Miticide Efficacy & Compatibility with *P. persimilis*

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Spider Mites
(Acari: Tetranychidae)

- Main pest in coastal California production
- Winter & Summer berries
Damage

• Feed on the underside of leaves
• Yellow mottling or dark spots on the topside
• Necrosis on underside
• Webbing
  • Spreads mites
  • Attracts dust on the underside
  • Can change transpiration
• Reduction in fruit size & yield

• Heavy infestations cause stunting & leaf drop

• Can kill a stressed plant
Two major mite pests

Twospotted spider mite

- No. 1 pest in Ventura Co. strawberry production
- Has >1,000 hosts
- Known to be resistant to >90 unique insecticide/miticide active ingredients in over 367 cases world wide
- Present in winter & summer berries
Two major mite pests

**Lewis spider mite**

- Increasing as a pest on strawberry & raspberry
- Found on raspberry, poinsettias, lemon, & castor bean
- Present in fall & summer berries
Spider mite control methods

Sprays

Miticides (conventional)
Organic sprays, oils (Organic)

Predator mite releases (Phytoseiidae)

*Phytoseiulus persimilis*
*Neoseiulus californicus*
*N. Fallacis*
*Amblyseius andersoni*
Efficacy of newest miticide

Nealta (BASF)

- BASF Experimental (Cyflumetofen)
- MOA:
  MET II electron transport inhibitor
- IRAC #25
- Bioassays to evaluate efficacy against Lewis spider mite
Methods

Treatments

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASF experimental</td>
<td>13.7 fl. oz/acre</td>
</tr>
<tr>
<td>Acramite 50 WS</td>
<td>1 lb/ acre</td>
</tr>
<tr>
<td>DiWater</td>
<td>-</td>
</tr>
</tbody>
</table>

**DyneAmic was added to ALL treatments at a rate of 0.375% v/v

- Mid-Tier strawberry leaves were sprayed with each treatment & allowed to dry
15 adult ♀

Lewis spider mite

**Laboratory conditions**

- Bench top (RCBD)
- $24^\circ C \pm 1^\circ C$
- 18:6 L/D
- 50 – 55% RH
Percent Mortality:

Schneider-Orelli’s corrected mortality:

\[ \frac{(T - C)}{(100 - C)} \times 100 \]

Where:

\( T = \) % mortality in treated

\( C = \) % mortality in control
Lewis Spider Mite Mortality

![Bar graph showing percent mortality (%) vs hours after treatment (HAT) for Nealta and Acramite 50WS.]
Lewis Spider Mite Eggs

![Graph showing the average number of eggs present after treatment](image-url)

- Nealta
- Acramite 50WS
- Control

**Hours After Treatment (HAT)**

**Avg. eggs Present**

- 96 hrs
## 2015 Field Study

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Active Ingredient</th>
<th>Product Rate (per acre)</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acramite 50WS</td>
<td>Bifenazate</td>
<td>16 oz</td>
<td>6.5</td>
</tr>
<tr>
<td>Acramite 50WS + Buffering agent*</td>
<td>Bifenazate + buffering agent</td>
<td>16 oz</td>
<td>5.5</td>
</tr>
<tr>
<td>Agri-Mek</td>
<td>Abamectin</td>
<td>16 fl. oz</td>
<td>6.5</td>
</tr>
<tr>
<td>Nealta</td>
<td>Cyflometofen</td>
<td>13.7 fl. oz</td>
<td>6.5</td>
</tr>
<tr>
<td>Untreated Control</td>
<td>---</td>
<td>---</td>
<td>6.5</td>
</tr>
</tbody>
</table>

*Buffering agent: Phosphorous acid (H₃PO₃)
Methods

• 50 ft. x 4ft. Beds with 2 plots per bed
  • 20 plants per plot (var San Andreas)
  • 40 plots total (2 reps per block)

• Collected 4 mid-tier leaves per plot each sampling date

• Treatments established in RCBD with four blocks
Data Collected:

No. live spider mites*
No. spider mite eggs
No. *P. persimilis* motiles*
No. *P. persimilis* eggs*
Twospotted spider mite motiles

#spider mite mobiles / trifoliate

- Bifenazate (Acramite)
- Bifenazate (Buffered)
- Abamectin (Agri-Mek)
- Cyflometofen (Nealta)
- Untreated

0 DAT
7 DAT
14 DAT
#Spider mite mobiles / trifoliate

<table>
<thead>
<tr>
<th>Treatment</th>
<th>0 DAT</th>
<th>7 DAT</th>
<th>14 DAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bifenazate (Acramite)</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Bifenazate (Buffered)</td>
<td>1.5</td>
<td>2.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Abamectin (Agri-Mek)</td>
<td>3.0</td>
<td>4.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Cyflometofen (Nealta)</td>
<td>4.5</td>
<td>5.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Untreated</td>
<td>1.0</td>
<td>1.5</td>
<td>2.0</td>
</tr>
</tbody>
</table>
$P. \text{ persimilis}$ motiles

![Bar chart showing the number of $P. \text{ persimilis}$ motiles under different treatments and time points.](image)
How do miticides affect predators?
Methods

• Leaf (1” disc) dip at the label rate & allowed to dry

• Treated leaf placed inside a petri dish with wet filter paper
  • Filter paper moistened daily
Methods

• 7 adult *P. persimilis* are placed onto the leaf (♀ & ♂’s)

• >35 TSSM motiles & eggs placed on the leaf for food
  • TSSM replenished every day
Lab Conditions

Temp: 82.4 °C ± 1 °C
% RH: 60-65%
16:8 hr (L/D)
RCBD on benchtop, 5 reps
Corrected Percent Mortality

- **Acramite**
- **Envidor**
- **Fujimite**
- **Kanemite**
- **Nealta**

**Days After Treatment (DAT)**

**Average % Mortality**
Fecundity (# eggs produced)
Fertility (# young produced)
Total live predators

![Graph showing total live predators over days after treatment (DAT).](image)
Summary

• Nealta is a new miticide that can be added to the rotation in strawberry

• Miticides differ in efficacy depending on the species of spider mites

• Effects of miticides on *P. persimilis* should be considered before spraying and releasing
Guidelines

Harsh on *P. persimilis*:
Fujimite & Envidor

“Soft” on *P. persimilis*:
Nealta

“Softer” on *P. persimilis*:
Acramite & Kanemite
Acknowledgements

Darin Allred (Arysta LifeSciences)
Kate Walker (BASF)
Syngenta Biolines
Michael Roberts
Jose DeSoto