Research update on the Lychee Erinose Mite (*Aceria litchii*)

Revynthi AM

Carrillo D, Cruz LF, Crane JH, Tabanca N, Bauchan GR, Ochoa R, Kendra PE, Mannion C, & Bolton S
Aceria litchii
Lychee Erinose Mite LEM

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

- LEM is a lychee specialist
- More susceptible during the flowering and 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
India, Pakistan, Bangladesh, Thailand, China, Taiwan, Australia and Hawaii

Brazil - 80% yield reduction

2010

2018?
Management in other countries

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

- Sprays start at bud emergence until leaves have hardened
<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>
</tr>
<tr>
<td></td>
<td>Wettable sulfur</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>Dicofol</td>
<td>NA</td>
</tr>
<tr>
<td>Thailand</td>
<td>Spiromesifen</td>
<td>2 applications at 0.144 g/L</td>
</tr>
<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>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Dimethoate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dicofol</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chlorpyrifos</td>
<td></td>
</tr>
<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>
</tr>
<tr>
<td></td>
<td>Fenpyroximate</td>
<td>100 ml/ 100 L</td>
</tr>
<tr>
<td></td>
<td>Sulfur</td>
<td></td>
</tr>
<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>

**Chemical control**
Cultural practices

- Pruning
- Synchronize flushing
- Burn infested branches
Biological control

Mainly predatory mites:

- *Phytoseius intermedius*
- *P. woodburyi*
- *Amblyseius compositus*
- *A. herbicolas*
- *Euseius concordis*
- *Iphiseiodes zuluagai*
- *A. largoensis* (Florida)
- *E. mesembrinus* (Florida)
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
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
Performance of Abamectin to protect the new flush

% of plants developing erinea on the new flush

- Non-sprayed
- Water
- Abamectin
- Oil
- Abamectin + Oil
Conclusions from trials with Abamectin

• None of the treatments was effective

• Lychee plants receiving leaflets sprayed with abamectin developed erinea later

• Abamectin application could not protect the new flush

• Abamectin alone or with oil cannot control the mite population inside the erinea
Sulfur phytotoxicity

- Winter trial on new/emerging and mature vegetative growth (Av. temp: 72F; 83% RH; 1.98 inches rain)

- Spring trial on panicles and flowers (Av. Temp: 72F; 82% RH; 1.88 inches rain)

- Summer trial to commence
Winter trial

- 6 mature “Mauritius” lychee trees
- 10 limbs per tree
- 5 applications at 7 day interval

<table>
<thead>
<tr>
<th>TRT</th>
<th>Products</th>
<th>Rate per acre*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Suffa 1x</td>
<td>5 gal/acre</td>
</tr>
<tr>
<td>2</td>
<td>Suffa 2x</td>
<td>10 gal/acre</td>
</tr>
<tr>
<td>3</td>
<td>Tracite sulfur 1x</td>
<td>5 pts/acre</td>
</tr>
<tr>
<td>4</td>
<td>Tracite sulfur 2x</td>
<td>10 pts/acre</td>
</tr>
<tr>
<td>5</td>
<td>Yellow Jacket 1x</td>
<td>30 lbs/acre</td>
</tr>
<tr>
<td>6</td>
<td>Yellow Jacket 2x</td>
<td>60 lbs/acre</td>
</tr>
<tr>
<td>7</td>
<td>Kolla sulfur 1x</td>
<td>4 pts/acre</td>
</tr>
<tr>
<td>8</td>
<td>Kolla sulfur 2x</td>
<td>8 pts/acre</td>
</tr>
<tr>
<td>9</td>
<td>Non-treated</td>
<td>NA</td>
</tr>
<tr>
<td>10</td>
<td>Non-treated</td>
<td>NA</td>
</tr>
</tbody>
</table>
Spring trial

- 8 mature “Mauritius” lychee trees
- 10 limbs per tree
- 6 applications at 7 day interval
- Same treatments applied

<table>
<thead>
<tr>
<th>Rating</th>
<th>Damage rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No damage to panicle</td>
</tr>
<tr>
<td>1</td>
<td>Slight necrosis to panicle</td>
</tr>
<tr>
<td>2</td>
<td>Moderate necrosis to panicle</td>
</tr>
<tr>
<td>3</td>
<td>Severe necrosis to panicle</td>
</tr>
<tr>
<td>4</td>
<td>Necrosed (dead) panicle/abscission</td>
</tr>
<tr>
<td>5</td>
<td>No necrosis to open flowers</td>
</tr>
<tr>
<td>6</td>
<td>Slight necrosis to open flowers</td>
</tr>
<tr>
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</table>
Winter trial

Leaves sprayed to run-off with Suffa at 2X rate, Photo: JHC

Little to no phytotoxicity on immature and mature treated foliage

No apparent differences among the sulfur products
Spring trial

No phytotoxicity on any treated foliage adjacent to the panicles.

No phytotoxicity to the panicles was observed.

Consistent mass necrosis and/or abscission was not observed.

Emerged panicle after 2nd spray with Yellow Jacket sulfur 2X rate. No phytotoxicity damage. Photo: JHC

Male stage flowering panicle after 4 Kolla sulfur sprays at 2X rate. No phytotoxicity damage. Photo: JHC

Female stage of flowering panicle after five Suffa at 2X rate. No phytotoxicity damage. Photo: JHC
General conclusions

- Abamectin does not eliminate LEM and fails to protect new flush

- Preliminary results suggest that Sulfur causes little to no phytotoxicity on Lychee
Thank You!

Questions and Discussion

Photo USDA, /ARS