



An IPM Approach to Controlling Oriental Spider Mite (*Eutetranychus orientalis*) in North Queensland Citrus

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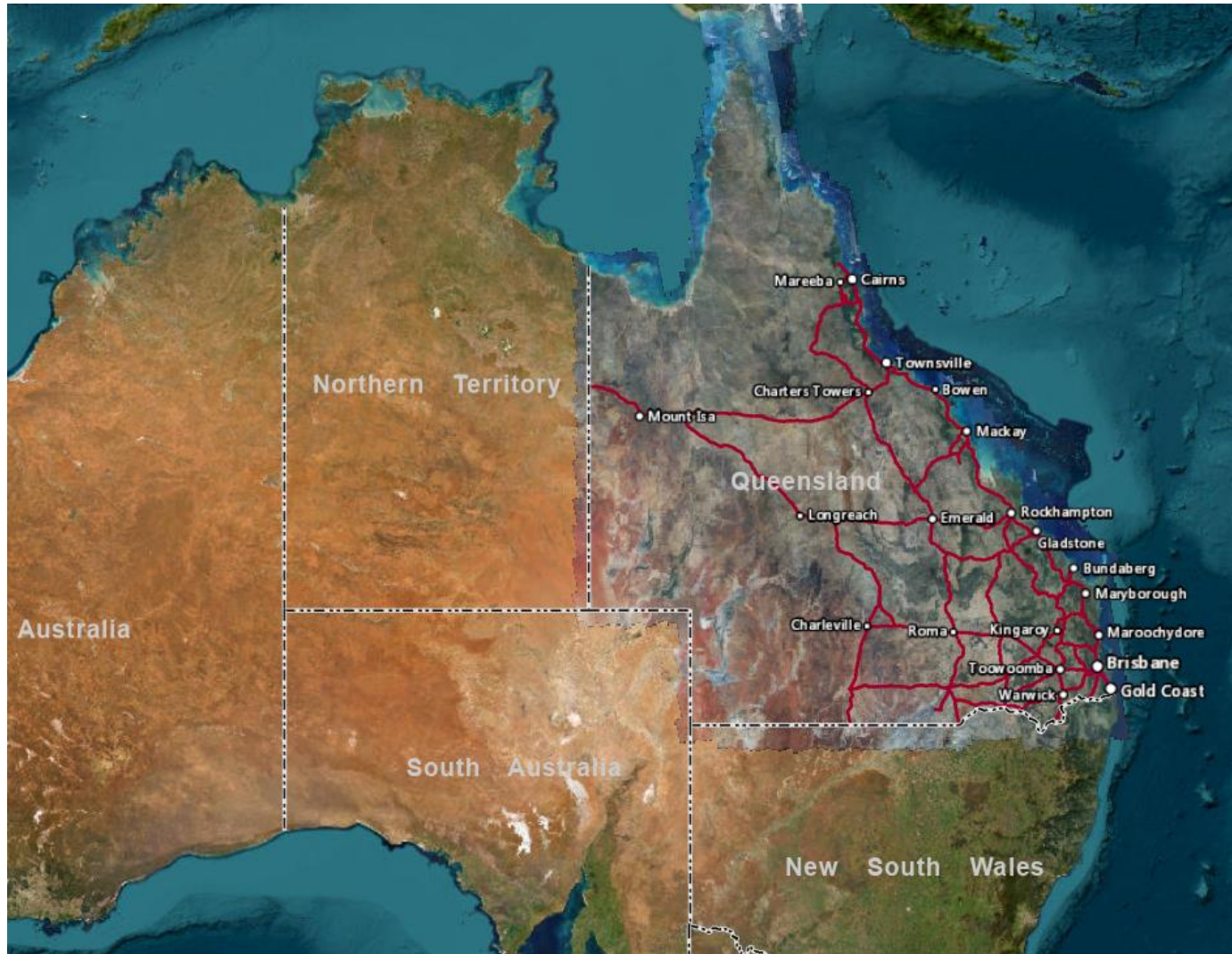
CT19011: Citrus industry IPDM extension project

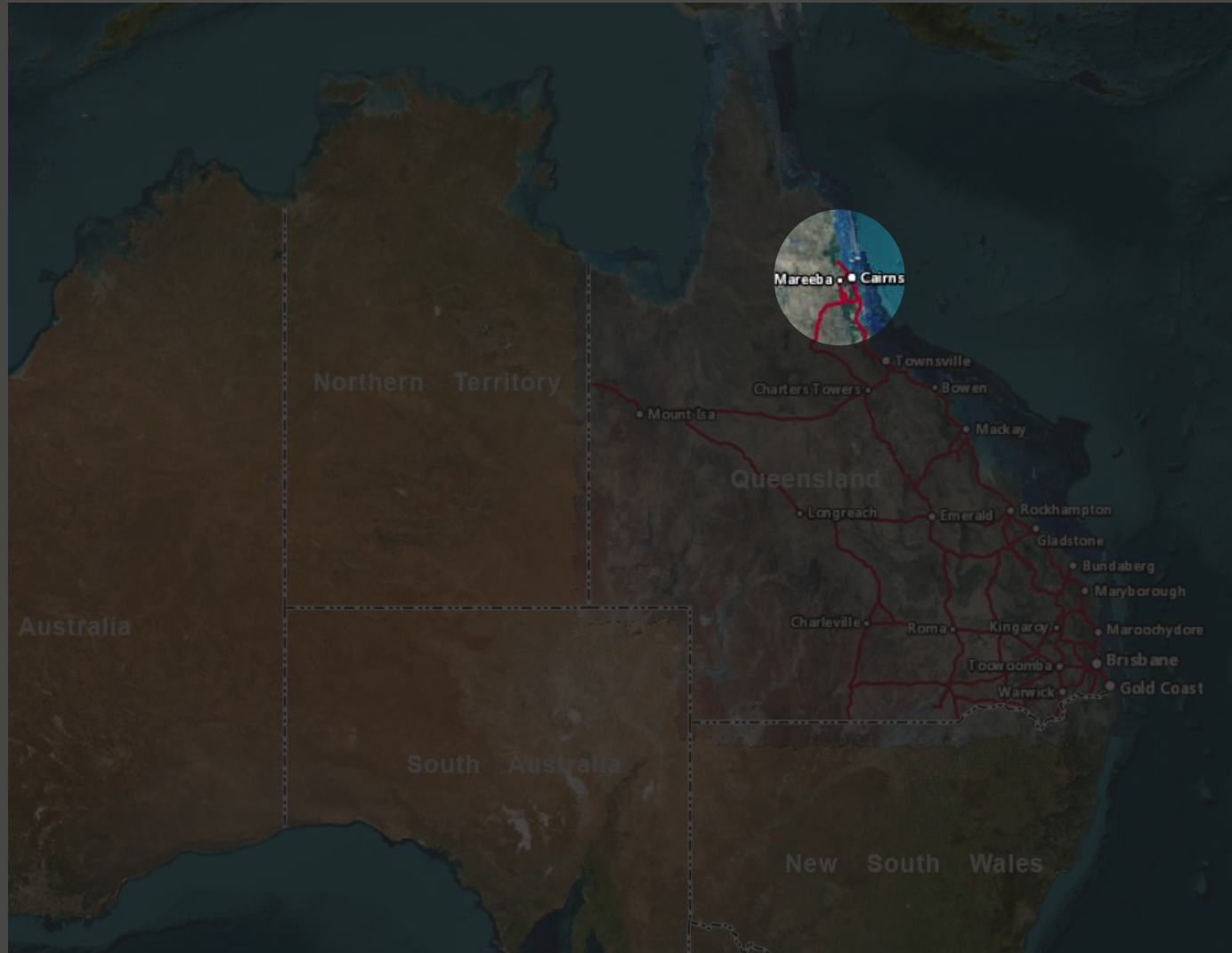


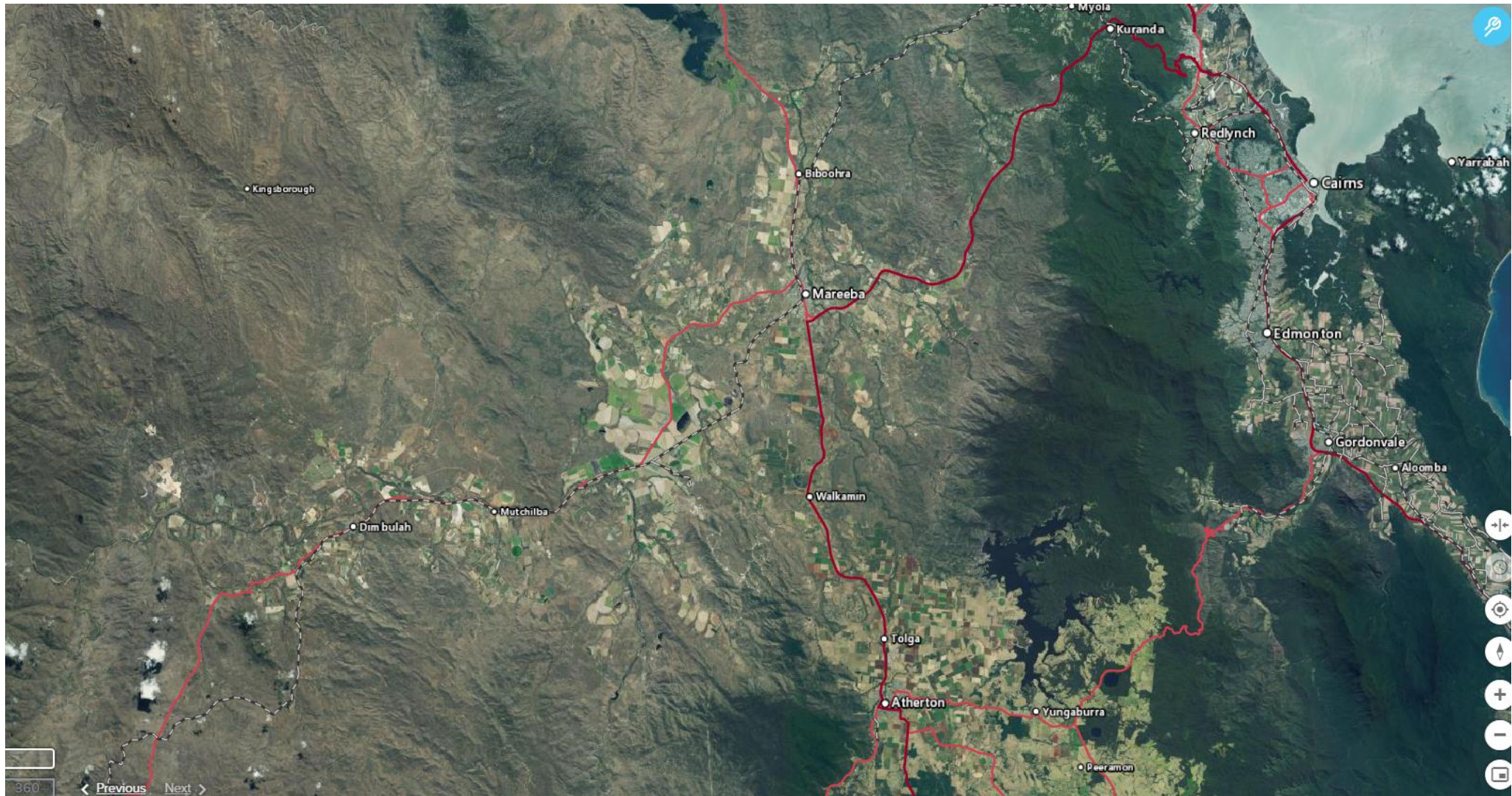
IPDM for the citrus industry



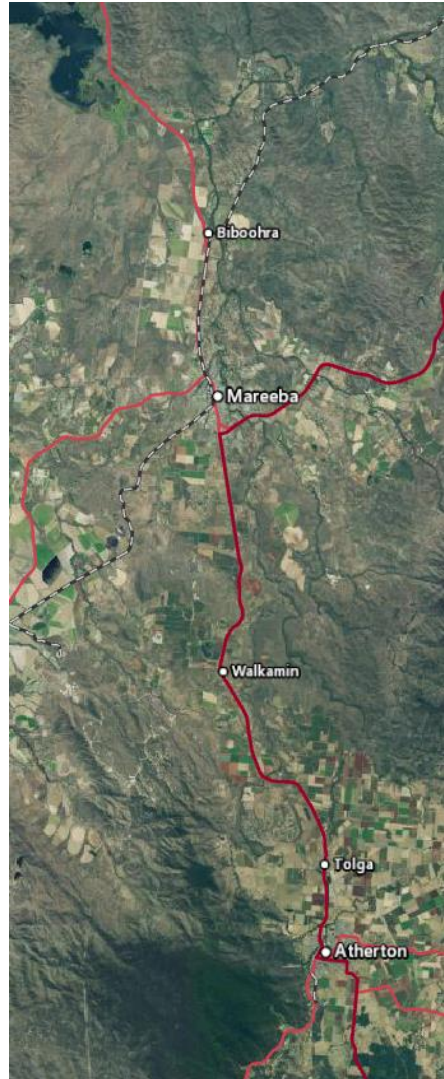
This project has been funded by Hort Innovation using the citrus research and development funds from the Australian Government. For more information on the fund and the strategic levy investment, visit horticulture.com.au







Citrus growing in the Mareeba-Dimbulah region



818 hectares of limes

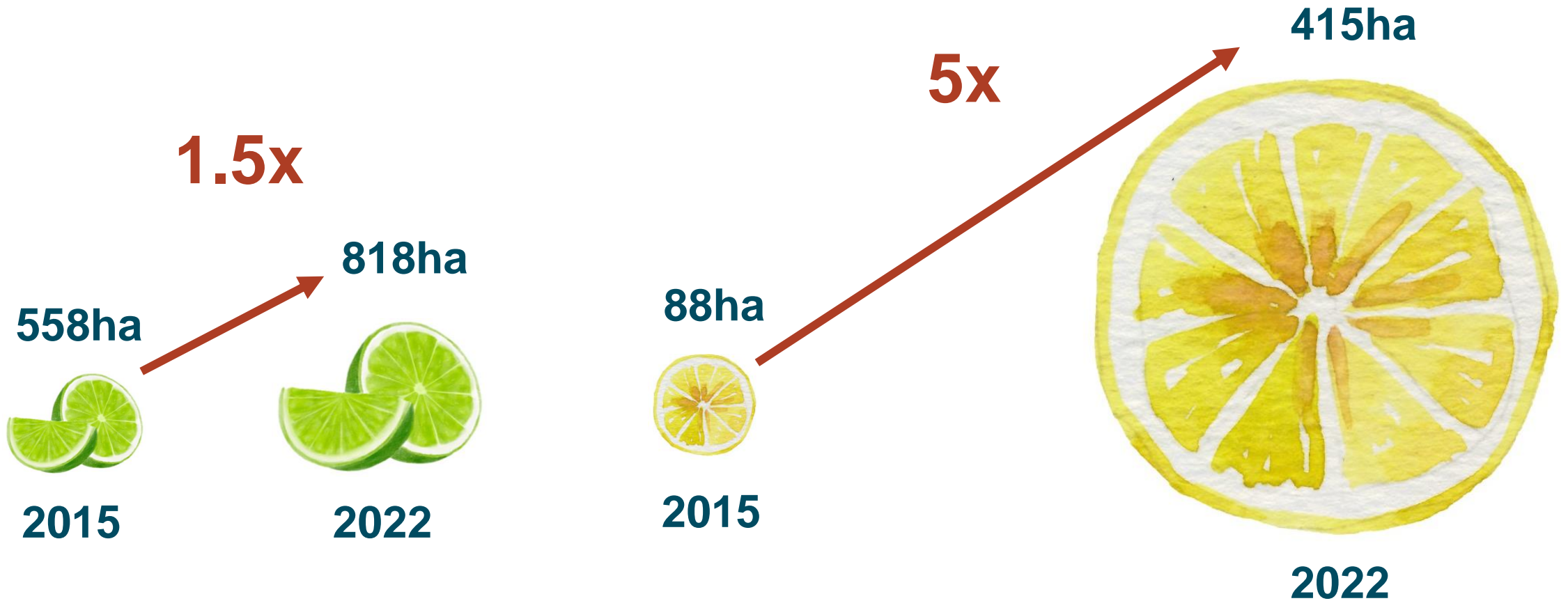


415 hectares of lemons



343 hectares of mandarins

North Queensland Citrus Growth





Citrus Growth

5ha
2015

70x

343ha

2022



What are the ADVANTAGES of growing citrus in the Mareeba-Dimbulah region?



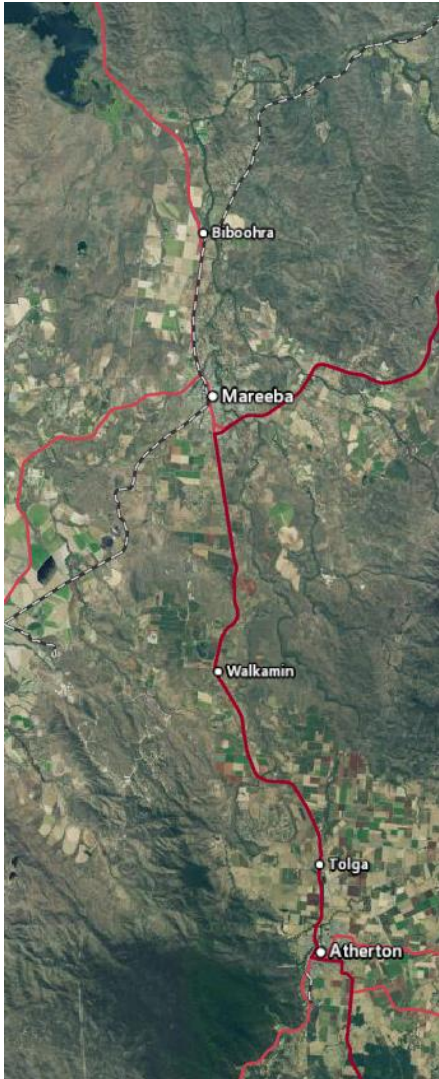
Tropical climate

All-year-round production (limes) or out-of-season production (lemons and mandarins)

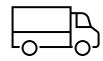


Access to reliable water

Irrigation source is Tinaroo dam, only 438,000ML, but has the **most reliable refill out of any dam in Australia**



What are the CHALLENGES to growing citrus in the Mareeba-Dimbulah region?



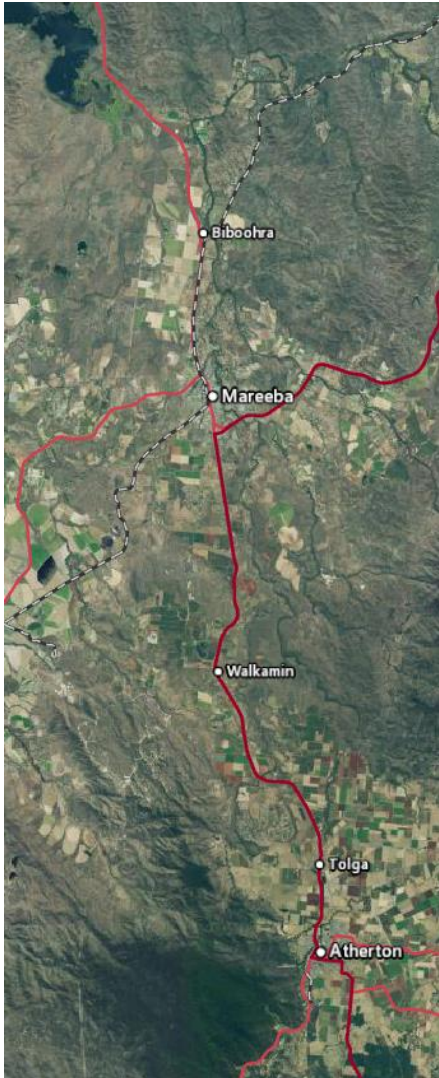
Distance from markets

It is 1745km from Mareeba to our closest major market - Brisbane



Pest pressure

Mild winters means that pests cycles **do not break**, and the pests have **more generations** per year





The solution: (or part of it)

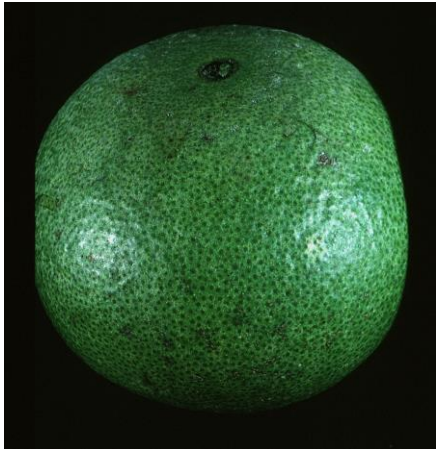
**Improved management of pests and diseases
to ensure more consignments have more
premium fruit**



NQ Pest Priorities:

Oriental Spider Mite was rated the no. 1 pest issue in North Queensland citrus

- 100% of growers considered Oriental spider mite (OSM) to be a pest of concern
- 86% are only achieving poor control of OSM, 14% achieving adequate control, 0% are achieving good control



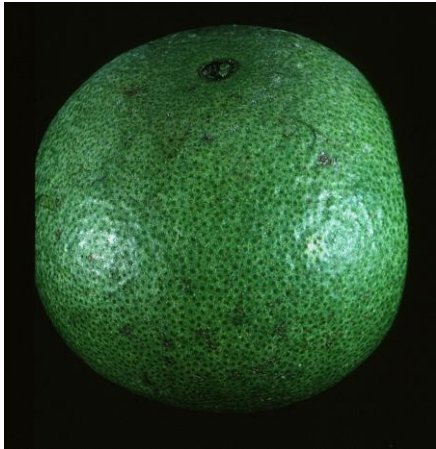


Reliance on chemical control

NQ citrus growers are:

- Spending an average on \$541 per hectare per year on miticides.
- Applying an average of 15 miticides a year

And 86% are still only achieving poor control



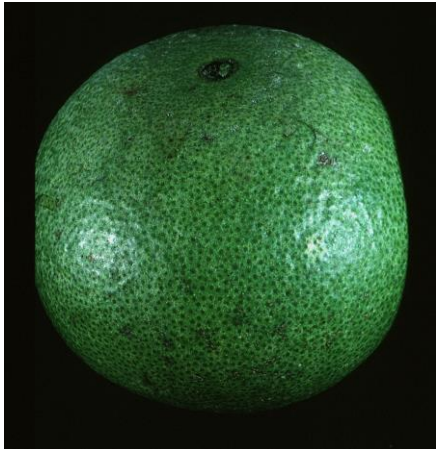


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What affects the populations of Oriental spider mite?

Chemicals

Sulphur
Paramite
Danisaraba
Abamectin
Vendex

Decrease natural
enemy populations

Natural enemies

Stethorus (lady bug)

Predatory mite

Nutrition

High nitrogen can
increase mite
populations

Environment

Temperatures
over 35°C favour
OSM

Interrow environment
e.g. flowering grasses

decrease mite populations

increase mite populations

decrease mite populations

increase mite populations

Decrease natural predator populations

increase natural predator populations



Demonstration 1: Biological and cultural control focus

**Release
predatory mites
into the crop**

**Reduce tissue
nitrogen**

**Spray low residual
miticides**

**Allow interrow
grass to flower
as a food source
to sustain
predatory mites**



Demo block:

- Release 6 x cylinders of 10,000 californicus (*Neoseilus californicus*) every fortnight
- Let interrow grass grow and flower
- Reduce nitrogen fertiliser



Monitoring:

- Weekly monitoring of OSM populations
- Tissue nitrogen tests
- Recording miticides

Monitoring

- 1-5 rating scale that could be used consistently between scouts



0

No mites



1

1 mite/leaf



2

<5 mites/leaf



3

<10 mites/leaf



4

>10 mites/leaf,
confined to
midrib, moderate
damage



5

>10 mites/leaf,
covering whole
leaf, high
damage



Added the ratings at each site to give a final population score out of 30 for each block



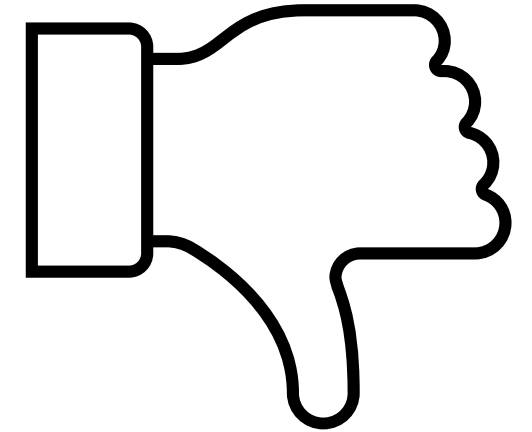
Results – Tissue nitrogen

IPM Block

Nutrient	Units	Range	29/8/22	11/11/22
Total nitrogen	%	2.40 – 2.96	2.7	2.4
Nitrate nitrogen	mg/kg		71	50

Conventional (control)

Nutrient	Units	Range	29/8/22	11/11/22
Total nitrogen	%	2.40 – 2.96	2.1	2.2
Nitrate nitrogen	mg/kg		50	50



Results – Allowing interrow grass to flower



IPM Block

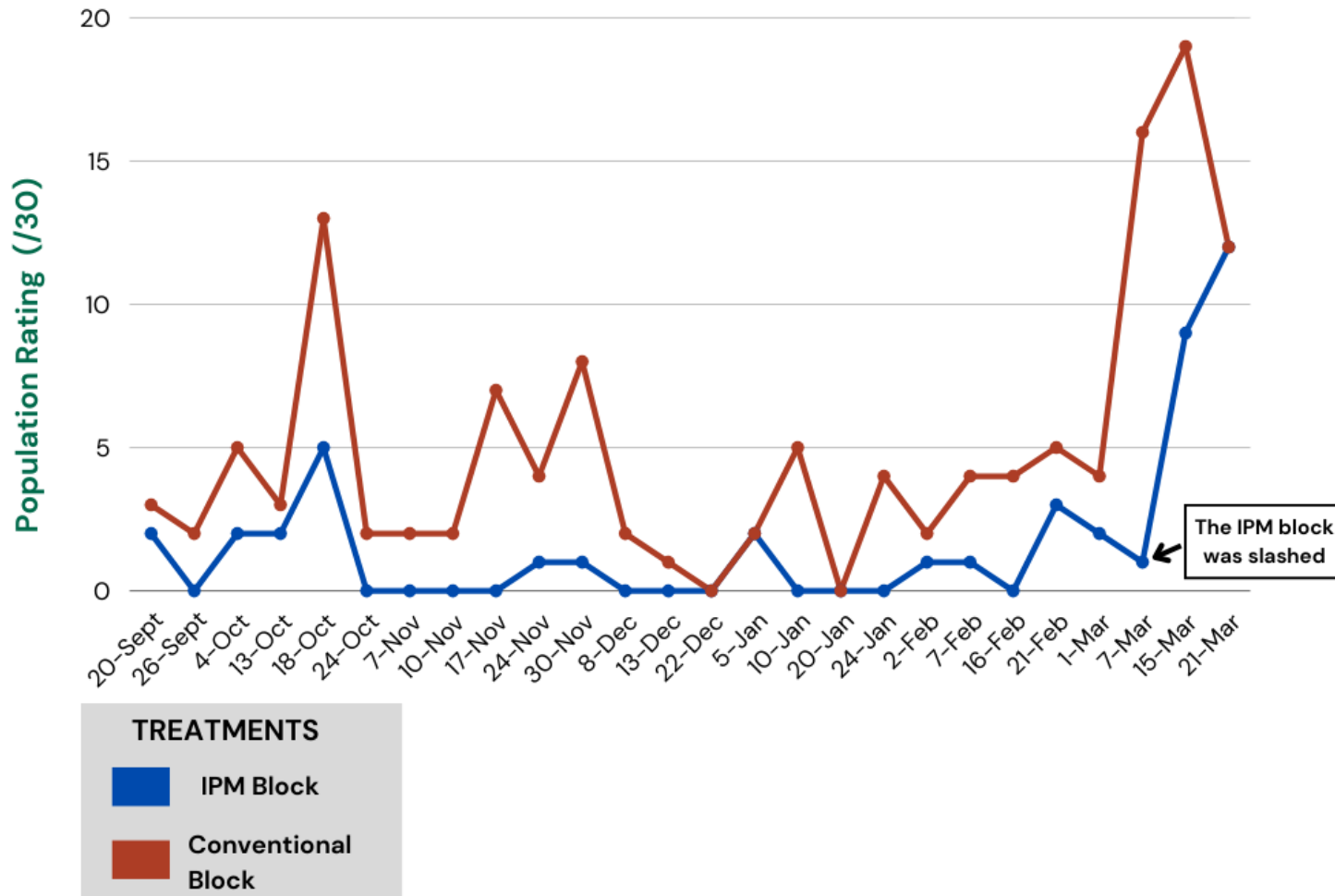
VS.



Conventional (control) Block

Results – OSM populations

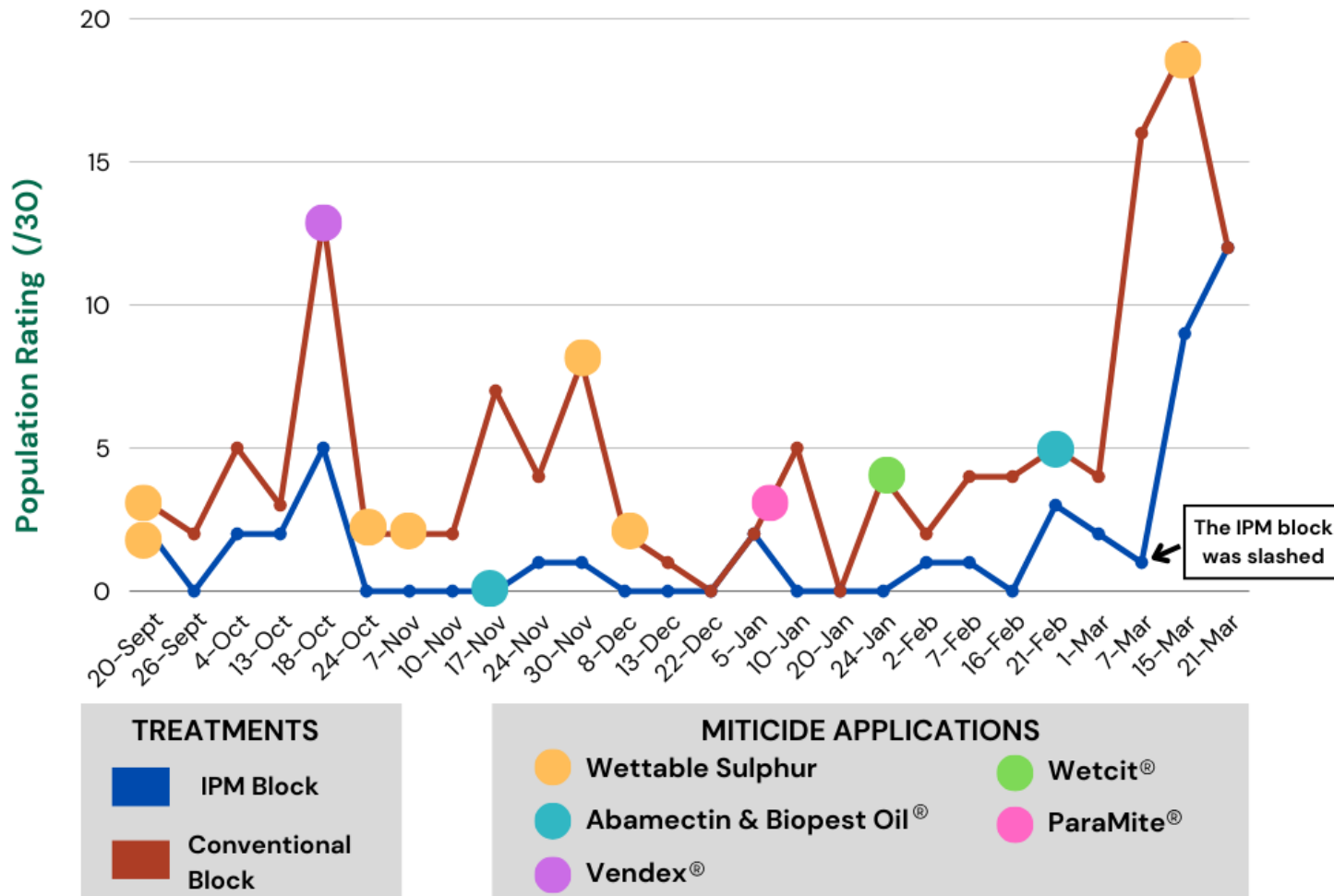
Oriental Spider Mite Populations



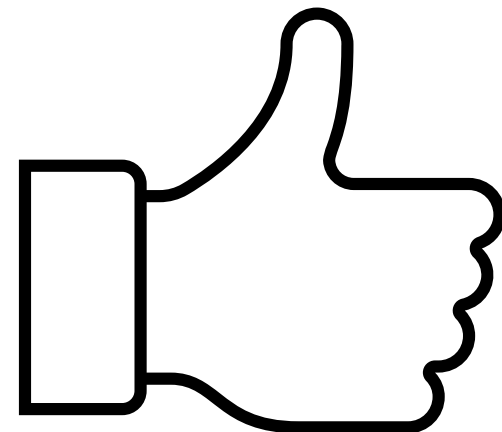
- Reduced OSM populations by 75%

Results – OSM populations

Oriental Spider Mite Populations



- Reduced OSM populations by 75%
- Reduced miticides used from 10 to 2





Demonstration 1 conclusions:

- Predatory mite releases combined with letting interrow grass flower can provide effective mite control without miticides
- Further research needed:
 - I. More properties and blocks to validate results
 - II. How often and at what rate do predatory mites need to be released
 - III. Are there improved strategies for interrow slashing



Demonstration 2: Improving chemical control

Integrated Pest Management (IPM) uses:

- **Chemical**
- ~~Biological~~
- ~~Cultural~~

practices to improve pest management



Demonstration 2: Improving chemical control

Miticides available to citrus:

Abamectin

Registered
for one use a
season

ParaMite

Registered
for one use a
season

Vendex

Works best in
specific
climatic
conditions

Danisaraba

Maximum of
two sprays
Expensive

Wettable sulphur

Registered for
multiple uses
Cheap



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Demonstration 2: Improving chemical control

Wettable sulphur

- Forms the backbone of NQ mite control
- Growers report “hit and miss” results
- NQ growers generally use water volumes between 2000-3000L/ha

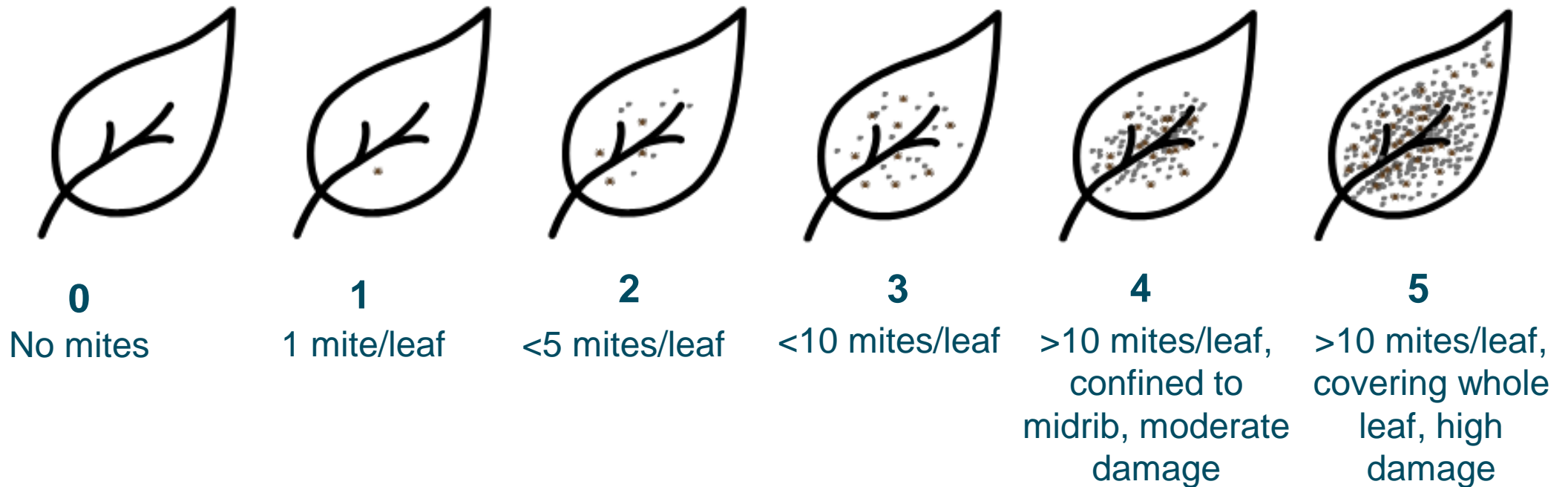


-  1500L/ha treatment area
-  3000L/ha treatment area
-  4500L/ha treatment area
-  6000L/ha treatment area

20 rows of limes
4 x treatments of 5 rows

- Populations were monitored every week using the 1-5 scale

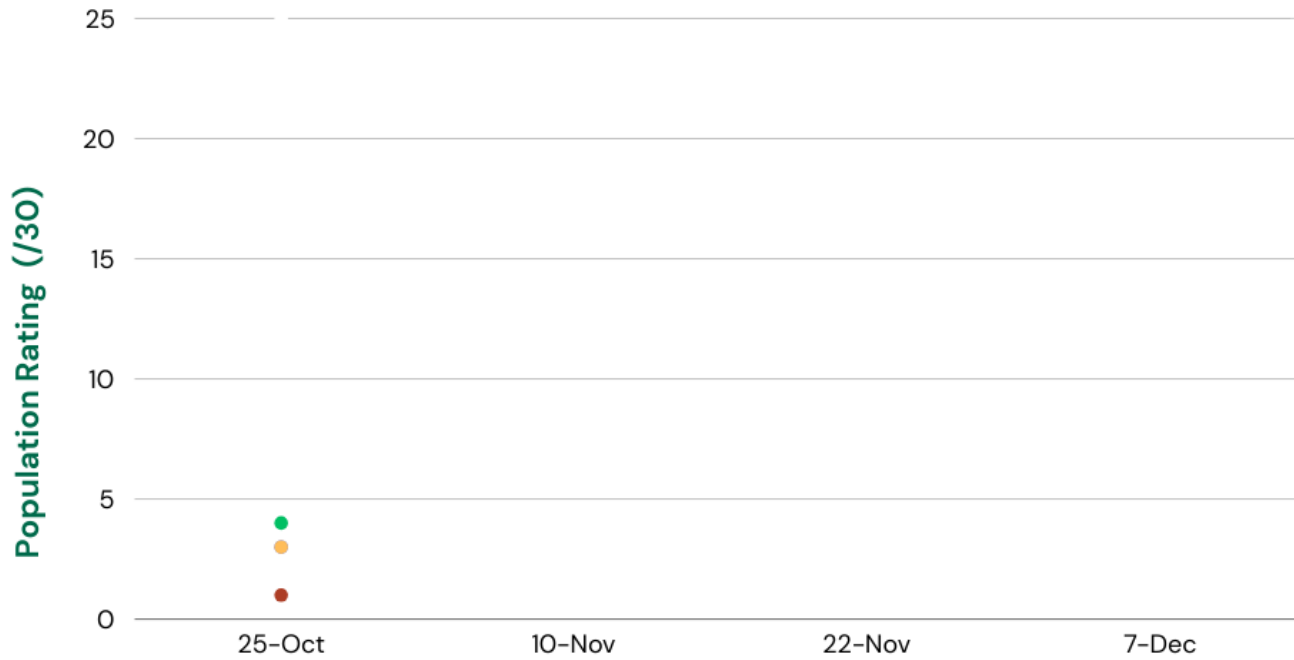
- 6 sites/treatment
- Final score for each treatment /30



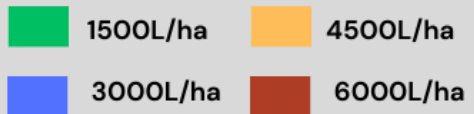
- Grower was asked to spray wettable sulphur at 400g/100L + 30mL/100L of Activator as populations began to increase



Oriental Spider Mite Populations

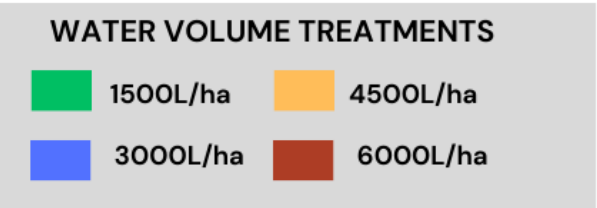
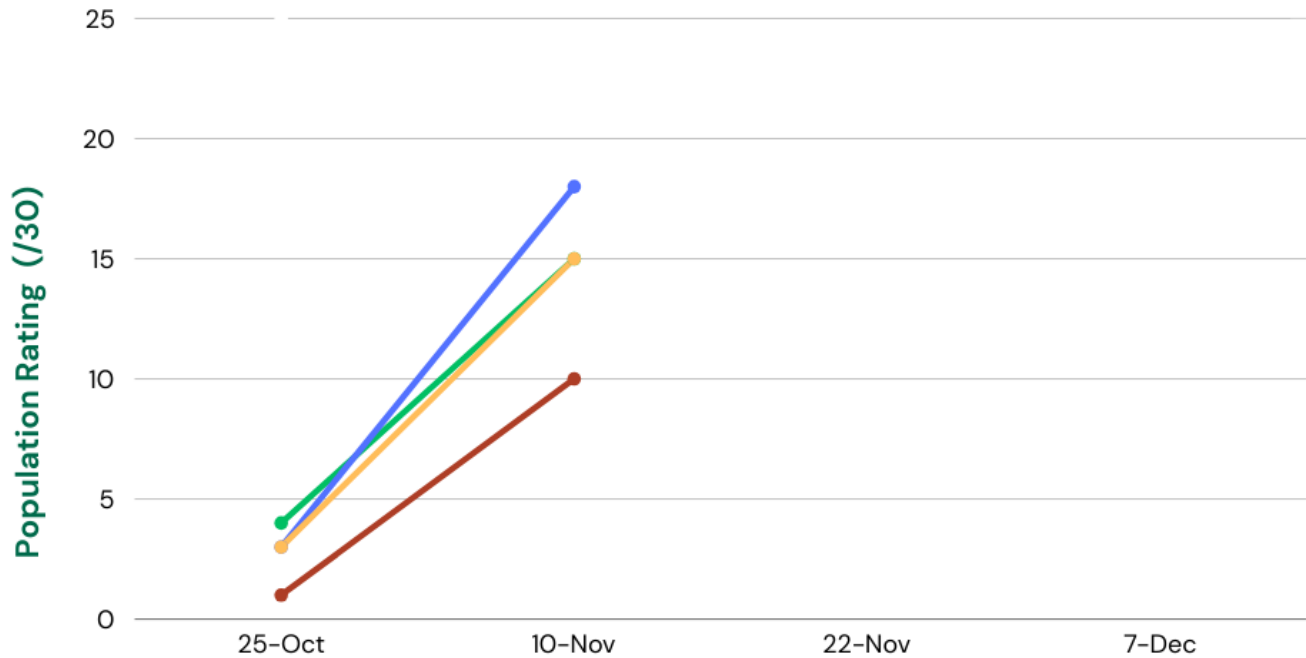


WATER VOLUME TREATMENTS



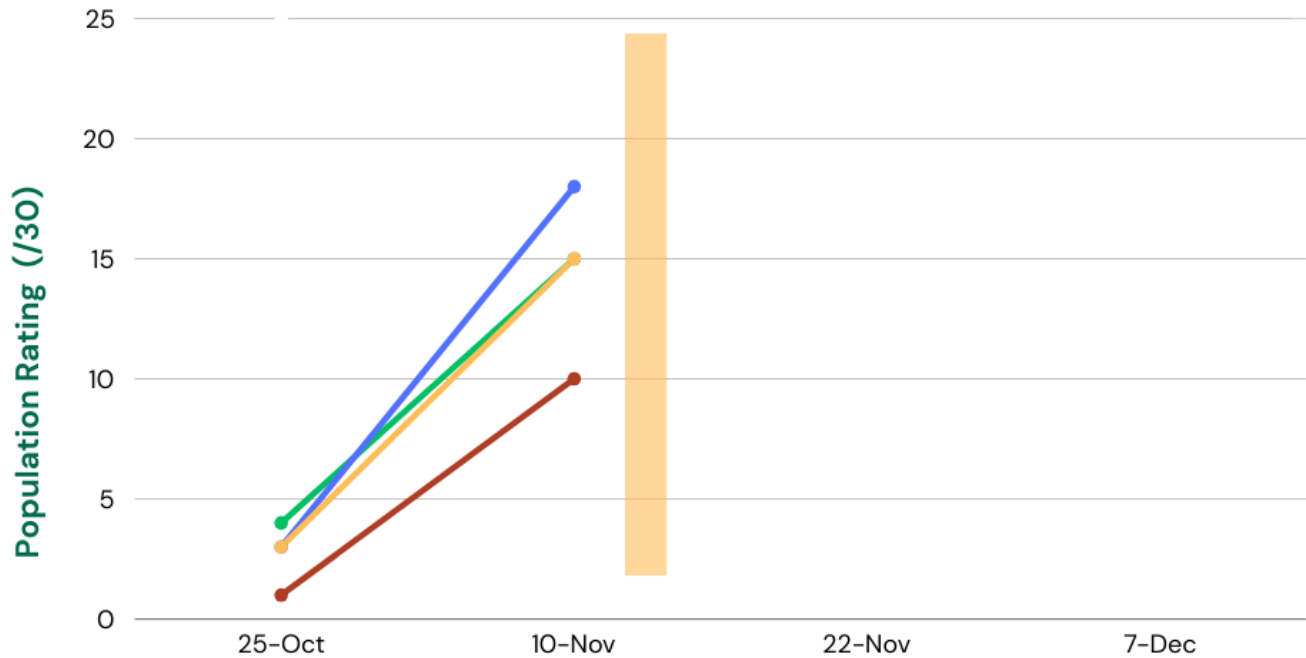


Oriental Spider Mite Populations





Oriental Spider Mite Populations



WATER VOLUME TREATMENTS

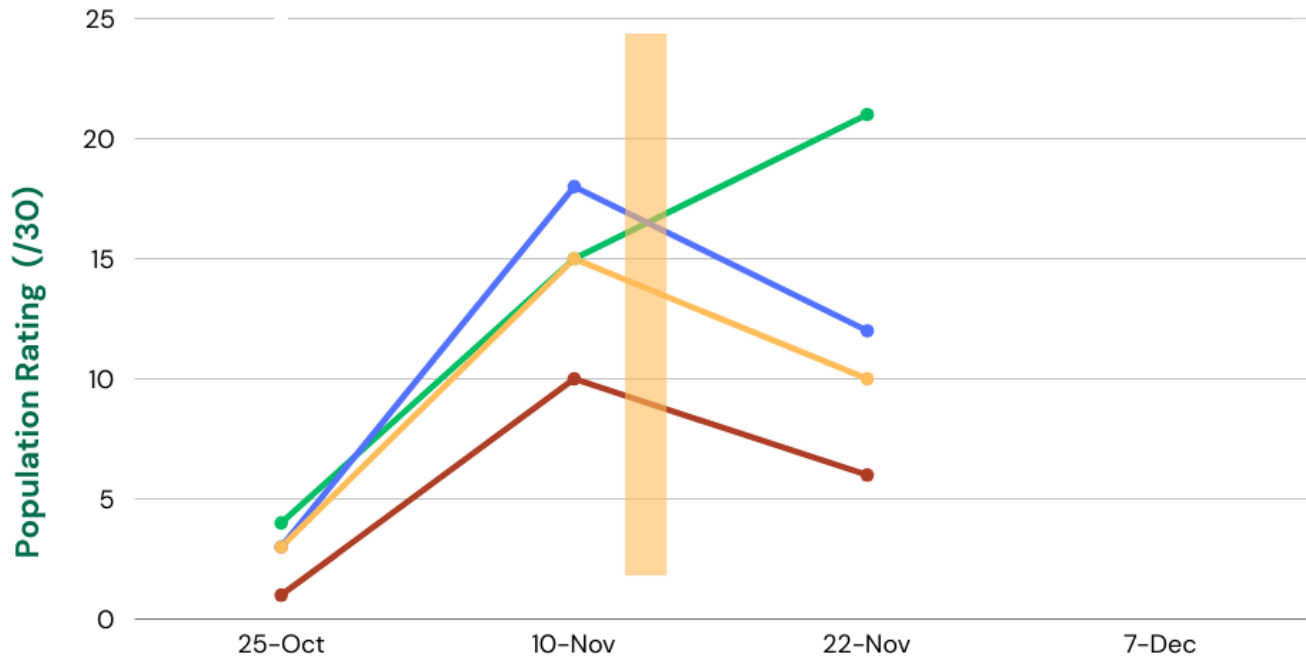
■ 1500L/ha	■ 4500L/ha
■ 3000L/ha	■ 6000L/ha

MITICIDE APPLICATIONS

■ Wettable Sulphur + adjuvant at the assigned volume
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Oriental Spider Mite Populations



WATER VOLUME TREATMENTS

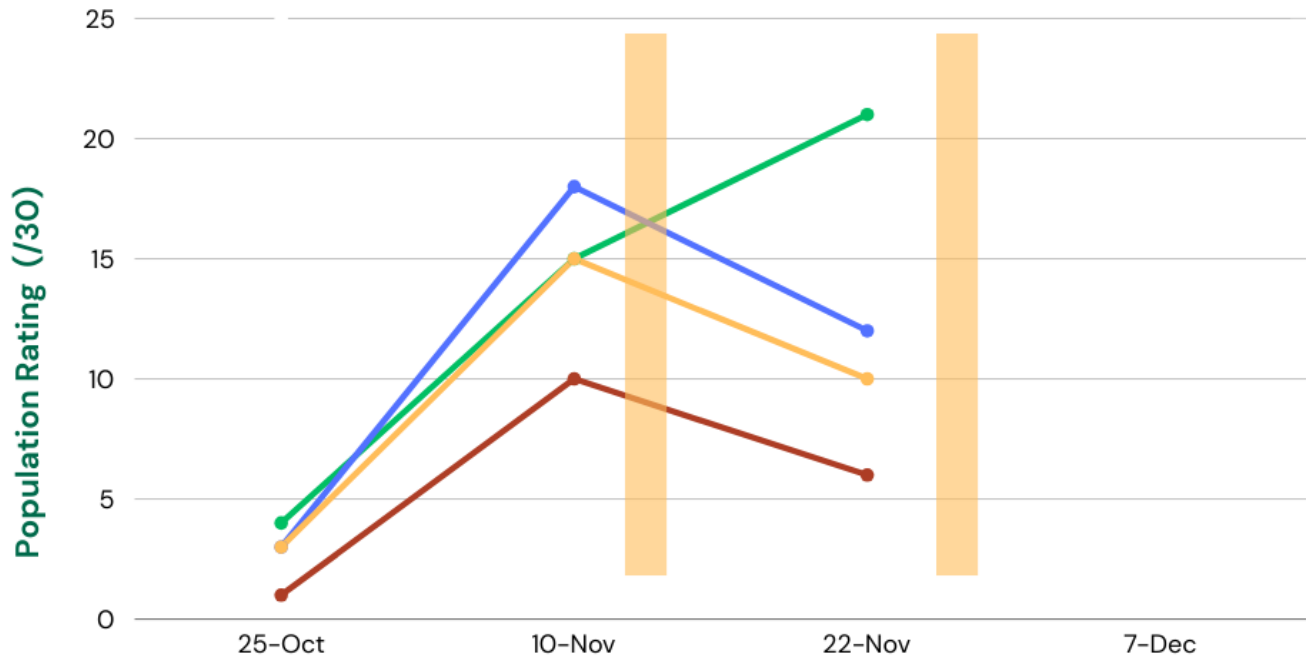
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Oriental Spider Mite Populations



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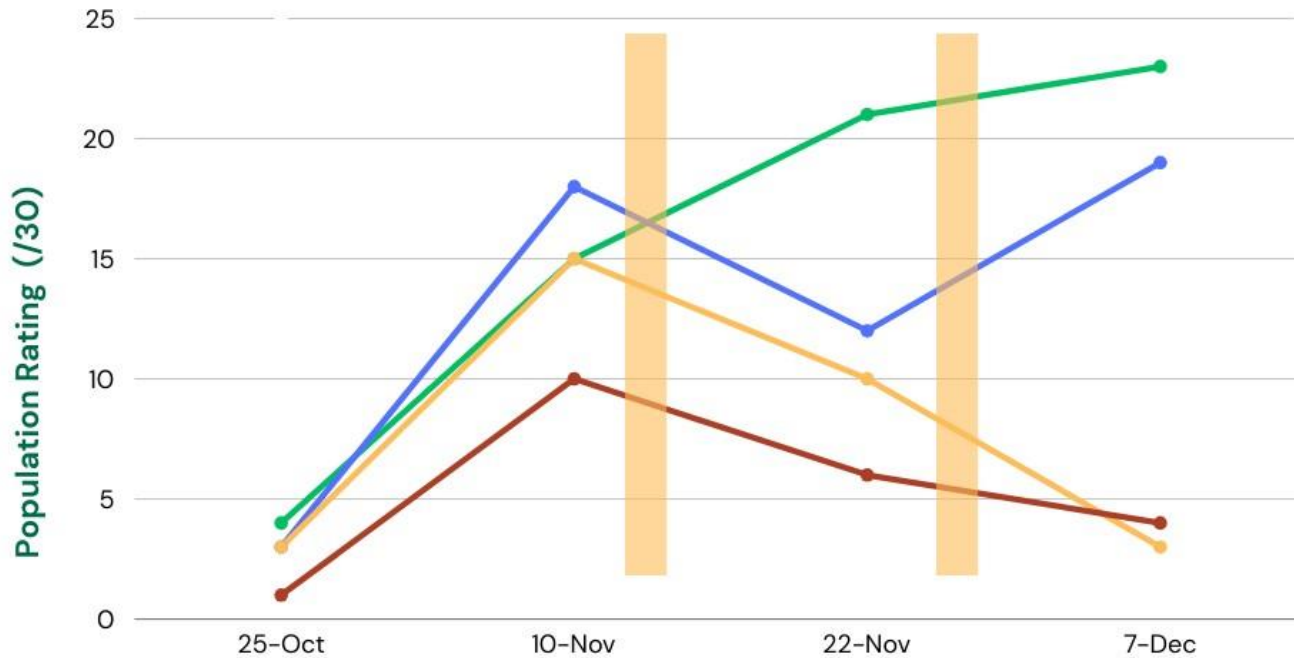
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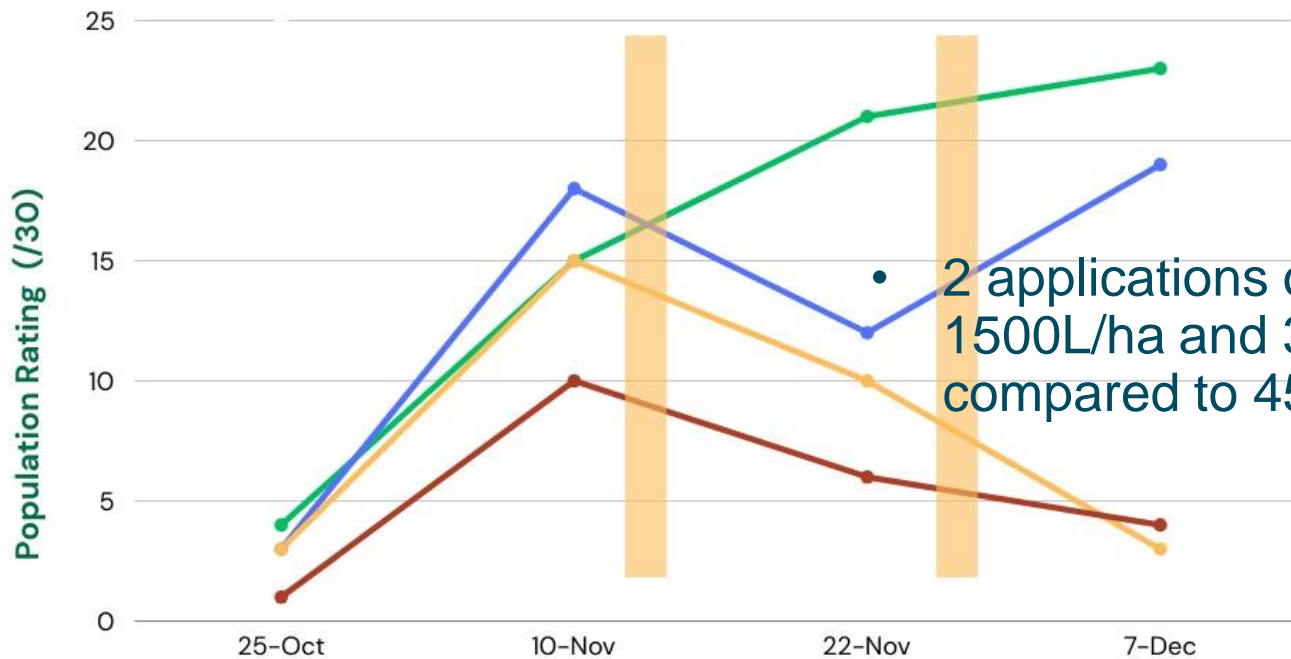
Oriental Spider Mite Populations



WATER VOLUME TREATMENTS		MITICIDE APPLICATIONS	
 1500L/ha	 4500L/ha	 Wettable Sulphur + adjuvant at the assigned volume	
 3000L/ha	 6000L/ha		



Oriental Spider Mite Populations



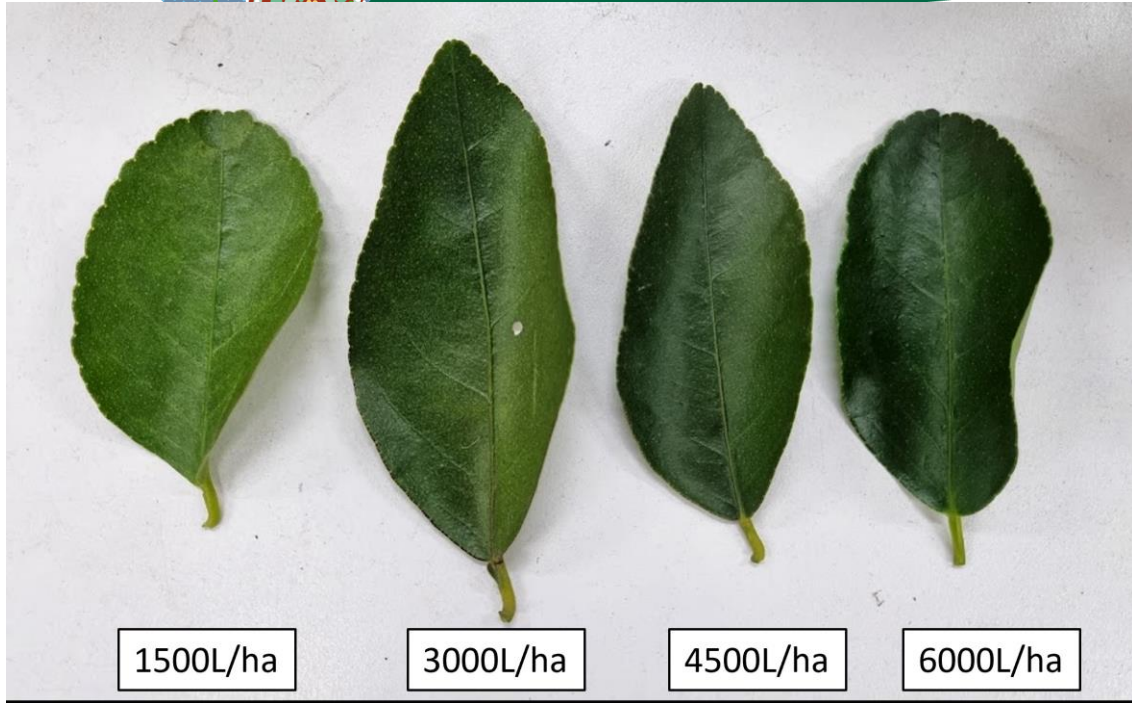
- 2 applications of wettable sulphur at 1500L/ha and 3000L/ha had poor results compared to 4500L/ha 6000L/ha

WATER VOLUME TREATMENTS

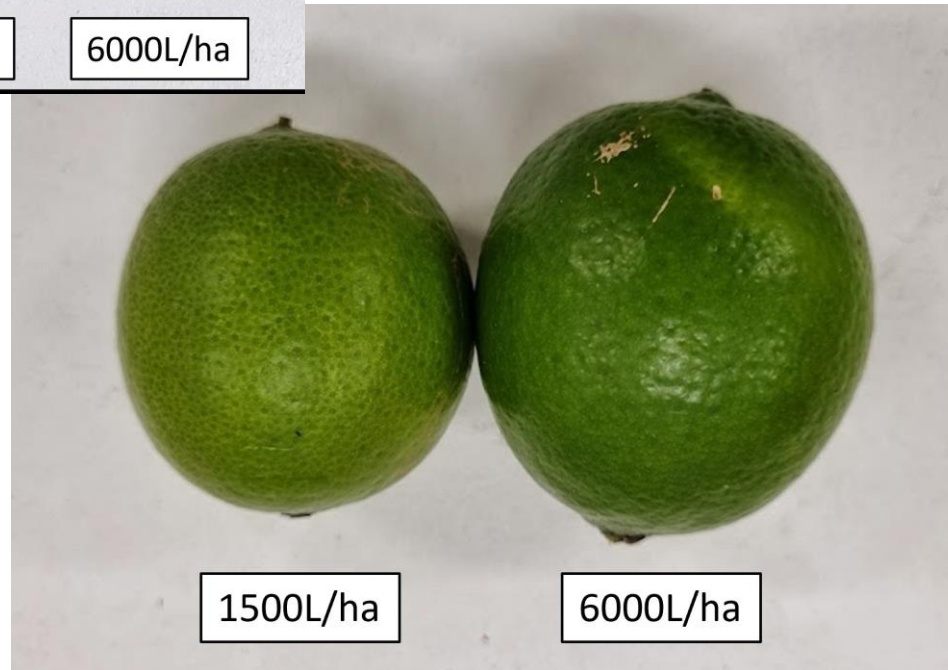


MITICIDE APPLICATIONS





- More damage on leaves and fruit from 1500L/ha and 3000L/ha





Demonstration 2 conclusions:

- Wettable sulphur used at volumes above 4500L/ha and 6000L/ha reduced Oriental spider mite and decreased damage on leaves and fruit
- Further research needed to validate results:
 - I. More properties and blocks
 - II. Different spray equipment
 - III. Different adjuvants?



Demonstration 3?

- We've proved that cultural and biological practices can improve mite control, and we've proved that we can be getting better control from our chemicals....
- Is it possible to combine Demos 1 and 2 to make a true IPM system that is cost-effective that NQ growers can use?

Stay tuned for mite season 2024 demo

North Queensland IPM mission statement

Better IPM = Better quality fruit = More premium pallets = Sustained NQ citrus industry



Thank you!

Acknowledgments

- Hort Innovation for funding CT19011 which allowed us to do the work
- Hilltop Farming, Mareeba and Rocky Tops, Dimbulah
- The project team – Rebecca Dumbrell, Charlee Macdonald and Stef De Faveri
- Ebony Faichney from Farmour Au
- Darcy Filmer from Natural Solutions
- The extension team in Mareeba

IPDM for the citrus industry



**Hort
Innovation**
Strategic levy investment

**CITRUS
FUND**



**Queensland
Government**



Department of
Primary Industries and
Regional Development



**BIOLOGICAL
SERVICES**



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