventative measure, although it may not completely eradicate the fungus.

If disease is observed, cessation of irrigation will minimize damage but not stop the disease. In addition, follow a long-term rotation schedule and do not follow *Allium* crops with other *Allium* crops. Rotation alone will not control white rot because sclerotia can survive more than 20 years in soil, but it does help prevent build up of the pathogen.

Management Decisions

The white rot fungus produces no functional spores. Instead, it propagates only by the production of round, poppyseed-sized sclerotia produced on the roots of decayed host plants. The sclerotia germinate only in response to root exudation peculiar to the genus *Allium*. The specific reaction between sclerotia and exudates suggests a possible use of sclerotial germination stimulants for controlling white rot disease.

Biosecurity risk diseases

Iris yellow spot (Topovirus)

- Iris yellow spot is considered to be:
 - Potentially a serious disease in onions.
 - Transmitted by Onion thrips.
 - This disease is a virus and is spread by vectors, mainly Onion thrips and Western flower thrips. IPM considered important in the management of this disease. Symptoms include lesions on leaves.
 - The first detection of Iris yellow spot in Australian onions was in 2003 and it was found in 3 states (CSIRO 2003).
 - There has been recent detection of Iris yellow spot in onions in QLD (QLD PMS 2008).
 - To minimise the spread of viral diseases, preventative methods are aimed at minimising the spread of the disease by vectors. Ploughing in of crop debris after harvest may minimise the access of vectors to the old diseased crop to spread into new crops.

Overall new fungicide uses that can be pursued

The diseases identified as a high priority are:

Disease (common name)	Disease (scientific name)
Bacterial Rot	<i>Erwinia spp. & Pseudomonas spp</i>
Downy Mildew	<i>Peronospora destructor</i>
Neck and Bulb Rot	<i>Botrytis allii. and B. aclada</i>
Seedling blight rot	<i>Aspergillus niger</i>
White Rot	<i>Sclerotium cepivorum</i>

PUBLIC

Insects of Onions

Common name

Scientific name

HIGH PRIORITY

Cutworms	<i>Agrotis spp.</i>
Onion thrips	<i>Thrips tabaci</i>

MODERATE PRIORITY

Onion maggot	<i>Delia platura</i>
Snails	<i>Gastropoda</i>
Strawberry beetle	<i>Coleoptera</i>
Whitefringed weevil	<i>Naupactus leucoloma</i>

LOW PRIORITY

Aphids	<i>Aphidae</i>
Black field cricket	<i>Teleogryllus commodus</i>
Bugs	<i>Hemiptera</i>
Carpophilus beetle	<i>Carpophilus spp.</i>
Earwigs	<i>Dermaptera</i>
Field crickets	<i>Gryllidae</i>
Green vegetable bug	<i>Nezara viridula</i>
Heliothis	<i>Helicoverpa spp.</i>
Jassids	<i>Cicadellidae</i>
Leafhoppers	<i>Cicadellidae</i>
Leafminer flies	<i>Agromyzidae</i>
Lucerne flea and springtails	<i>Sminthurus viridis / Collembola</i>
Mites	<i>Acarina</i>
Mole crickets	<i>Gryllotalpidae</i>
Redlegged earth mite	<i>Halotydeus destructor</i>
Seed harvesting ants	<i>Pheidole spp.</i>
Spotted vegetable weevil	<i>Desiantha diversipes</i>
Thrips	<i>Thysanoptera</i>
Vegetable weevil	<i>Listroderes difficilis</i>
Wingless grasshopper	<i>Phaulacridium vittatum</i>
Wireworm	<i>Heteroderes sp.</i>

BIOSECURITY RISK

For accurate information on the insect bio security risks to the onion industry, reference: Plant Health Australia.

High priority insects

Cutworms (*Agrotis spp.*)



These larvae feed at night and stay in the soil during the day. A row of wilted plants along a crop row is a good indication of the presence of cutworm. They may grow to 30-40 mm in length and 5 mm thick. Colour may vary from brown to grey to black with longitudinal stripes.

Damage is usually seen as either the chewing off of seedlings at ground level so that they collapse or holes chewed in the bulbs of older crops.

Only an early season pest of onions.

- Cutworms are considered a:
 - Major problem in Tasmania and NSW. Low priority for other states.
 - In Tasmania, there is a high reliance on chlorpyrifos. There is a need for other management options.
 - Cultural control: Early preparation of soil by cultivating and allowing green plant matter to decay will remove their feed source causing them to starve (QLD DPI 1994).
- Insecticides registered for the control of cutworms in onions are:
 - Lorsban (chlorpyrifos) – Group IB contact and systemic insecticide.
 - Growers claim chlorpyrifos is not good enough at label rates (700 mL/ha).

Onion thrips (*Thrips tabaci*)



Onion thrips are very small and slender. Mature thrips are 1.3 mm long. Adults are pale yellow to light brown in colour. The immature stages have the same body shape as adults but are lighter in colour and are wingless. A hot, dry spring that follows a mild, dry winter favours this pest.

Onion thrips have a very extensive range of hosts, including cereals and broadleaved crops.

Symptoms are 'white flecking' on the leaves of plants. High populations of thrips can reduce both yield and keeping quality of onions.

Onions thrips can affect onions throughout the growing phase in all regions, except Tasmania where it is a late season pest.

- Onion thrips are considered a:
 - Major problem in all states.
 - In Tasmania, the majority of insecticides used are older generation chemistries. Many of these older products are under review by APVMA and may have restrictions placed on future usage patterns. There is resistance to commonly used insecticides and they are hard on beneficial/predatory insects.
 - In Qld, it is believed that this pest will always provide limitations to IPM and that scheduled spraying will always have a role in controlling this pest.

- Research is looking at the use of predatory mites as a biological control method for thrips (QLD PMS 2008).
- Onion thrips are easier to control than Western Flower Thrips, in that they do not develop resistance as quickly. From Aust experience, Karate is very effective in some regions and totally ineffective in others (NZ 2008).
- Insecticides registered for the control of Onion thrips in onions are:
 - Diazinon (diazinon) – Group IB contact and systemic insecticide.
 - Commonly used – commonly used by some but not all growers.
 - Used in all states - works well. WA & SA regularly used. NSW - not working well.
 - Hy-mal (maldison) – Group IB contact and systemic insecticide.
 - Occasionally used - rarely used by some growers
 - Only used in SA & NSW - replacement for diazinon. Effective. Not used in other states.
 - Supracide (methidathion) – Group IB contact and systemic insecticide.
 - Occasionally used - rarely used by some growers
 - Only used in SA & NSW - replacement for diazinon. Effective. Not used in other states.
- Insecticides listed for Onion thrips control in onions via permits are:
 - Alpha-cypermethrin / onions/ Onion thrips (PER8432). Valid for Tas only. Expires 5/2/11.
 - Commonly used in Tas - occasionally used by some growers
 - Used in rotation with diazinon. Some resistance known. NSW believe it does not work.
 - Diazinon / onions/ Onion thrips (PER9648). Valid for Tas only. Expired 9/1/09.
 - Occasionally used in Tas - occasionally used by some growers
 - Used in rotation with alpha-cypermethrin.
 - Lambda-cyhalothrin / onions / onion thrips (PER10714). Valid for all states (except Vic). Expires 30/9/11.
 - Commonly used - occasionally used by some but not all growers
 - Commonly used by all states. Works well in all states other than SA. SA-ineffective. Little used in Tas.

University of California comments

Biological Control

Natural enemies, including predaceous mites, minute pirate bugs, and lacewings, are often found feeding on thrips. These beneficials are very susceptible to insecticide sprays, however, and may not be important in paddocks where insecticides have been used.

Cultural Control

Avoid planting onions near grain fields, if possible, because thrips numbers often build up in cereals in spring. Overhead irrigation and rainfall provide some suppression of thrips populations, but treatments are often still necessary.

Monitoring and Management Decisions

Although thrips feeding during the early bulbing stage is the most damaging to yields, thrips must be controlled before onions reach this stage so that populations do not exceed levels that can be adequately controlled. Onions can tolerate higher thrips populations closer to harvest.

To make a cursory evaluation of thrips infestation levels, randomly sample leaves and evaluate thrips numbers and damage under leaf folds. A far more reliable means of evaluating thrips populations, however, is to randomly sample entire onion plants. This way leaves can be pulled apart and, using a hand lens, all the thrips on the inner leaves near the bulb can be counted as well as those under the leaf folds. Sample at least five plants from four separate areas of the field. A reliable treatment threshold has not been developed; however, a threshold of 30 thrips per plant mid-season (lower for very young plants and higher for larger mature plants) has been used successfully for dry bulb fresh market and drying onions.

While resistance to organophosphate insecticides has not been evaluated in California, it has been documented in other states and is suspected in California. For this reason, alternate insecticides from different chemical families when multiple treatments are needed during a season. Thorough coverage is essential for control, as most thrips feed in protected areas of the plant.

Overall new insecticides that can be pursued

Insect (common name)	Insect (scientific name)
Cutworms	<i>Agrotis spp.</i>
Onion thrips	<i>Thrips tabaci</i>

Currently all the insecticides registered in onions, except for alpha-cypermethrin and lambda-cyhalothrin (both permits), use for insect control are Group 1B insecticides. Continuing use of only Group 1B products could potentially lead to resistance developing and the complete loss of insects management.

Herbicide use in onions

Weeds are a major problem in onions as they are continuously competitive throughout the onion crop cycle. Heavy weed infested paddocks are expensive to harvest. Need weed control for 90-120 days.

- Registered herbicides that are used in onions are:
 - ASULOX (asulam as Na salt) – Group R specific knockdown herbicide. Only used to spot spray Dock in Tasmania - one application per year. Very effective.
 - DACTHAL 900 WG (chlorthal-dimethyl) – Group D broad spectrum pre-emergent residual herbicide. Commonly used in WA, Qld & SA, occasionally used in Tasmania, rarely used in NSW.
 - SELECT (clethodim) – Group A post-emergent grass herbicide. Commonly used in all states about once a year, in SA commonly used. Very effective on most grasses. Used for ryegrass in Tasmania.
 - BLADDEX 900 WG (cyanazine) – Group C broadleaf post-emergent herbicide. Registered only in Tasmania where it is commonly used and is found to be very effective.
 - SPRAYSEED (diquat + paraquat) – Group L general knockdown herbicide. Used pre-planting. Used once pre-crop.
 - TRAMAT 500SC (ethofumesate) – Group J broadleaf post-emergent herbicide. Registered only in Tasmania where it is commonly used and is found to be very effective.
 - FUSILADE FORTE (fluazifop-P) – Group A post-emergent grass herbicide. Used up to once per crop in Tasmania and WA, used for ryegrass in Tasmania. Does not work in SA. Is rarely used in NSW. Used as a spot spray only in Qld. Resistant ryegrass an issue.
 - ROUNDUP (glyphosate) – Group M general knockdown herbicide. Used pre-plant once per crop.
 - TOTRIL (ioxynil) – Group C broad spectrum pre-emergent residual herbicide. Commonly used by all states on every crop at low label rates. Mixed with Tribunil. Works well. In Qld there has been report of some crop damage. Over-reliance in Tas.
 - AFALON (linuron) – Group C broadleaf post-emergent herbicide. Commonly used only in Tasmania. Very effective.
 - TRIBUNIL (methabenzthiazuron) – Group C broad spectrum pre-emergent residual herbicide. Commonly used by all states on every crop. Mixed with Totril. Works well. In Qld there has been report of some crop damage. Does not control legume weeds.
 - GOAL (oxyfluorfen) – Group G broadleaf post-emergent or spike herbicide. Only used in Tasmania, Qld, WA, NSW. Commonly used. Not used in SA on sandy soils due to crop phytotoxicity. BARON (oxyfluorfen) - registered use in all states. Reported to have improved crop safety over other oxyfluorfen formulations.
 - STOMP XTRA (pendimethalin) – Group D pre-emergent herbicide. Registered in all states other than Qld. Commonly used in Qld (off-label) and Tasmania. Very effective.
 - RAMROD FLOWABLE (propachlor) – Group K post seeding broadleaf residual herbicide. Only used in Qld (some crop damage), Tasmania and WA up to once per crop.
 - TARGA BOLT (quizalofop-P) – Group A post-emergent grass herbicide. Used in SA to remove cover crops (usually barley) twice per crop. Used on ryegrass in Tasmania and growers claim it is effective.
 - SERTIN 186 EC (sethoxydim) – Group A post-emergent grass herbicide. Occasionally used in all states. Used on ryegrass in Tasmania.

Weeds identified as a high priority for control and currently registered herbicides are:

Weed (common name)	Weed (scientific name)	Herbicides registered
Fleabane	<i>Conyza spp.</i>	propachlor
White thistle	<i>Asteraceae</i> (unidentified species)	chlorthal-dimethyl cyanazine ioxynil linuron methabenzthiazuron oxyfluorfen propachlor
Wireweed	<i>Polygonum aviculare</i>	chlorthal-dimethyl ethofumesate ioxynil oxyfluorfen pendimethalin
Onion weed	<i>Asphodelus fistulosus</i>	no options currently available
annual ryegrass (Group A resistant)	<i>Lolium rigidum</i>	propachlor
Mexican poppy	<i>Argemone ochroleuca spp.</i> <i>Ochroleuca</i>	no options currently available.
Fumitory	<i>Fumaria spp.</i>	ethofumesate ioxynil oxyfluorfen
Carrot weed	<i>Cotula australis</i>	methabenzthiazuron oxyfluorfen
Stinging nettle	<i>Urtica spp.</i>	linuron
Self sown potato	<i>Solanum tuberosum</i>	ethofumesate oxyfluorfen
Cleavers	<i>Galium aparine</i>	oxyfluorfen

All of these weeds can be control prior to crop establishment with glyphosate +/- oxyfluorfen or diquat + paraquat as a general weed control.

The above suggestions for control of major weed problems are for existing registered herbicides in onions.

Onions are very susceptible to weed pressure due to the parallel growth phases with many weeds. As seedlings they are also very susceptible to herbicide damage.

References

- Australasian Biological Control 2008. <http://www.goodbugs.org.au/>
- Australian Horticultural Statistics Handbook, 2003.
- Australian Pesticide and Veterinary Medicines Authority website. www.apvma.gov.au
- AusVeg website:
www.ausveg.com.au/assets/contentitems/public/1977/2Plantingsofvegetables-CD06.pdf
- Biobest 2008. www.biobest/en/nieuws/scanivital.htm
- Ciba Plant Protection vegetables 'Onions' publication 1993.
- CSIRO (2003) Iris yellow spot virus found infecting onions in three Australian states. www.publish.csiro.au/?paper=AP03060
- Diseases of Vegetable Crops. Department of Primary Industries Queensland, 1994.
- Infopest, DPI&F, Queensland Government, July 2008.
- IPM Technologies Milestone report. Project: Pesticide effects on beneficial insects and mites in vegetables.
- Managing Insects and Mites in horticultural crops, QLD DPI, 1994.
- McMaugh, 'What garden pest or disease is that?' published 1989.
- NSW Department of Primary Industries website:
www.dpi.nsw.gov.au/agriculture/horticulture/vegetables/commodity/agfact/Onion
- New Zealand Horticulture and AgAware: Onion SARP report 2008.
- Onions Australia (2000) Publication Volume 17.
- Onion World (2005):
www.columbiapublications.com/onionworld/december2005/moreirisyellowspot.htm
- Pacific Magazine Accessed 2008:
www.pacificmagazine.net/issue/2003/04/01/thriving-taro-export-business-under-threat
- Pest management strategy documents for Queensland's fruit and vegetable industries, Queensland Fruit and Vegetable growers, 2003.
- Pest management strategy documents for Queensland's fruit and vegetable industries, Queensland Fruit and Vegetable growers, 2008.
- The IR-4 Project. Website: <http://ir4.rutgers.edu/index.html>
- University of California - <http://www.ipm.ucdavis.edu/PMG>

Acronyms

AgAware	AgAware Consulting Pty Ltd
AOIA	Australian Onion Industry Association
APVMA	Australian Agrichemicals and Veterinary Medicines Authority
HAL	Horticulture Australia
IPM	Integrated pest management
IR-4	Interregional Program 4 (USA)
MRL	Maximum residue limit (mg/kg or ppm)
OA	Onions Australia
Plant pests	Diseases, insects, nematodes, viruses, weeds, etc
Pesticides	Plant protection products (fungicide, insecticide, herbicide, nematicides, etc).
SARP	Strategic Agrichemical Review Process
WHP	Withholding period

Acknowledgement

APVMA:	All staff
Government agencies:	Each state DPI as excellent sources of information
Horticulture Australia Ltd:	Brad Wells and Lucy Keatinge
Industry:	Onion Australian (Joanne Thomas-Ward) Jason Dennis, Tim Groom and other OA members
Work colleagues:	Eileen Dal Santo and Laura Watson

Disclaimer

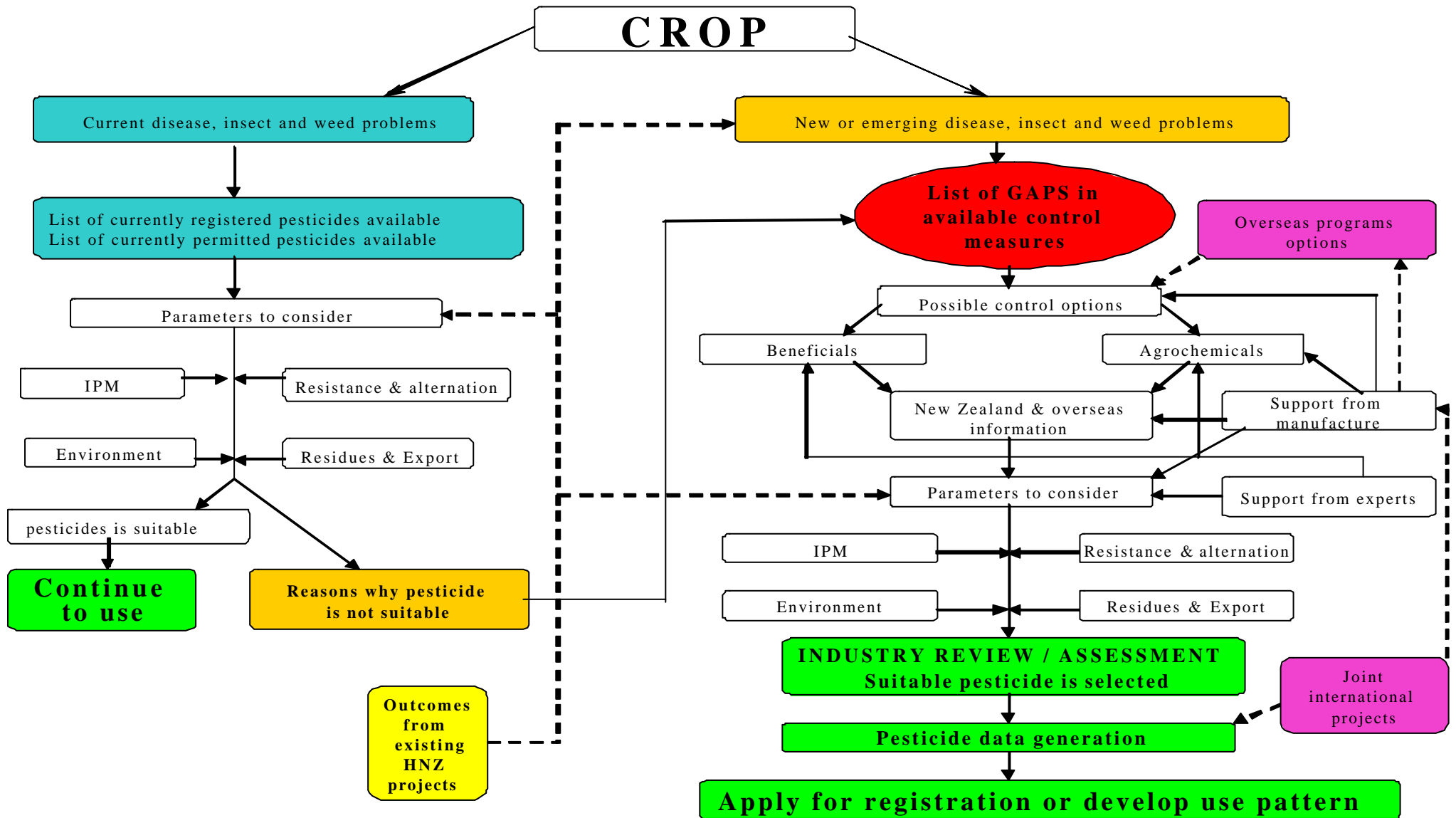
The information in this report is general information only and is not intended to constitute a recommendation or advice. The report has been prepared from the information provided by the industry without taking into account the total objectives, situations or needs of the industry or any individual. Therefore before acting on the information in this report, you should consider whether the information is appropriate in light of your objectives, situation and needs. You may wish to consult a professional adviser for further advice.

While AgAware Consulting Pty Ltd has taken all care and responsibility in producing the information in this report, we make no representation in respect of, and, to the extent permitted by law, exclude all warranties in relation to, the accuracy or completeness of the information. AgAware Consulting Pty Ltd exclude all liability whatsoever for any loss or damage, howsoever, arising out of reliance, in whole or in part, on the information.

PUBLIC

Appendices

DIAGRAM 1: The Strategic Agrichemical Review Process



Appendix 2 – results of the onion Strategic Agrichemical Review Process - currently available fungicides



Disease name	Priority	Active ingredient	Product name	Chem group	WHP (days)	Frequency of use	CURRENT PRODUCT SUITABILITY (availability, efficacy, IPM, residues, resistance, trade, WHP)	Industry comments
Anthracnose (Colletotrichum sp. Glomerella sp.) (Post-harvest)	Nil	carbendazim	PER8170 - CARBENDAZIM (expires 21/9/10)	A	NA	Not used	Allowed in NSW only - for disease control in storage.	In QLD disease prevention, in general, is best achieved through cultural control methods. E.g. irrigation practices and use of resistant varieties (QLD PMS 2008).
		mancozeb + metalaxyl-M	PER8172 - RIDOMIL MZ (expires 21/9/10)	DY	NA	Not used	Allowed in NSW only - for disease control in storage. In Tas, Ridomil is heavily relied upon in numerous crops in the rotation, potentially pre-disposing the product to resistance build-up.	
Bacteria (Post-harvest)	Nil	iodine	BIOMAXA IODINE GRANULES		NA	Not used		
Blue mould (Penicillium spp.) - Post-harvest	Nil	carbendazim	PER8170 - CARBENDAZIM (expires 21/9/10)	A	NA	Not used	Allowed in NSW only - for disease control in storage.	
		mancozeb + metalaxyl-M	PER8172 - RIDOMIL MZ (expires 21/9/10)	DY	NA	Not used	Allowed in NSW only - for disease control in storage.	
Blue mould (Penicillium spp.)	Moderate problem - export only issue - when bulbs in transit, ventilation issue	zineb	ZINEB	Y	7	Not used		
Downy mildew (Peronospora destructor)	Major problem - most States, moderate - Qld. Crop dies during growth.	benalaxyl	GALBEN	D				Commonly used - mainly MZ + Cu, then 2-4 Acrobat, i.e. management relies on protectant products particularly mancozeb then moves to eradicant if needed. Ridomil does not work in Tas. Tas has a over reliance on protectant products, particularly mancozeb. Need to develop an integrated management strategy.
		chlorothalonil	BRAVO	Y	14	Not used	Reported that does not work - resistance??	
		copper	various	Y	1	Commonly used	Used in combination with mancozeb - activates bacterial disease activity.	
		dimethomorph	ACROBAT	X	7	Commonly used depending on season	Extensively used and effective - curative. Works best if applied early - preventative timing when conditions favour disease.	

Appendix 2 (cont) – results of the onion Strategic Agrichemical Review Process - currently available fungicides

Disease name	Priority	Active ingredient	Product name	Chem group	WHP (days)	Frequency of use	CURRENT PRODUCT SUITABILITY	Industry comments
Downy mildew (Peronospora destructor)	Major problem - most States, moderate - Qld. Crop dies during growth.	mancozeb + metalaxyl-M	RIDOMIL GOLD MZ	DY	7	Commonly used depending on season	Ridomil does not work in Tas. In Tas, Over reliance on protectant products, particularly mancozeb.	In QLD, there is interest to improve the treatment of controlling this disease. It is reported by some growers that the use of some surfactants exacerbates the problem. More expenditure for IPM compatible chemicals, in particular thrips, white rot and post harvest rots (QLD PMS 2008).
		mancozeb + metalaxyl-M	PER8172 - RIDOMIL MZ CARBENDAZIM (expires 21/9/10)	DY	NA	Not used	Allowed in NSW only - for disease control in storage.	
		mancozeb	DITHANE	Y	7	Commonly used	Used in combination with copper - activates bacterial disease activity. Poor IPM - Qld.	
		phosphorous acid	PER7905-PHOSPHOROUS ACID (expires 30/9/12)	Y	7	Occasionally used	Some will not use as believe will not work on allium DM. Other believe suppression, others believe control.	
		propineb + oxadixyl	REBOUND	DY	14	Not used		
		propineb	ANTRACOL	Y	14	Not used		
		zineb	ZINEB	Y	7	Not used		
Fungi (Post-harvest)	Nil	iodine	BIOMAXA IODINE GRANULES		NA	Not used		
Neck and bulb rot (Botrytis allii. and B. aclada)	Major problem - all States.	boscalid and/or iprodione & chlorothalonil	PER10885 - FILAN (expires 31/3/10)	BGY	NA	boscalid and iprodione & chlorothalonil – regularly used.	Jurisdiction Tasmania and NSW only. Boscalid used and works well - needs to be used in rotation with iprodione & chlorothalonil as protectants. Other states see a priority.	No control available other than NSW. Increasing problem especially in long storage from infection in -crop. In Tas, problematic across most crops. Current rotations probably contributing to problem. A few management options, but an integrated management strategy is needed. In QLD, not such a problem as bulbs are air dried (QLD PMS 2008).
		boscalid (seed)	PER10885 - FILAN (expires 31/3/10)	G	NA	Regularly used	Jurisdiction Tasmania and NSW only - used on all crops. Other states see a priority.	
		carbendazim	PER8170 - CARBENDAZIM (expires 21/9/10)	A	NA	Not used	Allowed in NSW only - for disease control in storage.	

Appendix 2 (cont) – results of the onion Strategic Agrichemical Review Process - currently available fungicides

Disease name	Priority	Active ingredient	Product name	Chem group	WHP (days)	Frequency of use	CURRENT PRODUCT SUITABILITY	Industry comments
Purple blotch (Alternaria porri)	Nil to minor problem	copper	various	Y	7	Not used	Not specifically used for this disease. Controlled when used for Downy Mildew	
		Copper hydroxide + mancozeb	MANKOCIDE DF	Y	7	Not used		
		dimethomorph	ACROBAT	X	7	Not used	Not specifically used for this disease. Controlled when used for Downy Mildew	
		mancozeb	DITHANE	Y	7	Not used	Not specifically used for this disease. Controlled when used for Downy Mildew	
		mancozeb + metalaxyl-M	RIDOMIL GOLD MZ	DY	7	Not used	Not specifically used for this disease. Controlled when used for Downy Mildew	
		mancozeb + metalaxyl-M	PER8172 - RIDOMIL MZ	DY	NA	Not used	Allowed in NSW only - for disease control in storage.	
		zineb	ZINEB	Y	7	Not used		
Sclerotinia (Sclerotinia spp.)	Nil	carbendazim	PER8170 - CARBENDAZIM (expires 21/9/10)	A	NA	Not used	Allowed in NSW only - for disease control in storage.	In Tas, problematic across most crops. Current rotations probably contributing to problem. A few management options, but an integrated management strategy is needed.
White rot (Sclerotium cepivorum)	Major problem - Tas, Vic, Qld (Lockyer), SA (parts). Nil - NSW & WA.	procymidone	SUMISCLEX 500	B	28	Not used	Registered Vic, Qld, NSW, SA, Tas, NT	All regions require more management options. Research is also looking into the benefit of composted onion waste in the control of white rot (QLD PMS 2008). Controlling White rot to date has required an IPM approach by using the following: Paddock selection based on disease history, timing to minimise infection, use of Folicur and lime super at seeding.
		procymidone	SUMISCLEX 500	B	28	Occasionally used	Registered Vic, Qld, NSW, SA, Tas as in-furrow application. Registered Vic, Qld, NSW, SA, NT as soil spray. application. Used in Vic, SA (Mt Gambier). Very effective.	
		tebuconazole	FOLICUR 430 SC	C	NA	Occasionally used	Tas 70-80% crop mixed with fertilizer. Used in rotation with Sumislex in SA (Mt Gambier).	

 chemicals under review or planned for review by APVMA
 major pest problem

APPENDIX 3: Results of the Onion Strategic Agrichemical Review Process - currently available nematicides

Disease name	Priority	Active ingredient	Product name	Chem group	WHP (days)	Frequency of use	CURRENT PRODUCT SUITABILITY (availability, efficacy, IPM, residues, resistance, trade, WHP)	Industry comments
Nematodes (pre-plant) - Root knot nematode (Meloidogyne spp.)	Moderate - SA, Tas, WA, Vic - patches only within crop. Nil - NSW & Qld	fenamiphos	NEMACUR	1B	84	Rarely used	1-10% of total crop treated. Works well.	

	Compounds under review or proposed for review by the APVMA CRP program
	Major crop pest

PUBLIC

Appendix 4 – results of the onion Strategic Agrichemical Review Process - currently available insecticides

Insect name	Priority	Active ingredient	Product name	Chem group	WHP (days)	Frequency of use	CURRENT PRODUCT SUITABILITY (availability, efficacy, IPM, residues, resistance, trade, WHP)	Industry Comments
Aphids (Aphidae) - pre-plant	Nil	fenamiphos	NEMACUR	1B	84	Not used		
Aphids (Aphidae)	Nil	dimethoate	ROGOR	1B	7	Not used		
Black field cricket (Teleogryllus commodus)	Nil	chlorpyrifos	LORSBAN	1B	NS	Not used		
Bugs (Hemiptera)	Nil	dimethoate	ROGOR	1B	7	Not used		
Cutworms (Agrotis spp.)	Major problem - Tas, NSW. Minor problem - other states	chlorpyrifos	LORSBAN	1B	NS	Commonly used (Tas & NSW)	Not good enough at label rates (700 mL/ha).	High reliance on chlorpyrifos (Tas). In Tas, heavy reliance on just a few products. Need other management options.
Earwigs (Dermaptera)	Nil	chlorpyrifos	LORSBAN	1B	NS	Not used		
Field crickets (Gryllidae)	Nil	chlorpyrifos	LORSBAN	1B	NS	Not used		
Green vegetable bug (Nezara viridula)	Nil	dimethoate	ROGOR	1B	7	Not used		
Jassids (Cicadellidae)	Nil	dimethoate	ROGOR	1B	7	Not used		
Leafhoppers (Cicadellidae)	Nil	dimethoate	ROGOR	1B	7	Not used		
Leafminer flies (Agromyzidae)	Nil	dimethoate	ROGOR	1B	7	Not used		
Lucerne flea and springtails (Sminthurus viridis & Collembola)	Minor problem - Tas & SA. Nil - other states	omethoate	FOLIMAT	1B	14	Occasionally used	Used as a foliar spray - works well.	
Mites (Acarina)	Nil	dimethoate	ROGOR	1B	7	Not used		Mite species - Rhizoglyphus echinopus and R. robini are both present in Aus and onions are a host (QLD PMS 2008)

Appendix 4 (cont) – results of the onion Strategic Agrichemical Review Process - currently available insecticides

Insect name	Priority	Active ingredient	Product name	Chem group	WHP (days)	Frequency of use	CURRENT PRODUCT SUITABILITY	Industry Comments
Mole crickets (Gryllotalpidae)	Nil	chlorpyrifos	LORSBAN	1B	NS	Not used		
Onion (Cotton seedling) thrips (Thrips tabaci)	Major problem - all states	alpha-cypermethrin	PER8432-ALPHA-CYPERMETHRIN (expires 5/2/11)	3A	14	Commonly used (Tas)	Permit for Tasmania only. Used in rotation with diazinon. Some resistance known. NSW believe it does not work.	In Tas, the majority of insecticides used are older generation chemistries such as chlorpyrifos, dimethoate and diazinon. Many of these older products are under review by APVMA and may have restrictions placed on future usage patterns. In Tas, resistance to commonly used insecticides. Current insecticides hard on beneficials. In QLD, it is believed that this pest will always provide limitations to IPM and that scheduled spraying will always have a role with this pest. Research is looking at the use of predatory mites as a biological control method for thrips (QLD PMS 2008).
		diazinon	DIAZOL 800	1B	14	Commonly used	Used in all states - works well. WA & SA 6-8 x per crop. NSW - not working well. Tas populations resistant to diazinon.	
		lambda-cyhalothrin	PER10714-LAMBDA-CYHALOTHRIN (expires 30/9/11)	3A	14	Commonly used	Permit for all states. Commonly used by all states. Works well in all states other than SA. SA-ineffective. Little used in Tas.	
		maldison	HY-MAL	1B	3	Occasionally used	Only used in SA & NSW - replacement for diazinon. Effective. Not used in other states.	
		methidathion	SUPRACIDE 400	1B	7	Occasionally used	Only used in Tas, SA & NSW - replacement for diazinon. Effective. Not used in other states.	
Onion maggot (Delia platura)	Moderate problem - SA, Tas & WA. Minor problem - Qld & NSW.	diazinon	DIAZINON	1B	14	Commonly used	Not specifically used for this pest. Controlled when used for Thrips. Used in all states - works well.	In Tas, heavy reliance on older chemistries. Need other management options.
		phorate	THIMET 100G	1B	70	Occasionally used	Used in SA & NSW. Very low usage in Tas. Works well.	
Redlegged earth mite (Halotydeus destructor)	Minor problem - SA. Nil - others	dimethoate	ROGOR	1B	7	Occasionally used	1 application in SA only. Works well.	
Seed harvesting ants (Pheidole spp.)	Nil	chlorpyrifos	LORSBAN	1B	0	Not used		
Spotted vegetable weevil (Desiantha diversipes)	Nil	chlorpyrifos	LORSBAN	1B	0	Not used		

Appendix 4 (cont) – results of the onion Strategic Agrichemical Review Process - currently available insecticides

Insect name	Priority	Active ingredient	Product name	Chem group	WHP (days)	Frequency of use	CURRENT PRODUCT SUITABILITY	Industry Comments
Thrips (Plague thrips - Thrips imaginis; Western Flower thrip - Frankliniella occidentalis; Intonsa thrip - Frankliniella intonsa)	Minor- moderate problem	diazinon	DIAZINON	1B		Commonly used	Not specifically used for this pest. Controlled when used for Thrips. Used in Tas (PER9648/onion thrips - exp 10/1/09, Tas only). Registered in all states except Tas. Tas populations resistant to diazinon and synthetic pyrethroids known to exist in some areas.	Plague thrips sometimes occur but not a problem and not sprayed. These insecticides used to control Onion thrips. Need to look at all products used in rotation.
		dimethoate	ROGOR	1B	7	Occasionally used	In NSW used in rotation with Karate, but poor efficacy. Lower rate used in Tasmania.	
		fenamiphos	NEMACUR	1B	84	Not used		
		omethoate	FOLIMAT 800	1B		Rarely used	Used in Tas.	
		phorate	THIMET 100G	1B	70	Occasionally used	Only used in SA and Tas to control Onion maggot and thrips. Works well.	
Vegetable weevil (Listroderes difficilis)	Nil	chlorpyrifos	LORSBAN	1B	NS	Not used		
Wingless grasshopper (Phaulacridium vittatum)	Nil	chlorpyrifos	LORSBAN	1B	NS	Not used		
		dimethoate	ROGOR	1B	7	Not used		
Wireworm (Heteroderes sp.)	Minor problem - all states	diazinon	DIAZINON	1B	14	Commonly used	Not specifically used for this pest. Controlled when used for Thrips.	
		chlorpyrifos	LORSBAN	1B	NS	Occasionally used	Routinely used to control a wide range of pests with one application, including wireworm. Works well.	


	Compounds under review or proposed for review by the APVMA CRP program
	Major crop pest

Appendix 5A – results of the onion Strategic Agrichemical Review Process - currently available herbicides

Active ingredient	Product name	Chem group	WHP (days)	Frequency of use	CURRENT PRODUCT SUITABILITY (availability, efficacy, IPM, residues, resistance, trade, WHP)	Industry Comments
asulam as Na salt	ASULOX	R	NS	Occasionally used	Only used as spot spray for Dock in Tas. Very effective.	Weeds are a major problem in onions as they are continuously competitive throughout the onion crop cycle. Heavy weed infested paddocks are expensive to harvest. Need weed control for 90-120 days. Need a herbicide to control legume weeds. Clopyralid is registered in the UK for this purpose. Legume weeds are not controlled by Tribunil and Ioxynil. (QLD PMS 2008). In Tas, populations of resistant ryegrass common in many areas. Few suitable management options available. Volunteer potatoes - long running problem with few effective options being used by growers. In regards to cleavers, distribution and incidence increasing, with few effective management options at present. Permit for Command may assist in many crops (Peracto can assist with this).
chlorthal-dimethyl	DACTHAL 900 WG	D	NA	Occasionally used	Commonly used in WA, Qld & SA, NSW rare, TAS occasional. EFFECTIVENESS??	
clethodim	SELECT	A	14	Occasionally used	Commonly used in all states. SA use 1-3 x per crop. Very effective on most grasses, including resistant ryegrass in some paddocks. Used in ryegrass in Tas.	
cyanazine	BLADEX 900 WG	C	NA	Occasionally used	Registered in Tas only. Very effective.	
diquat + paraquat	SPRAYSEED	L	NA	Commonly used	Used pre-plant.	
ethofumesate	TRAMAT 500SC	J	91	Occasionally used	Registered in Tas only. Very effective.	
fluazifop-P	FUSILADE FORTE	A	35	Occasionally used	SA - does not work. NSW rarely used. Qld spot spray only, Tas & WA used occasionally. Used for ryegrass in Tas. Resistant ryegrass an issue.	
glyphosate	ROUNDUP	M	NA	Commonly used	Used pre-plant.	
ioxynil as octanoate	TOTRIL	C	NA	Commonly used	Used by all states on every crop at lower than label rates. Mixed with Tribunil. Works well. Qld - some crop damage.	
linuron	AFALON	C	NA	Occasionally used	Only used in Tas. Very effective	
methabenzthiazuron	TRIBUNIL	C	49	Commonly used	Used by all states on every crop. Mixed with Totril. Works well. Qld - some crop damage.	Does not control legume weeds.

Appendix 5A (cont) – results of the onion Strategic Agrichemical Review Process - currently available herbicides

Active ingredient	Product name	Chem group	WHP (days)	Frequency of use	CURRENT PRODUCT SUITABILITY	Industry Comments
oxyfluorfen	GOAL	G	NA	Occasionally used	Only used in Tas, Qld, WA, NSW. Not in SA on sandy soils - crop phytotoxicity.	Good for early applications in an early emerging crop that contains only small weeds. Crop damage has in some cases been known to occur after application in overcast and humid conditions. This is due to the stomata being open and local volatilisation of the chemical had occurred, increasing the chance of plant uptake of the chemical causing some damage. In most cases, onion plants are immune to the chemical due to their thick waxy cuticle and vertical leaf structure. Overall GOAL is a good product to use in IWM when used in the suitable conditions (OA 2000).
oxyfluorfen	BAREN 400 WP	G	NA	Occasionally used	Reported to have improved crop safety over other oxyfluorfen formulations	
pendimethalin	STOMP XTRA	D	NA	Commonly used	Registered in all states other than Qld. Used in Qld and Tas. Very effective. Registered use in onions for wireweed only (label Infopest 2008).	Good on wireweed (OA 2000).
propachlor	RAMROD FLOWABLE	K	NA	Occasionally used	Only used in Qld (some crop damage), Tas, WA. Effective	
quizalofop-P	TARGA BOLT	A	126	Occasionally used	Only used in SA to remove cover crops (usually barley). Used on ryegrass in Tas. Effective.	
sethoxydim	SERTIN 186 EC	A	28	Occasionally used	Used in all states. Used on ryegrass in Tas. Effective	

 Compounds under review or proposed for review by the APVMA CRP program

Appendix 5B – results of the onion Strategic Agrichemical Review Process - major weed problems

Weed	Scientific name	Comments
Fleabane	Conyza spp.	Can be a major problem
Wireweed	Polygonum aviculare	No 1 weed - affects lifters/harvester - can abandon crop if too bad.
Onion weed	Asphodelus fistulosus	
Group A resistant annual ryegrass	Lolium rigidum	
Mexican poppy	Argemone ochroleuca	
Fumitory	Fumaria spp.	
Carrot weed	Cotula australis	
Stinging nettle	Urtica spp.	
Self sown potato	Solanum tuberosum	
Cleavers	Galium spp.	No 2 weed - affects lifters/harvester - can abandon crop if too bad.
Thistles	Asteraceae	No 3 - affects lifters/harvester.