Strawberry Miticides: What’s New? What’s Coming Up?

Greenhouse Whitefly: What’s Up?

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Two spotted spider mite
Two spotted spider mite

Damage -
Yield reduction (fewer fruit, not fruit size)
Greatest impact in early season
(bud differentiation?)

Monitoring - avg. mites per midtier leaflet

Threshold -
Early season - <5 mites / midtier leaflet
Later season - 15 - 20 mites / midtier leaflet
Two spotted spider mite

Management strategies -

Plant vigor -
  vernalization
  summer planting

Biological control -
  predatory mites (augmentation)
  generalist predators (conservation)
What’s Registered?
Agrimek (abamectin)
Savey (hexythiozox)
Acramide (bifenazate)
Valero (cinnamic aldehyde)
Omni Supreme (mineral oil)
Kelthane (dicofol)
Vendex (fenbutatin-oxide)
Beauvaria bassiana

Not recommended:
Danitol (fenpropathrin)
Brigade (bifenthrin)

What’s Not?
Mesa (milbemectin) *
Pyramite (pyridaben) *
Secure (etoxizole) *
Ecosmart (rosemary oil) *
Oberon *
Kanemite (Quininoline) *
Alert (chlorfenapyr) *

*** registration soon?
organic?
Fresh Market Yield, Irvine, 1995-96

Trays per acre
Processing Yield, Irvine, 1995-96

Pounds per acre

April
May
June

Omite
Agrimek
Oil (1%)
Untreated
Monthly spray
Watsonville, 2001

- Untreated
- Agrimek (2X)
- Savey (1X)
- Acramite 0.38 (1X)
- Acramite 0.5 (1X)
- Mesa 32 oz (2X)
- Mesa 32 oz (1X) + Savey (1X)

Pretreat

Week 1

Week 2

Mites per leaflet
Watsonville, 2001

- Untreated
- Agrimek (2X)
- Pyramite (2X)
- Secure 0.09 (1X)
- Secure 0.135 (1X)
- Secure 0.045 (1X)
- + Danitol (1X)

Pretreat

Week 1

Week 2

Mites per leaflet
Watsonville, 2001

Untreated
Agrimek (2X)
EcoSmart 1.25% (2X)
EcoSmart 2.5% (2X)
Kanemite 15 oz (1X)
Kanemite 30 oz (1X)
Kanemite 60 oz (1X)

Pretreat
Week 1
Week 2

Mites per leaflet
## Winter Mite Control, Irvine, CA
### Mean ± SE mites per leaflet

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate (ai/acre)</th>
<th>Spray Dates</th>
<th>Pre-treat</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
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</thead>
<tbody>
<tr>
<td>untreated</td>
<td></td>
<td>1/12 1/20</td>
<td>1/12</td>
<td>1/20</td>
<td>1/26</td>
<td>2/2</td>
<td>2/10</td>
<td>2/21</td>
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<tr>
<td>Αγρι-μακ</td>
<td>0.0188 µB</td>
<td>ξ ξ</td>
<td>9 ± 2</td>
<td>14 ± 7</td>
<td>10 ± 3</td>
<td>8 ± 2</td>
<td>4 ± 2</td>
<td>11 ± 10</td>
</tr>
<tr>
<td>Αχραμίτε</td>
<td>0.25 µB</td>
<td>ξ</td>
<td>9 ± 2</td>
<td>2 ± 1*</td>
<td>5 ± 2*</td>
<td>0.1 ± 0*</td>
<td>0 ± 0*</td>
<td>0 ± 0*</td>
</tr>
<tr>
<td>Αχραμίτε</td>
<td>0.38 µB</td>
<td>ξ</td>
<td>3 ± 1</td>
<td>2 ± 1*</td>
<td>1 ± 1*</td>
<td>0.1 ± 0*</td>
<td>0 ± 0*</td>
<td>0 ± 0*</td>
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<tr>
<td>Αχραμίτε</td>
<td>0.5 µB</td>
<td>ξ</td>
<td>11 ± 3</td>
<td>2 ± 0.2*</td>
<td>1 ± 1*</td>
<td>0.3 ± 0.2*</td>
<td>0.1 ± 0*</td>
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<tr>
<td>Σέχυρε</td>
<td>0.045 µB</td>
<td>ξ</td>
<td>11 ± 8</td>
<td>3 ± 1*</td>
<td>3 ± 2*</td>
<td>1 ± 1*</td>
<td>1 ± 0*</td>
<td>0 ± 0*</td>
</tr>
<tr>
<td>Σέχυρε</td>
<td>0.09 µB</td>
<td>ξ</td>
<td>11 ± 5</td>
<td>7 ± 3</td>
<td>7 ± 5*</td>
<td>5 ± 3*</td>
<td>1 ± 1*</td>
<td>2 ± 2*</td>
</tr>
<tr>
<td>Πυρομ ανε</td>
<td>0.3 µB</td>
<td>ξ ξ</td>
<td>10 ± 7</td>
<td>5 ± 1*</td>
<td>5 ± 3*</td>
<td>1 ± 0*</td>
<td>0.4 ± 0.1*</td>
<td>2 ± 2*</td>
</tr>
<tr>
<td>Μεσα</td>
<td>48 οζ/</td>
<td>ξ</td>
<td>8 ± 3</td>
<td>3 ± 0*</td>
<td>1 ± 0.1*</td>
<td>0.3 ± 0*</td>
<td>0 ± 0*</td>
<td>0 ± 0*</td>
</tr>
<tr>
<td>Μεσα</td>
<td>32 οζ/</td>
<td>ξ ξ</td>
<td>10 ± 4</td>
<td>3 ± 1*</td>
<td>0.3 ± 0.1*</td>
<td>0 ± 0*</td>
<td>0 ± 0*</td>
<td>0 ± 0*</td>
</tr>
<tr>
<td>ζ αλρο</td>
<td>0.2 %/</td>
<td>ξ ξ</td>
<td>11 ± 3</td>
<td>9 ± 3</td>
<td>12 ± 2</td>
<td>2 ± 0*</td>
<td>2 ± 1*</td>
<td>4 ± 1*</td>
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<td>Σασεψ</td>
<td>0.1875 µB</td>
<td>ξ</td>
<td>7 ± 2</td>
<td>4 ± 1*</td>
<td>5 ± 3*</td>
<td>0.4 ± 0*</td>
<td>0.2 ± 0.1*</td>
<td>0 ± 0*</td>
</tr>
</tbody>
</table>

*Spider mite density for this date is significantly different from the untreated control plots by pairwise t-tests at $P<0.05$  
1/ Formulated product amount
Predator bioassays

Species tested -

*Phytoseiulus persimilis*
*Chrysoperla carnea* - green lacewing
*Orius insidiosus* - minute pirate bug

Methods - contact and residual bioassay

Length of exposure - 72 hours
Predator bioassays for registered and non-registered strawberry acaricides. Proportion of field rate that killed 50% of the test specimens (LD50).  

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Chemical</th>
<th>Field Rate (a.i./acre)</th>
<th><em>P. persimilis</em></th>
<th>Lacewing</th>
<th><em>Orius sp.</em></th>
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</thead>
<tbody>
<tr>
<td>Agrimek</td>
<td>Abamectin</td>
<td>0.0188 lbs</td>
<td>0.54</td>
<td>3.93</td>
<td>0.12</td>
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<tr>
<td>Mesa</td>
<td>Milbemectin</td>
<td>48 oz* /1</td>
<td>0.38</td>
<td>5.13</td>
<td>0.33</td>
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<tr>
<td>Acramite</td>
<td>Bifenazate</td>
<td>0.38 lb/1</td>
<td>87.23</td>
<td>&gt;100.00</td>
<td>60.00</td>
</tr>
<tr>
<td>Secure</td>
<td>Etoxizole</td>
<td>0.09 lb/1</td>
<td>&gt;100.00</td>
<td>&gt;100.00</td>
<td>5.73</td>
</tr>
<tr>
<td>Savey</td>
<td>Hexythiazox</td>
<td>6 oz*</td>
<td>&gt;100.00</td>
<td>&gt;100.00</td>
<td>100.00</td>
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<tr>
<td>Pyramite</td>
<td>Pyridaben</td>
<td>0.3 lb/1</td>
<td>0.10</td>
<td>&gt;100.00</td>
<td>0.06</td>
</tr>
<tr>
<td>Valero</td>
<td>Cinnamic aldehyde</td>
<td>0.2%</td>
<td>0.79</td>
<td>5.93</td>
<td>2.53</td>
</tr>
</tbody>
</table>

* Formulated rate
1 These chemicals are not currently registered on strawberry.
LD50 values are mean of 3 trials.
Untreated controls all had > 90% survival after 72 hours.
Some Common Whiteflies

- Eggs
- Crawler
- Second instar
- Third instar
- Fourth instar
- Adult

Greenhouse whitefly

Iris whitefly

Silverleaf whitefly
Greenhouse Whitefly

**Damage (some observations)** -
- Yield reduction (none at 20-40 adults/leaflet)
- Quality - decreased levels of soluble solids and citric acid at 10 adults/leaflet
- Sooty mold on honeydew

**Monitoring** -
- Avg. adults per midtier leaflet, 20 leaflets/quarter of field
- Yellow sticky cards for detection
Greenhouse Whitefly

Characterizing the problem

Ventura/Oxnard - whiteflies move to strawberries from other hosts in the area.

Central coast - whiteflies move to new plantings from infested second year plantations and are also associated with summer plantings.
Greenhouse Whitefly - Controls

Registered pesticides - Admire Section 18

Effect of Application Dates on Efficacy of Admire Against Greenhouse Whiteflies, Oxnard, 2000

Number of adult whiteflies/leaflet
Greenhouse Whitefly - Controls

Registered pesticides - Danitol + Malathion

Efficacy of Malathion plus Danitol Against Greenhouse Whiteflies, 2000
Adult Greenhouse Whitefly Control by Neonicotinoids, Post plant drip application Oxnard, 2000
Greenhouse Whitefly - Controls
New pesticides - Knack

Adult Greenhouse Whitefly Control by IGRs
Oxnard, 2000

Application (post-planting)

Number of adult whiteflies/leaflet
Greenhouse Whitefly - Controls
Areawide management

For optimum management, the continuous development of whiteflies must be broken through cultural practices:

• host elimination
• controlling infestations on other hosts
• pruning infested leaves from second year plantings before transplanting