Spider Mites in Silage Corn: Damage & Management

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Spider Mites are more closely related to ticks and spiders than to insects!!
Mites of the world!

Spider mites are one kind of mite.

Other kinds of mites include (but not limited to):
- Predatory mites
- Bulb mites
- Cyclamen mites
- Eriophyid mites
Life Cycle of Spider Mite

- Egg
- Larva
- Protonymph
- Deutonymph
- Adult

- Head and abdomen
- No antennae
- 4 pair of legs usually
- No Wings
Spider mite eggs

Spider mite nymphs

Spider mite adults
Problem Spider Mites on Corn

Two spotted spider mite predominant on corn in CA
Banks grass mite is often the dominant one in CO, UT, TX, NM, etc.
Two spotted spider mite    Banks grass spider mite
Damage

Ada Szczepaniec  SDSU Extension
Damage
- Colonies develop on undersides of leaves
- Heavy populations go to tops of leaves

**Summer**
- Populations increase in June/July (hot & dry)
- Generation in as little as 7 days
Spider mite damage

L. Godfrey
Godfrey 2002 Trial Tulare County
So what!

What do they do to silage corn yield & quality?
## Impact on Yield in 3 Large Scale Trials – Tulare Co, CA

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Untreated</strong></td>
<td>30.7</td>
<td>32.4</td>
<td>39.4</td>
</tr>
<tr>
<td><strong>Average of all Miticide Treatments</strong></td>
<td>36.5</td>
<td>37.4</td>
<td>39.4</td>
</tr>
<tr>
<td><strong>Difference</strong></td>
<td>+5.8</td>
<td>+5.0</td>
<td>0</td>
</tr>
</tbody>
</table>

Large scale trials, commercially applied; 4 replications
2010, 2012 no difference in moisture; 2013 there were differences in moisture
### Impact on % ADF in 3 Large Scale Trials – Tulare Co, CA

<table>
<thead>
<tr>
<th></th>
<th>Percent Acid Detergent Fiber</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
</tr>
<tr>
<td>Untreated</td>
<td>30.1</td>
</tr>
<tr>
<td>Average of all Miticide Treatments</td>
<td>28.2</td>
</tr>
<tr>
<td>Difference</td>
<td>-1.9</td>
</tr>
</tbody>
</table>

Large scale trials, commercially applied; 4 replications
2010, 2012 no difference in moisture; 2013 there were differences in moisture

Frate
## Impact on % NDF in 3 Large Scale Trials – Tulare Co, CA

<table>
<thead>
<tr>
<th></th>
<th>% Neutral Detergent Fiber</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
</tr>
<tr>
<td>Untreated</td>
<td>47.6</td>
</tr>
<tr>
<td>Average of all Miticide Treatments</td>
<td>45.4</td>
</tr>
<tr>
<td>Difference</td>
<td>NS</td>
</tr>
</tbody>
</table>

Large scale trials, commercially applied; 4 replications
2010, 2012 no difference in moisture; 2013 there were differences in moisture
Mite-promoting conditions

- Dust
- Water-stressed plants
  - Insufficient irrigation
  - Excessively hot weather
- Use of broad-spectrum insecticides
  - Lack of beneficial organisms
- BMR variety (seems to be more susceptible)
Beneficial Organisms

- Six spotted thrips
- Minute pirate bug
- Lacewings
- Predatory mites
- Big-eyed bug
Insect Predators of Mites

- **Disadvantages**
  - Most with slow developmental time
  - Most with relatively low reproductive rate
  - Not pest specific (may only eat mites if no other food)

Lacewing larva (good bug) eating a predatory beetle (another good bug)
Thresholds for Treatment Decisions

Recommendations differ for different states:

In some of the western states if:
- lower 1/3 leaves show damage
- & middle 1/3 leaves have spider mites
- & corn has not reached hard dough
- & evaluate economics

Treat

In San Joaquin Valley of CA, if:
- spider mites are present before lay-by

Treat
### Currently Registered Miticides on Corn in CA

<table>
<thead>
<tr>
<th>Comite</th>
<th>Oberon</th>
<th>Onager</th>
<th>Zeal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate/A/App</td>
<td>Apps/Season</td>
<td>Total/Season</td>
<td>PHI (days)</td>
</tr>
<tr>
<td>2 -3 pts</td>
<td>1</td>
<td>3 pts</td>
<td>30</td>
</tr>
<tr>
<td>5.7 - 16 fl oz</td>
<td>2</td>
<td>17 fl oz</td>
<td>5</td>
</tr>
<tr>
<td>10 – 24 fl oz</td>
<td>1</td>
<td>24 fl oz</td>
<td>30</td>
</tr>
<tr>
<td>1-3 oz</td>
<td>2</td>
<td>6 oz</td>
<td>21</td>
</tr>
</tbody>
</table>
Registration Expected 2014 on Corn in CA

*Miteus* 5 SC

*Registered on corn as Portal in some states and as Fujimite on some other commodities. Kills all stages by contact so coverage is important*
Miticide Trials in California

UC West Side Field Station
Small replicated plots
No yield taken

Tulare County
Large replicated plots
(12-24 rows wide, ¼ mi long) in grower field
Yields taken on 5 rows

About 60 miles apart
Two spotted spider mite dominant
NIS used w/ all treatments except Comite
Miticide Trials in California

Small replicated plots at UC West Side Field Station
Large replicated plots (12-24 rows wide, ¼ mi long) in grower field
On ear leaf, average of 2000 spider mites per leaf on the UTC
2013 UC West Side Trial
L. Godfrey

Percent Spider Mite Control

On ear leaf, average of 1900 spider mites per leaf on the UTC

Fujimite~Portal~Miteus
2010 Large Scale Trial – Tulare County

Number of Spider Mites/Leaf

Average number of spider mites (adults+nymphs)/leaf

- Untreated
- Oberon 12.8floz
- Oberon 16floz
- Onager 16 floz
- Comite 3pt

Frate
2010 Large Scale Trial – Tulare County

Number of Spider Mites/Leaf

Average spider mites (adults+nymphs) per leaf

- Untreated
- Oberon 12.8floz
- Oberon 16floz
- Onager 16 floz
- Comite 3pt
2010 Large Scale Trial – Tulare County

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Tons per Acre @ 70%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td>28</td>
</tr>
<tr>
<td>Oberon @ 12.8 oz</td>
<td>a</td>
</tr>
<tr>
<td>Oberon @ 16 oz/A</td>
<td>a</td>
</tr>
<tr>
<td>Onager @ 16 oz/A</td>
<td>a</td>
</tr>
<tr>
<td>Comite @ 3 pt/A</td>
<td>a</td>
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Legend:
- Untreated
- Oberon @ 12.8 oz
- Oberon @ 16 oz/A
- Onager @ 16 oz/A
- Comite @ 3 pt/A
2012 Large Scale Trial – Tulare County

Number of Spider Mites per Leaf

Average spider mites (adults+nymphs) per leaf

UTC
Oberon @12.8 oz
Onager @16 oz
Comite @ 3 pt
Zeal @3 oz

Number of Spider Mites per Leaf

Frate

University of California
Agriculture and Natural Resources
2012 Large Scale Trial – Tulare County

- UTC
- Oberon @12.8 oz
- Onager @16 oz
- Comite @ 3 pt
- Zeal @3 oz

Frate
2012 Large Scale Trial – Tulare County

Adjusted Yield (70% Moisture)
Tons/Acre

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>UTC</td>
<td>d</td>
</tr>
<tr>
<td>Oberon 2SC@12.8</td>
<td>cd</td>
</tr>
<tr>
<td>Onager @16</td>
<td>bc</td>
</tr>
<tr>
<td>Comite @3</td>
<td>b</td>
</tr>
<tr>
<td>Zeal @3</td>
<td>a</td>
</tr>
</tbody>
</table>

Frate
2013 Large Scale Trial – Tulare County

Number of Spider Mites per Leaf

Average # spider mites (adults+nymphs)/leaf

- Untreated
- Comite @ 3 pt
- Oberon @ 16 floz
- Onager @ 20 floz
- Zeal @ 2.5 oz
- Miteus @ 2 pt

Frate
2013 Large Scale Trial – Tulare County

Number of Spider Mites per Leaf

Average # spider mites (adults+nymphs)/leaf

- Untreated
- Comite @ 3 pt
- Oberon @ 16 floz
- Onager @ 20 floz
- Zeal @ 2.5 oz
- Miteus @ 2 pt

WAT Levels:
- 10 WAT
- 9 WAT
- 8 WAT
- 7 WAT
- 6 WAT
- 5 WAT
- 4 WAT
- 3 WAT
- 2 WAT
- 1 WAT
- PRE
2013 Large Scale Trial – Tulare County

Tons per Acre @ 70%

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<td>ab</td>
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<td>Zeal @ 2.5 oz</td>
<td>bc</td>
</tr>
<tr>
<td>Miteus @ 2 pt</td>
<td>c</td>
</tr>
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Frate
2005 Large Scale Trial – Tulare County

Number of Spider Mites/10 Leaves

- UTC
- Comite 2.7 pt
- Oberon 8.5 fl oz
- Capture/dimeth. 6.4 fl oz + 1.5 pt

Frante
## Corn Miticidies – Mode of Action

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Mode of Action</th>
<th>Resistance Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comite 73.6 propargite</td>
<td>Inhibit mitochondria/energy</td>
<td>12 C</td>
</tr>
<tr>
<td>Oberon 23.1 spiromesifen</td>
<td>Interferes w/lipid synthesis</td>
<td>23</td>
</tr>
<tr>
<td>Onager 11.8 hexythiazox</td>
<td>Growth inhibitor</td>
<td>10 A</td>
</tr>
<tr>
<td>Zeal etoxazol</td>
<td>Ovicide &amp; inhibits molting; translaminar</td>
<td>10 B</td>
</tr>
<tr>
<td>Miteus fenpyroximate</td>
<td>Contact on eggs &amp; juveniles</td>
<td>21</td>
</tr>
</tbody>
</table>
Summary

Spider mites can significantly reduce yield and quality of silage corn
Avoid stressing corn – especially water stress
Minimize dust and avoid broad spectrum insecticide applications
Follow treatment threshold recommendations for your area
Be aware of spider mite species and reports of resistance in your area when choosing a miticide
Rotate miticides to avoid developing resistant spider mites
Thank you to the following people and companies that made this research possible:

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UC Davis, Dept. of Entomology

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