Efficacy of abamectin and an organosilicone surfactant to control the Lychee Erinose Mite, a new invasive pest in Florida

Revynthi AM
Cruz LF, Argolo P, Duncan RE, Canon MA, Tabanca N, Kendra PE, Mannion C & Carrillo D
India, Pakistan, Bangladesh, Thailand, China, Taiwan, Australia and Hawaii

Brazil - 80% yield reduction

2010

2018?
Detection in FL (2018)

Epicenter: Pine Island, Lee County
The Florida Department of Agriculture and Consumer Services has put an immediate quarantine in place for all of Lee County due to the presence of a major pest of lychee, *Aceria litchii*, known as lychee erinose mite. This pest has been found in several locations in Lee County including in lychee groves on Pine Island, and on residential properties and plant nurseries in other areas of the county.

To prevent the further spread of this major pest, the department is prohibiting the movement of lychee fruit or plant parts (trees, leaves or stems) out of the county.

**NO LYCHEE FRUIT OR PLANT PARTS CAN BE MOVED OUT OF LEE COUNTY UNLESS THE FOLLOWING CONDITIONS ARE MET:**

- Growers, harvesters and shippers sign compliance agreements with the Florida Department of Agriculture and Consumer Services.
- Lychee fruit is harvested and packed in Lee County for shipment outside of Florida only.

No lychee fruit or plant parts can be moved out of Lee County to other locations in Florida.

For more information, please contact,
1-888-397-1517
Aceria litchii
Lychee Erinose Mite LEM

• Uses stylets to pierce and feed on leaf epidermal cells

• Induces an abnormal growth of abundant leaf hairs “erinea”
Symptoms
Host Range

- LEM is a lychee specialist
- Susceptible → flowering & fruiting seasons
Dispersal

- Drifting on air currents
- Honey bees
- Plant propagation (air-layers)
- Humans
Environmental Conditions

- **Favorable conditions**: new growth on trees, moderately hot and dry periods

- **Unfavorable conditions**: high temperature, high RH and heavy rainfall
Management in other countries

- Timed acaricide sprays to **protect new flush**

- Sprays start at bud emergence until leaves have hardened
## Chemical control

<table>
<thead>
<tr>
<th>Country</th>
<th>Product</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Dimethoate</td>
<td>3 applications at 2-3 weeks interval</td>
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<tr>
<td></td>
<td>Wettable sulfur</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>Dicofol</td>
<td>NA</td>
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<tr>
<td>Thailand</td>
<td>Spiromesifen</td>
<td>2 applications at 0.144 g/L</td>
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<tr>
<td></td>
<td>Dimethoate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wettable sulfur</td>
<td>2-3 weeks interval</td>
</tr>
<tr>
<td>China</td>
<td>Dichlorvos</td>
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<tr>
<td></td>
<td>Dimethoate</td>
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<tr>
<td></td>
<td>Dicofol</td>
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<tr>
<td></td>
<td>Chlorpyrifos</td>
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<tr>
<td></td>
<td>Isocarbophos</td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>Abamectin</td>
<td>30 ml/ 100 L</td>
</tr>
<tr>
<td></td>
<td>Mineral oil</td>
<td>1000 ml/ 100 L</td>
</tr>
<tr>
<td></td>
<td>Hexythiazox</td>
<td>3 ml/ 100 L</td>
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<tr>
<td></td>
<td>Fenpyroximate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sulfur</td>
<td>100 ml/ 100 L</td>
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<tr>
<td></td>
<td>Dimethoate</td>
<td></td>
</tr>
<tr>
<td>USA (Hawaii)</td>
<td>Wettable sulfur</td>
<td>5 applications with 5 lbs/gal monthly</td>
</tr>
</tbody>
</table>
Cultural practices

- Pruning
- Synchronize flushing
- Burn infested branches
Acaricides registered for use on Lychee in FL

- Abamectin (Agri-Mek ® SC)
  Rate for lychee: 2.25 - 4.25 Oz

- Bifenazate (Acramite ® 50WS)
  Rate for lychee: 0.75 - 1 Lb

Photo USDA, /ARS
Complexities of LEM work

• Mites hidden inside erinea

• Large and highly variable populations

• Cannot evaluate efficacy in the traditional way

Area: 19.6 mm²
Average of 2,106.5 ± 236 mites
Meaning 10,750 mites / cm²
Performance of Abamectin to control an existing infestation

Treatments applied on infested leaflets:

1. Abamectin (Agri-Mek® SC, 4.25 oz/100 gal)
2. Oil (DyneAmic®, 5 pints/100 gal)
3. Abamectin + Oil
4. Water (positive control)
5. Non-sprayed (negative control)
Performance of Abamectin to protect the new flush

Treatments applied on plants after 30 days:

1. Abamectin (Agri-Mek® SC, 4.25 oz/100 gal)

2. Oil (DyneAmic®, 5 pints/100 gal)

3. Abamectin + Oil

4. Water (positive control)

5. Non-sprayed (negative control)
Performance of Abamectin to control an existing infestation

% of plants developing erinea

Non-sprayed | Water | Abamectin | Oil | Abamectin + Oil

Time-to-event analysis with parametric model
Treatment: $\chi^2 = 12.47$, df = 4, $P = 0.01$
Performance of Abamectin to protect the new flush

% of plants developing erinea on the new flush

Non-sprayed  Water  Abamectin  Oil  Abamectin + Oil

Time-to-event analysis with parametric model
Treatment: $\chi^2 = 1.18$, df = 4, P = 0.88
Conclusions

• None of the treatments was effective

• Currently registered acaricide did not control LEM and did not protect the new flush

• Need for other acaricides, i.e. sulfur
Current research focus

- Post-harvest treatments
  - Paraffinic oil dips

![Graph showing the average number of mites per fruit for different treatments. The graph indicates that the oil dips significantly reduce the number of mites compared to the control.](image-url)
No adverse effect on fruit quality
Thank You!

Questions and Discussion