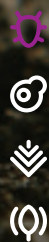




Pyrinex[®] Super

Technical Product Guide



ADAMA



Introducing Pyrinex® Super

Pyrinex® Super is a unique broad spectrum insecticide providing superior performance on difficult to control insect and mite pests during winter crop and pasture establishment. Pyrinex® Super controls key pests including Bryobia mite, Redlegged earth mite (including SP resistant strains), Lucerne flea and Blue oat mite and is the only registered solution for the control of Balaustium mite in Canola crops. Containing dual modes of action which provide synergistic activity on some pests, Pyrinex® Super sets a new benchmark in knockdown and residual protection at crop establishment.

Pyrinex® Super is also registered to control key pests of Cotton, Sugarcane and Tomatoes.

The Impact of Insect and Mite Pests on Broadacre Farming

Insect and mite pests are responsible for significant production losses throughout Australian broadacre farming regions. A study by Murray, Clarke and Ronning in 2012 indicated that invertebrate pests cost Australian grain growers \$360 million per year as well as causing regular and severe damage to pastures, limiting establishment, longevity and productive capacity.

Insecticides play an important role in helping farmers manage pests. However, they need to be used responsibly and in combination with other management options such as cultural control if the most sustainable outcomes are to be achieved.

Increasing insecticide resistance combined with fewer new insecticides becoming available, is creating a new challenge for the sustainable management of these key insect and mite pests. Farmers and agronomists need to utilise integrated control strategies and incorporate multiple modes of action where available to ensure the long term viability of existing control options. Using a dual mode of action product such as Pyrinex® Super is an important tool in the management of these pests.



Pyrinex® Super is available in 20 L, 110 L and 1000 L packs from Adama Innovation Centres.





Pyrinex[®] Super at a Glance

Registered Broadacre Crops and Pasture	Wheat, Barley Canola, Field Peas, Lupins, Subterranean Clover, Clover and Lucerne
Pest Spectrum	Lucerne Flea, Vegetable Weevil, Cutworm, Balaustium Mite, Lucerne Leafroller, Webspinner Caterpillar, Bluegreen Aphid, Spotted Alfalfa Aphid, Pea Aphid, Sitona Weevil, Cutworm, Blue Oat Mite, Pasture Webworm, Bryobia Mite, Redlegged Earth Mite and Brown Pasture Looper
Formulation Type	Emulsifiable Concentrate (EC)
Product Rate Range	175 mL to 1.13 L/Ha
Application	Apply in 50 to 200 L/Ha of water by ground application. Applications should be made as a fine spray preferably using hollow cone nozzles and a droplet size of 150 to 200 microns

Key Features

- Rapid knockdown action combined with long residual protection for seedlings of up to 58 days on some pest species
- Two highly effective and trusted active ingredients that combine synergistically to provide superior seedling protection
- Highly compatible EC formulation allowing one pass mite, insect and weed control when mixed with knockdown and/or residual herbicides
- Dual modes of action for resistance management.

Mode of Action

Pyrinex[®] Super is a combination of Group 1B (organophosphate) and Group 3A (synthetic pyrethroid) insecticides which have different modes of action.

Chlorpyrifos is a broad spectrum non-systemic organophosphate insecticide acting on target pests by direct contact, ingestion and inhalation.

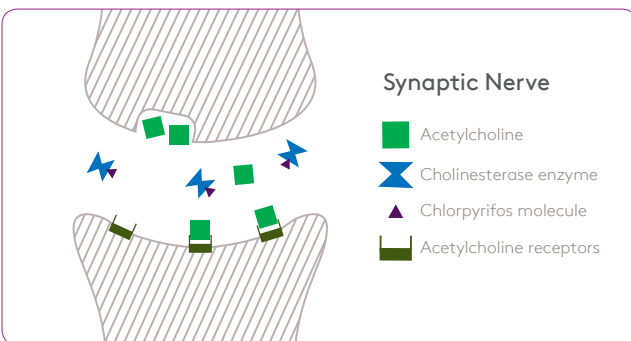


Figure 1. Chlorpyrifos inhibits the cholinesterase enzyme leading to neurotoxicity and death in the target insects.

Chlorpyrifos controls insects and mites by disrupting the normal function of the nervous system. When insects are exposed, chlorpyrifos binds to the active site of the cholinesterase enzyme, which prevents breakdown of acetylcholine in the synaptic nerve. The result is overstimulation of the neurons, which leads to neurotoxicity and death.

Bifenthrin is a synthetic pyrethroid (SP) insecticide. While bifenthrin has some structural similarities to other pyrethroids it is characterised by greater photostability, acaricidal (miticidal) activity and insecticidal activity when compared to other SPs. Bifenthrin acts by contact or ingestion and affects the central and peripheral nervous systems by interfering with sodium channel gating causing paralysis and ultimately death in the target pests.

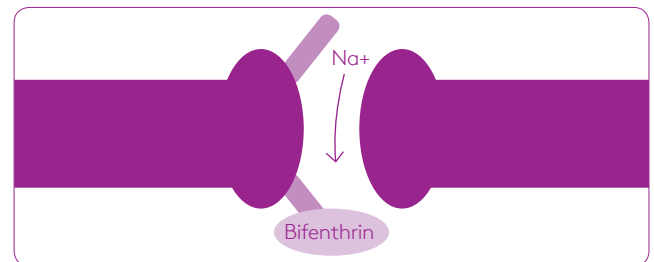


Figure 2. Gate cannot shut, Na⁺ continues to travel into cell, nerve cannot reset itself.

Mode of Action Summary

Parameter	Bifenthrin	Chlorpyrifos
Concentration (g/L)	20	400
IRAC Group	3A	1B
MOA	Sodium channel modulator, Disrupts neurotransmission	Acetylcholinesterase inhibitor, Disrupts neurotransmission
Uptake pathway	Contact & stomach	Contact, stomach, fumigant
Systemic activity	Non-systemic	Non-systemic
Speed of action	Rapid	Rapid

Use Rates and Target Pests

Bare Earth Application

Canola, Subterranean Clover, Clover, Barley, Lucerne, Wheat, Field peas and Lupins

Redlegged Earth Mite (including synthetic pyrethroid resistant biotypes), **Brown Pasture Looper and Lucerne Flea** - 250 mL to 500 mL/Ha

Blue Oat Mite, Pasture Webworm - 500 mL/Ha

Bryobia Mite - 1 L/Ha

Apply to bare soil prior to seedling emergence after conventional cultivation and sowing or onto well grazed or sprayed pasture after direct drilling.

Post-emergence Application

Canola

Lucerne Flea - 175 mL to 375 mL/Ha

Vegetable Weevil - 500 mL to 1 L/Ha

Cutworm - 875 mL to 1 L/Ha*

Balaustium Mite - 1 L/Ha

Apply to emerged canola when pests appear in large numbers and before damage occurs.

A second application may be required after 14 days.

Avoid spraying when pests are sheltering. Spray when at least 2.5 cm cover of crop is present.

Lucerne Seed Crops

Lucerne Leafroller - 375 mL to 500 mL/Ha

Webspinner Caterpillar - 875 mL/Ha

Bluegreen Aphid, Spotted Alfalfa Aphid and Pea Aphid - 250 mL to 375 mL/Ha

Sitona Weevil - 440 mL/Ha

Lucerne Flea - 175 mL to 375 mL/Ha

Cutworm - 875 mL/Ha to 1.13 L/Ha*

Blue Oat Mite, Pasture Webworm - 500 mL/Ha

Bryobia Mite - 1 L/Ha

DO NOT treat lucerne seed crops for alfalfa sprout production.

Apply when pests first appear.

Use the higher rate, where applicable, on heavier infestations and for longer residual protection.

Always consult the product label for detailed information on pests controlled, and rates required.

*Registered rates differ between states.

Surfactants

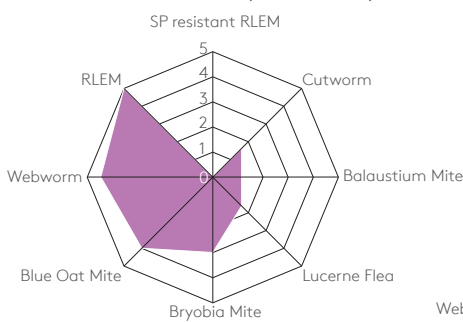
Additional surfactant may only be necessary on hard to wet plants and in high volume situations.

Wetspray® 1000 is recommended at label rates.

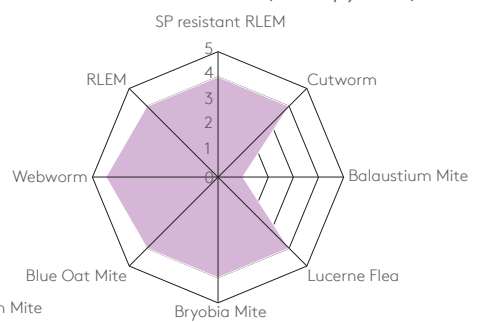


Broadacre Pest Spectrum

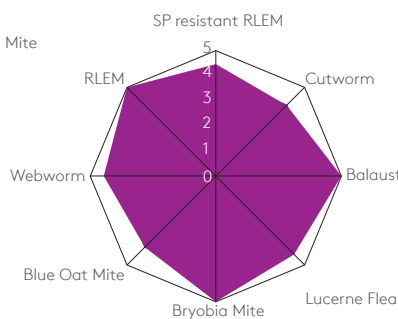
Venom® 100 EC (bifenthrin)



Strike-Out® 500 EC (chlorpyrifos)



Pyrinex® Super



The beneficial relationship between the two active ingredients in Pyrinex® Super is demonstrated when their individual effectiveness ratings are compared with that of Pyrinex® Super.

The strength of Pyrinex® Super across a broad range of key establishment pests makes it a flexible and highly reliable choice.



Key Insect Pests Controlled

<p>Balaustium Mite</p>		<ul style="list-style-type: none"> • Typically grow to 2 mm (Adults are significantly larger than most other mites) • Red-brown body with eight orange legs and distinctive foot pads • Can be mistaken for Bryobia mite, especially if not fully grown • Pyrinex® Super is the only product registered to control Balaustium mite in Canola • Use Pyrinex® Super at 1 L/Ha on emerged Canola.
<p>Blue Oat Mite</p>		<ul style="list-style-type: none"> • Typically 1 mm when fully grown • Adults have a blue-black body with a distinctive red mark on their back and eight orange legs • Can be mistaken for Redlegged Earth Mite • Pyrinex® Super is registered to control Blue Oat Mite in Canola, Subterranean Clover, Clover, Barley, Lucerne, Wheat, Field Peas and Lupins • Use Pyrinex® Super at 500 mL/Ha applied to bare earth prior to seedling emergence or post emergence on Lucerne seed crops.
<p>Redlegged Earth Mite</p>		<ul style="list-style-type: none"> • Grow to approximately 1 mm in length • Adults have a black body with 8 red legs • Attack all crops and pastures, but Canola, Pulses and other legume seedlings are most susceptible • Pyrinex® Super is registered to control Redlegged Earth Mite as a bare earth treatment in Canola, Subterranean Clover, Clover, Barley, Lucerne, Wheat, Field Peas and Lupins • Use Pyrinex® Super between 250-500 mL/Ha applied to bare earth prior to seedling emergence.
<p>Bryobia Mite</p>		<ul style="list-style-type: none"> • Typically grow to 0.75 mm • Dark grey body with 8 pale orange legs • Bryobia mites prefer broadleaf plants such as Canola, Lupins and Lucerne but will also attack cereals • Pyrinex® Super is registered to control Bryobia Mite in Canola, Subterranean Clover, Clover, Barley, Lucerne, Wheat, Field Peas and Lupins • Use Pyrinex® Super at 1 L/Ha applied to bare earth prior to seedling emergence.

<p>Pasture Web Worm</p>		<ul style="list-style-type: none"> • Larvae grow to approximately 18 mm long • Young larvae live in silken tubes among leaf blades and older larvae in web-lined tunnels beneath the ground • Prefer grass plants such as cereal crops • Pyrinex® Super is registered to control Pasture Web Worm in Canola, Subterranean Clover, Clover, Barley, Lucerne, Wheat, Field Peas and Lupins • Use Pyrinex® Super at 500 mL/Ha applied to bare earth prior to seedling emergence.
<p>Cutworm</p>		<ul style="list-style-type: none"> • Larvae grow up to 50 mm long • Larvae can be black, green-brown or grey • Attack all field crops • Pyrinex® Super is registered to control Cutworm in Canola, and Lucerne seed crops • Use Pyrinex® Super between 875-1000 mL/Ha on emerged Canola and Lucerne.
<p>Lucerne Flea</p>		<ul style="list-style-type: none"> • Adults are up to 3 mm in length • Adults and nymphs are yellow-green and wingless • Attack all crops and pastures, but Lucerne and Clovers are particularly susceptible • Pyrinex® Super is registered to control Lucerne Flea in Canola, Subterranean Clover, Clover, Barley, Lucerne, Wheat, Field Peas and Lupins • Use Pyrinex® Super between 250- 500 mL/Ha applied to bare earth prior to seedling emergence, and 175-375 mL/Ha on emerged Canola or post-emergence on Lucerne seed crops.
<p>Brown Pasture Looper</p>		<ul style="list-style-type: none"> • Larvae grow to approximately 20 mm long • Can cause significant damage to establishing Canola crops • Often worse where Capeweed hosts are present • Pyrinex® Super is registered to control Brown Pasture Looper in Canola, Subterranean Clover, Clover, Barley, Lucerne, Wheat, Field Peas and Lupins • Use Pyrinex® Super between 250-500 mL/Ha applied to bare earth prior to seedling emergence.





Application

Spray Application Recommendations

Ground Application: Water volume required will depend on whether the application is to bare earth or to an emerged crop and on the type and density of the crop. For low volume broadcast applications such as Cereals, Canola, Lucerne and Subterranean Clover it is recommended to use 50-200 L/Ha of water with a fine to medium spray quality ensuring the soil and any emerged plants are thoroughly covered. Use the higher rates where applying to emerged dense crops.

Aerial Application: DO NOT apply by aircraft.

Surfactant

Additional surfactant may only be necessary on hard to wet plants and in high volume situations. Wetspray® 1000 is recommended at label rates.

Rainfast Period

DO NOT apply as a foliar treatment if rainfall is expected before spray deposits are dry on the leaf surface.

Withholding Periods

Canola, Subterranean Clover, Clover, Field Peas, Lupins, Lucerne, Wheat, Barley:

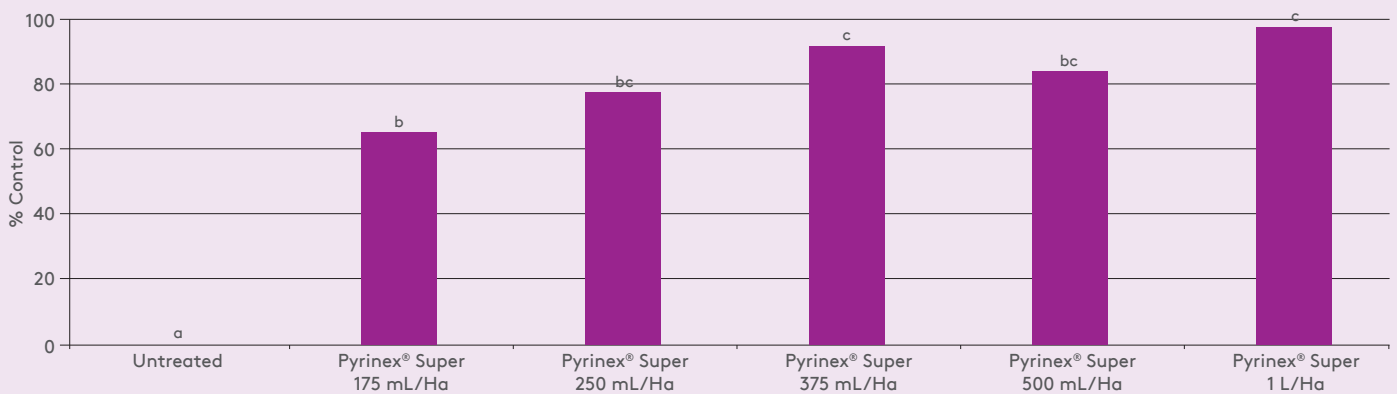
DO NOT graze or cut for stock food for 4 weeks after application.

Wheat, Barley, Canola, Field Peas, Lupins, Lucerne:
DO NOT harvest for 10 days after application.

Note: When applying to established crops DO NOT apply during flowering or within 7 days prior to flowering. Post-flowering applications should only commence after flowering has completely finished and bee hives are not likely to be reached by spray drift.

Trial Results

Balaustium Mite Control in Canola

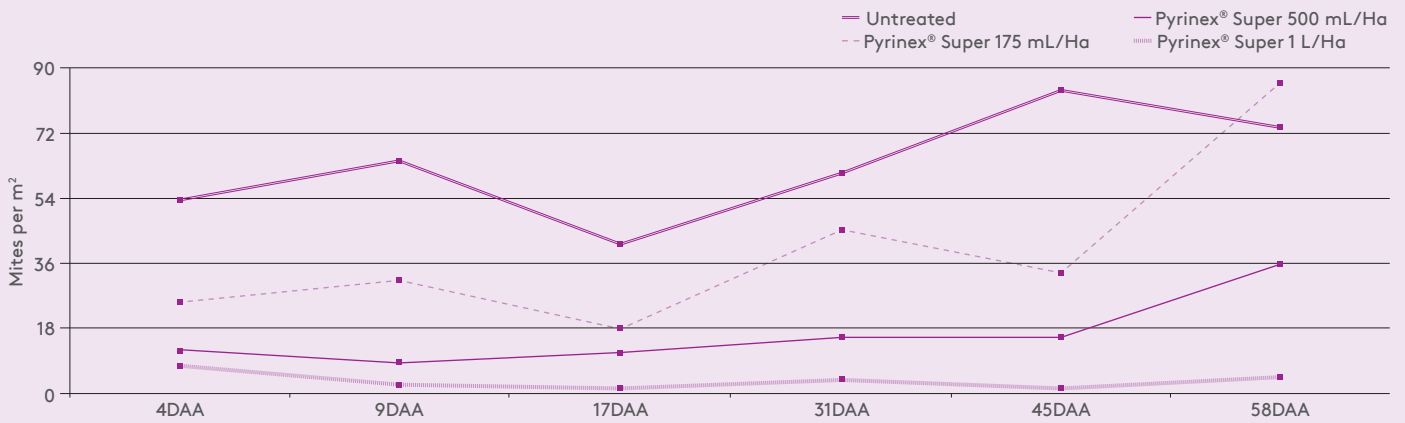


13 DAA, Oakfarm, WA, 2013 - Peracto
Means followed by same letter do not significantly differ (P = 0.05)

Chart 1.

This WA canola trial in 2013 shows that Pyrinex® Super is providing 98% control of Balaustium mite 13 days after application at the 1 L/Ha registered rate. While rates of 250 mL/Ha and above were all reasonably effective, the 1 L/Ha rate has been registered to ensure consistent, long term control when targeting Balaustium mite.

Balaustium Mite Abundance Over Time in Pasture

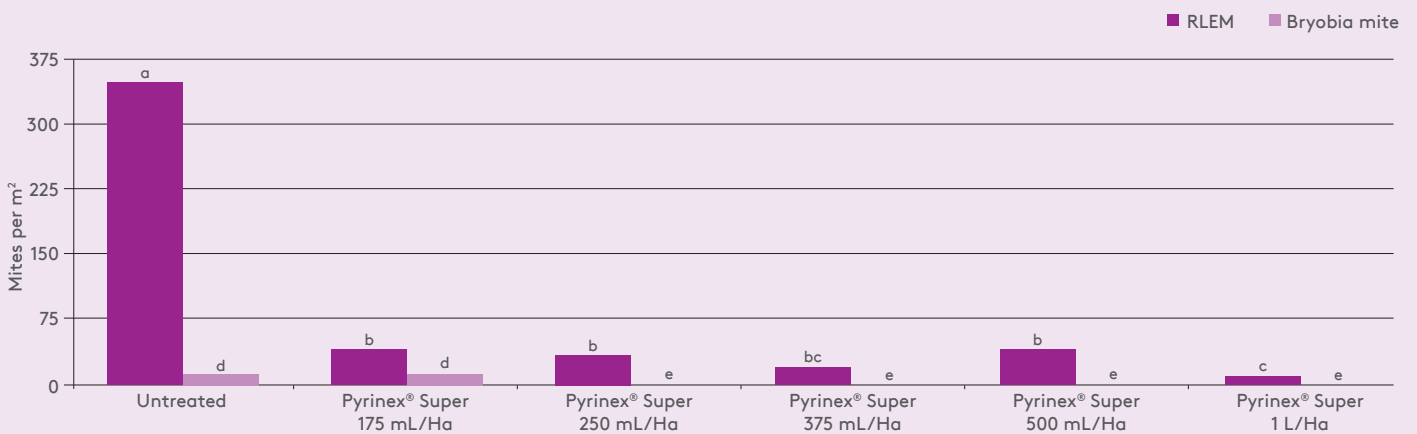


Katanning, WA, 2013 - Peracto
 P = ≤0.0021

Chart 2.

At Katanning, Western Australia, all rates of Pyrinex® Super in this mixed pasture trial resulted in significant reductions in the abundance of Balaustium mite by 4DAA. Rates of 500 mL/Ha and above provided significant Balaustium mite control right out to 58DAA, however, the 1 L/Ha rate is the most robust and hence is the registered rate.

Bryobia Mite and RLEM Control in Pasture



RLEM 9 DAA, Bryobia Mite 4 DAA, Katanning, WA, 2013 - Peracto
 Means followed by same letter do not significantly differ (P = 0.05)

Chart 3.

The results of the above trial demonstrate the strength of Pyrinex® Super on RLEM where significant reductions in numbers were achieved at all rates. The trial also shows that the 175 mL/Ha rate of Pyrinex® Super was insufficient to fully control Bryobia mite with the control and 175 mL/Ha treatments both recording 10.52 Bryobia mites per metre squared after 9 days while all rates above 250 mL/Ha reduced the numbers to zero.





Trial Results

SP Resistant RLEM response to Pyrinex® Super - Pasture Microcosm

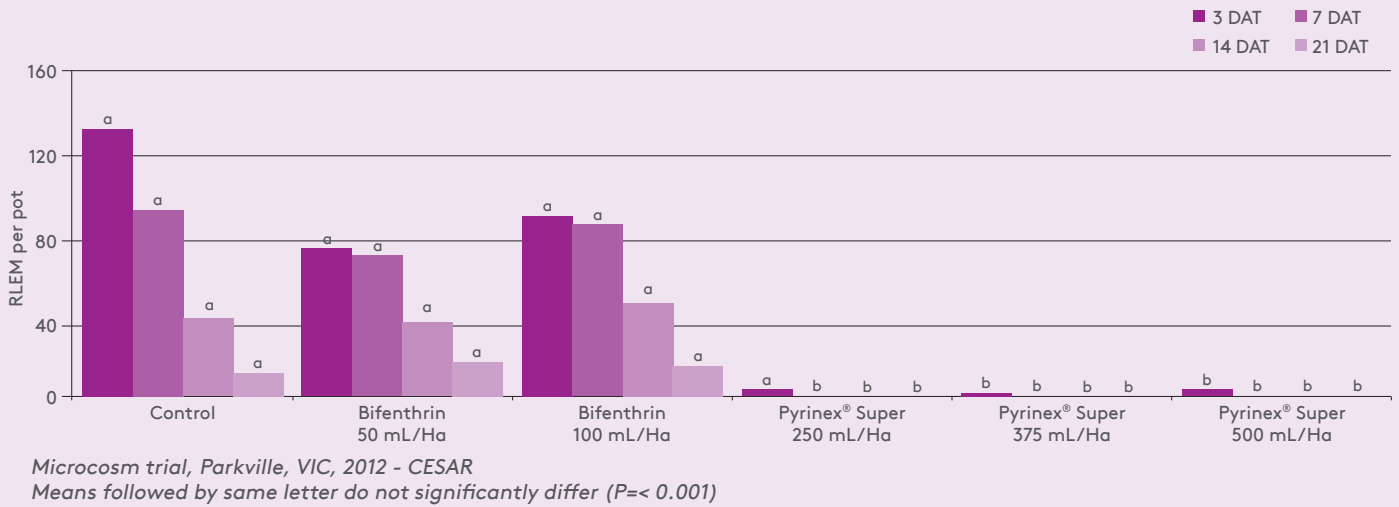


Chart 4.

In this microcosm study, the efficacy of three rates of Pyrinex® Super was tested against a known synthetic pyrethroid (SP) resistant population of RLEM under semi-field conditions and compared with two rates of Venom® (bifenthrin). Plant damage and pest numbers were assessed 3 days after application (DAA) and then again at 7, 14 and 21 DAA. The results showed that Pyrinex® Super has a high level of efficacy against SP resistant RLEM even at the lower rates and even after 21 days. Plant species assessed in the microcosm trial were a mixture of phalaris, ryegrass, white clover, subterranean clover and vetch.

Lucerne Flea Response to Pyrinex® Super - Bare Earth

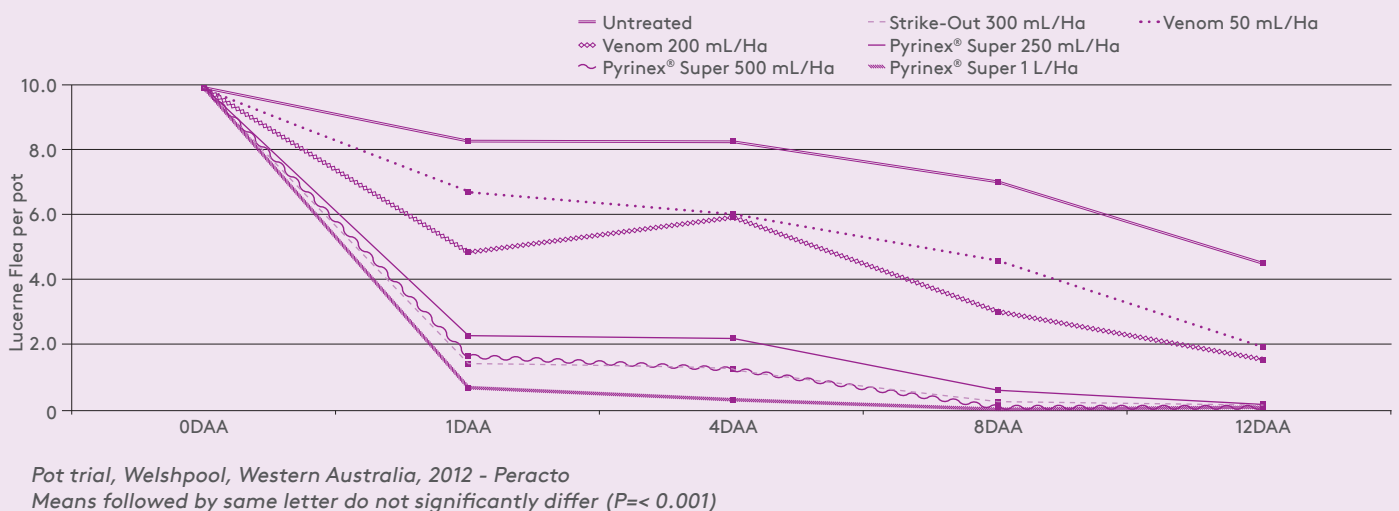
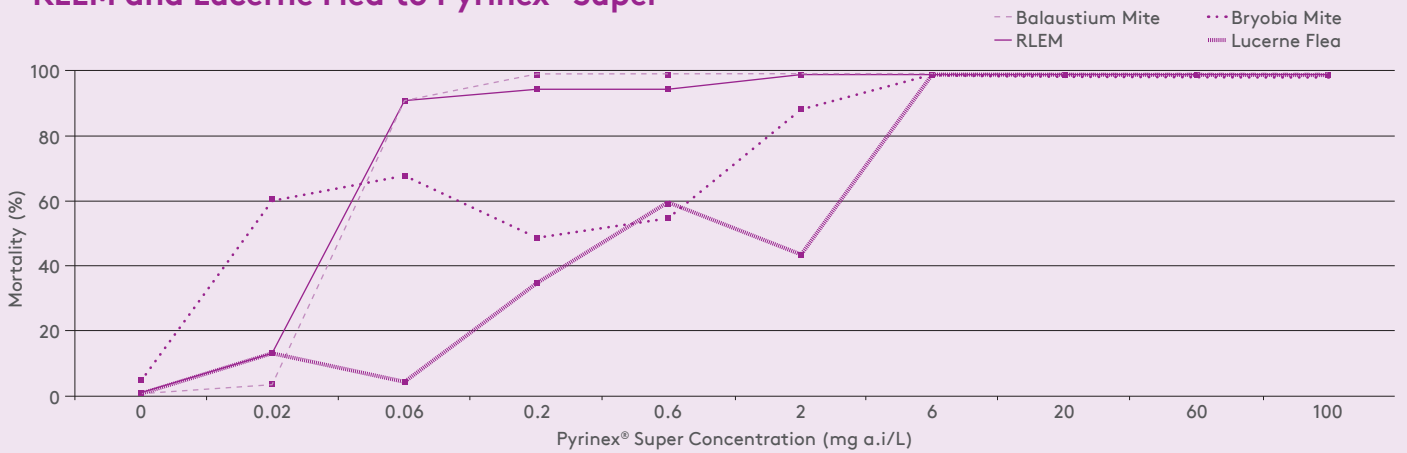


Chart 5.

At Welshpool, Western Australia in 2012, broadcast insecticide treatments were applied to bare soil in pots for the control of Lucerne flea. Pyrinex® Super provided Lucerne flea control of 72.9% to 91.1% at 1 DAA which increased to 100% control at all rates by 12 DAA. There was a significant dose response to increasing rates of Pyrinex® Super with the two higher rates providing faster knockdown than the lower rate.

Dose-response Curves of Balaustium Mite, Bryobia Mite, RLEM and Lucerne Flea to Pyrinex® Super



Microcosm trials, Parkville
Cesar bioassays, VIC, 2012

Chart 6.

Dose-response curves generated for 4 key pest species against Pyrinex® Super are shown above. The curves indicate different responses between the species. Lucerne flea and Bryobia mite have dose response curves shifted to the right, suggesting a higher level of tolerance to Pyrinex® Super. RLEM and Balaustium mite show a higher sensitivity to Pyrinex® Super with 100% mortality reached at 2 mg a.i./L and 0.2 mg a.i./L, respectively. The Balaustium mite response is in contrast to many other insecticides and the individual components of Pyrinex® Super which do not control this pest when applied alone at commonly used rates.

Summary of Trial Results

The trial results in charts 1-6 demonstrate that Pyrinex® Super provides robust performance against a range of key insect and mite pests of broadacre crops including difficult to manage pests such as Balaustium mite and SP resistant RLEM. These results also demonstrate the residual control provided by Pyrinex® Super with higher rates significantly reducing mite numbers for up to 58 days after application.



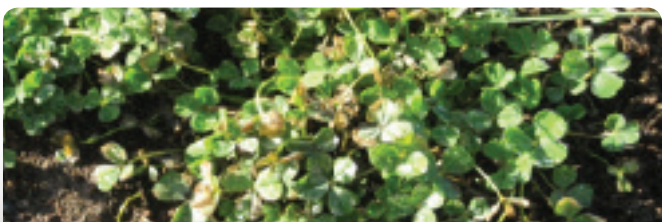
Untreated Control



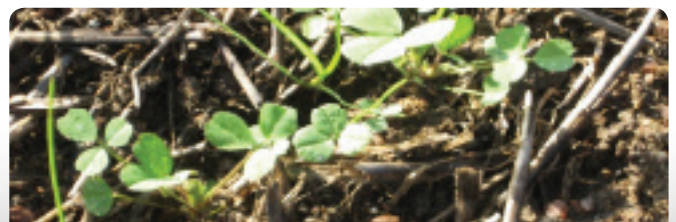
Pyrinex® Super 250 mL/ha

Canola establishment trial 17 DAA, Jamestown, South Australia, 2012, Peracto Pty Ltd.

The photos illustrate the undamaged leaf surface where Pyrinex® Super has been used compared with the significant damage caused by RLEM in the untreated plants.



Regenerated pasture, heavy insect pressure all season.
Damage present after 2 sprays of high rate Le-Mat*.



Single Pyrinex® Super application, 500 mL/ha PSPE.
Excellent insect control was observed all season

Pasture demonstration site Williams, WA, 2014



Tank Mixture Compatibility

Pyrinex® Super is compatible with a range of herbicides, insecticides, fungicides and foliar nutrients.

Adverse environmental conditions such as frosts, waterlogging, drought or anything else that causes stress to the crop can compound phytotoxic effects and should be avoided when tank mixing Pyrinex® Super.

Visit adama.com to view the Pyrinex® Super Tank Mix Tech Note for a full list of products tested for compatibility with Pyrinex® Super.

Resistance Management

The development of SP resistance in RLEM populations in WA is a significant challenge for the sustainable management of pests of crop establishment. Pyrinex® Super is a Group 1B + 3A insecticide and, due to the chlorpyrifos (1B) component, will control mite species resistant to SPs (3A). The likelihood of developing resistance to Pyrinex® Super in RLEM and other pests will depend on the following factors:

- Sexual or asexual reproduction – RLEM reproduce sexually and this can result in faster build-up of resistance
- Frequency of exposure – Repeated use will increase selection pressure and likelihood of selecting for resistant individuals
- The level of cultural control methods utilised to manage the pest, such as crop rotation, mixed cropping and sanitation
- Use rate can have an influence. Use of sub-lethal rates can speed up the selection pressure for both target site and metabolic resistance.

All insecticides, including dual mode of action products like Pyrinex® Super, should be rotated with alternative mode of action products and other non-chemical control techniques such as IPM and crop rotation.

Pyrinex® Super may be subject to specific resistance management strategies by region or by crop. For further information contact your local supplier, Adama representative or local agricultural department agronomist.

Adama encourage the responsible use of insecticides as outlined in the CropLife Insecticide Resistance Management Guidelines. CropLife guidelines can be found by visiting www.croplifeaustralia.org.au

Frequently Asked Questions

How will I know if Pyrinex® Super is the best option for my situation?

Agronomists and growers should know the identity of the pests present and the resistance status to commonly applied insecticides to allow them to make informed product choice decisions. Adama recommends that a comprehensive insect monitoring and identification programme should form part of any good crop management strategy and where possible insecticide resistance status should be confirmed as better outcomes can be achieved where this information is known.

Pyrinex® Super is registered for control of all the key pests of crop establishment, even the difficult to control Balaustium mite. Pest species and resistance status can often be unclear and Pyrinex® Super becomes a valuable choice in these circumstances. Growers and agronomists can have confidence with Pyrinex® Super at the higher rates that all key establishment pests will be controlled - even currently SP resistant strains.

What is the best timing to use Pyrinex® Super?

Crops are most vulnerable to pests at the critical establishment phase. Canola and pulses are the most susceptible to invertebrate damage and establishment is typically when the greatest yield losses occur. Much focus has been put onto weed control over the years and its critical impact on yield of the crop but the effect of insect and mite pests should not be underestimated. Ideal spray timings will depend on pest species present, their breeding cycle, plant growth stage and the balance of pests versus beneficial insects. When the decision has been made to spray, Pyrinex® Super should be applied when the pests are most active. With establishment pests this is often in the evening just before dark. Tools are also available that can assist with some pests such as the Timerite® model produced to help timing decisions in pastures to control Redlegged earth mite.

If I use Pyrinex® Super on bare earth will I still have residual control after the sowing operation?

For maximum residual control Pyrinex® Super treated soil should be disturbed as little as possible. Ideal results can be achieved by applying Pyrinex® Super Post Sowing Pre-emergence (PSPE). Where a PSPE application is not possible and Pyrinex® Super is applied prior to sowing, the soil disturbance that occurs will dilute the concentration of Pyrinex® Super through the soil profile reducing its ability to control surface dwelling pests. Pyrinex® Super will typically provide residual control in the range of 14 to 58 days depending upon rate. The closer the application can be made to crop emergence, the longer the benefit of the residual protection will be for the establishing crop.

We currently use chlorpyrifos prior to sowing canola mixed with trifluralin/ atrazine for wireworm and bifenthrin post sowing for mites. How could Pyrinex® Super fit into our canola system?

Pyrinex® Super is not registered for wireworm control in canola (Pyrinex® Super is registered to control wireworm and false wireworm in cotton only). Pyrinex® Super is an excellent alternative to current options for pre-sowing or post-emergence applications to control surface dwelling pests in canola. Compared with current single mode of action options, Pyrinex® Super provides the ultimate balance between strong knockdown and extended residual control in addition to the ability to control synthetic pyrethroid resistant mites. Infestations of wireworm and false wireworm in canola should still be controlled with Strike-Out® at recommended label rates.





Features and Benefits

Features	Benefits
Unique formulation with two modes of action	Control of SP resistant RLEM populations
Fast acting knockdown control of pest populations	Prevents early crop damage, maintaining target plant stand and helping to maintain crop yield potential
Up to 58 days residual activity	Extended protection providing peace of mind during the crop establishment phase and beyond
Only registered option for Balaustium mite control	Confidence that the crop is protected from all damaging mite pests
Excellent compatibility.	Convenient one-pass insect, mite and weed control when tank-mixed with knockdown and/or residual herbicides.





Summary

- Rapid knockdown action combined with long residual protection for up to 58 days on certain pests
- Dual modes of action for Resistance Management
- Highly compatible EC formulation allowing one pass mite, insect and weed control
- Two highly effective and trusted active ingredients that combine to provide superior seedling protection.



Pyrinex[®] Super is available through Adama Innovation Centre retailers.

® Registered trademarks of an Adama Agricultural Solutions Ltd Company.
* Registered Trademarks

Please note: This information is not intended to replace the product labels. Always read the complete product label appearing on the container before opening or using products.



Scan here for all the latest information and resources for Pyrinex[®] Super

For Technical Assistance:
1800 327 669

For more information visit
adama.com

For Customer Enquiries:
1800 229 284