Chemical, Botanical, and Microbial Solutions for Managing Spider Mites

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Twospotted spider mite

Nymph

Adult male

Eggs

Adult female
Spider mite damage

Symptoms progress from yellow mottling, scarring to bronzing and drying out of leaves. Stunted growth and plant death can also be seen.
Spider mite damage in Benicia

Purplish dark coloration of the upper leaf surface corresponding to the damaged underside is specific to the cultivar, Benicia.
## 2011 field trial

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Untreated control</td>
<td></td>
</tr>
<tr>
<td>2. Nealta (cyflumetofen) 13.7 fl oz/ac in 100 gal</td>
<td></td>
</tr>
<tr>
<td>3. Agri-Mek 0.15 EC (abamectin) 16 fl oz/ac in 100 gal</td>
<td></td>
</tr>
</tbody>
</table>

| Plot size                                      | 20’ long bed replicated 4 times                                   |
| Design                                         | Randomized complete block                                         |
2011 field trial - First spray

**EGGS**
- 0 DAT: Untreated, Nealta, Agri-Mek
- 3 DAT: Untreated, Nealta, Agri-Mek
- 7 DAT: Untreated, Nealta, Agri-Mek

**NYMPHS and ADULTS**
- 0 DAT: Untreated, Nealta, Agri-Mek
- 3 DAT: Untreated, Nealta, Agri-Mek
- 7 DAT: Untreated, Nealta, Agri-Mek
2011 field trial-Second spray

EGGS

0 DAT
(21 DAT of first spray)

0 20 40 60 80 100

0 2 4 6 8 10

Untreated Nealta Agri-Mek

NYMPS and ADULTS

3 DAT

0 20 40 60 80 100

0 2 4 6 8 10

Untreated Nealta Agri-Mek
## 2012 field trial

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Untreated</td>
<td></td>
</tr>
<tr>
<td>2 Agri-Mek EC (abamectin) 16 fl oz/ac in 150 gal</td>
<td></td>
</tr>
<tr>
<td>3 Acramite 50 WS (bifenazate) 1 lb/ac in 150 gal</td>
<td></td>
</tr>
<tr>
<td>4 BotaniGard 22WP (<em>Beauveria bassiana</em>) 4 lb/ac in 200 gal</td>
<td></td>
</tr>
<tr>
<td>5 BotaniGard 4 lb + Fujimite (fenpyroximate) 2pt in 200 gal</td>
<td></td>
</tr>
<tr>
<td>6 Nealta SC (cyflometofen) 13.7 fl oz/ac in 150 gal</td>
<td></td>
</tr>
<tr>
<td>7 Fujimite 5 EC 2 pt/ac in 150 gal</td>
<td></td>
</tr>
<tr>
<td>8 Movento 240 SC (spirotetramat) 5 fl oz/ac in 150 gal</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plot size</th>
<th>20’ long bed replicated 4 times</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Design</th>
<th>Randomized complete block</th>
</tr>
</thead>
</table>
2012 field trial

Number of eggs/leaflet

- Untreated
- Abamectin (Agri-Mek)
- Bifenazate (Acrinite)
- B. bassiana (BotaniGard)
- Bb + Fen. (BotaniGard+Fujinite)
- Cyflometofen (Nealta)
- Fenpyroximate (Fujinite)
- Spirotetramat (Movento)

Eggs

0 DAT 3 DAT 7 DAT
2012 field trial

Nymphs and adults

Number of mobile stages/leaflet

- Untreated
- Abamectin (Agri-Mek)
- Bifenazate (Acranite)
- B. bassiana (BotaniGard)
- Bb + Fen. (BotaniGard+Fujimite)
- Cyflometofen (Nealta)
- Fenpyroximate (Fujimite)
- Spirotetramat (Movento)

0 DAT  3 DAT  7 DAT
2012 field trial-Predatory mites

Number of predatory mites/leaflet

Eggs-Neoseiulus spp.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>0 DAT</th>
<th>3 DAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td>0.6</td>
<td>0.5</td>
</tr>
<tr>
<td>Abamectin (Agri-Mek)</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Bifenzate (Aramite)</td>
<td>0.8</td>
<td>1.2</td>
</tr>
<tr>
<td>B. bassiana (BotaniGard)</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Bb + Fen. (BotaniGard+Fujinite)</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Cyflometrine (Nealta)</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Fenpyroximate (Fujinite)</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Spirotetramat (Movento)</td>
<td>0.5</td>
<td>0.5</td>
</tr>
</tbody>
</table>
2012 field trial-Predatory mites

Nymphs and Adults-*Neoseiulus* spp.

Number of predatory mites/leaflet

<table>
<thead>
<tr>
<th>Treatment</th>
<th>0 DAT</th>
<th>3 DAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td>2.3</td>
<td>1.8</td>
</tr>
<tr>
<td>Abamectin (Agri-Mek)</td>
<td>2.8</td>
<td>2.2</td>
</tr>
<tr>
<td>Bifenazate (Acramite)</td>
<td>2.4</td>
<td>2.0</td>
</tr>
<tr>
<td>B. bassiana (BotaniGard)</td>
<td>2.6</td>
<td>2.1</td>
</tr>
<tr>
<td>Bb + Fen. (BotaniGard+Fujimite)</td>
<td>3.9</td>
<td>3.5</td>
</tr>
<tr>
<td>Cyflometofen (Nealta)</td>
<td>1.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Fenpyroximate (Fujimite)</td>
<td>1.8</td>
<td>1.4</td>
</tr>
<tr>
<td>Spirotetramat (Movento)</td>
<td>2.0</td>
<td>1.6</td>
</tr>
</tbody>
</table>
2013 field trial

Treatments
1 Untreated
2 Acramite 50 WS (bifenazate) 1 lb/ac
3 Agri-Mek SC (abamectin) 4.29 fl oz/ac
4 BotaniGard ES (*B. bassiana*) 1qrt/ac + Agri-Mek SC 3.5 fl oz/Acramite 0.75 lb/ac
5 Eco-Mite (rosemary and cottonseed oils) 1%
6 Fujimite 5 EC (fenpyroximate) 2 pt
7 Fujimite XLO 2 pt
8 Grandevo (*Chromobacterium subtsugae* strain PRAA4-1) 2 lb
9 MBI 206 2 gal
10 Nealta (cyflumetofen) 13.7 fl oz – all in 150 gal

Plot size
15’ long bed replicated 4 times

Design
Randomized complete block
2013 field trial - first spray

Number of eggs/leaflet

- Untreated
- Acramite 50WS
- Agri-Mek SC
- BotaniGard+Acramite
- Eco-Mite
- Fujimite 5EC
- Fujimite XLO
- Grandevo
- MBI 206
- Nealta

Eggs

I-3 DAT I-7 DAT
2013 field trial-first spray

Nymphs and adults

Number of mobile stages/leaflet

<table>
<thead>
<tr>
<th>Product</th>
<th>I-3 DAT</th>
<th>I-7 DAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acramite 50WS</td>
<td>23.5</td>
<td>17.2</td>
</tr>
<tr>
<td>Agri-Mek SC</td>
<td>15.5</td>
<td>10.0</td>
</tr>
<tr>
<td>BotaniGard+Acramte</td>
<td>12.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Eco-Mite</td>
<td>17.0</td>
<td>13.0</td>
</tr>
<tr>
<td>Fujimite 5EC</td>
<td>25.0</td>
<td>18.0</td>
</tr>
<tr>
<td>Fujimite XLO</td>
<td>16.0</td>
<td>14.0</td>
</tr>
<tr>
<td>Grandevo</td>
<td>18.0</td>
<td>16.0</td>
</tr>
<tr>
<td>MBI 206</td>
<td>19.0</td>
<td>17.0</td>
</tr>
<tr>
<td>Nealta</td>
<td>18.0</td>
<td>16.0</td>
</tr>
</tbody>
</table>
2013 field trial-second spray

Number of eggs/leaflet

Eggs

- II-3 DAT
- II-7 DAT

Untreated, Acramite 50WS, Agri-Mek SC, BotaniGard+Acramite, Eco-Mite, Fujimite 5EC, Fujimite XLO, Grandevo, MBI 206, Nealta
2013 field trial-second spray

Nymphs and adults

Number of mobile stages/leaflet

Untreated  Acramite 50WS  Agri-Mek SC  BotaniGard+Aramite  Eco-Mite  Fujimite SEC  Fujimite XLO  Grandevo  MBI 206  Nealta

II-3 DAT  II-7 DAT
2013 field trial-post-treatment average

Eggs and Mobile stages/leaflet comparison for different treatments:
- Utrepared
- Acramat 50WS
- Agri-Mek SC
- Botani Gard+Acramat
- Eco-Mite
- Fujimate 5EC
- Fujimate XLO
- Grandevo
- MBI 206
- Nealta
2013 field trial-post-treatment average

Percent change compared to control

Eggs | Mobile
--- | ---
Acramite 50WS | -40
Agri-Mek SC | -50
BotaniGard+Acra | -40
Eco-Mite | -30
Fujimite 5EC | -30
Fujimite XLO | -20
Grandevo | -20
MBI 206 | -10
Nealta | 0
2013 field trial-Predatory mites

Post-treatment number/leaflet

- Eggs
- Nymphs+Adults

- Untreated
- Acramite 50WS
- Agri-Mek SC
- BotaniGard+Acra.
- Eco-Mite
- Fujimite 5EC
- Fujimite XLO
- Grandevo
- MBI 206
- Nealta
Conclusions

• Some new and existing miticides have good activity against twospotted spider mites.

• Microbial and botanical options have a good potential and comparable to chemical miticides in some instances. They also appear to be safer to predatory mites.

• Consider combinations of reduced rates of chemicals and other options for good IPM
Spider mite management

- Regularly monitoring and making right treatment decisions
- Rotating chemicals from different classes
- Using microbial and botanical pesticides
- Judiciously using effective chemicals
- Using microbial and botanical pesticides
- Adequate chilling, nitrogen and water management for healthy plant growth
- Conserving natural enemies through dust control and using softer pesticides
- Releasing predatory mites and proper timing and quantity
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