Managing Two-Spotted Spider Mites on Corn

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Prolonged drought raises the threat of two-spotted spider mite (Tetranychus urticae) outbreaks in soybeans and corn. Growers and ag professionals tend to focus on spider mite problems in soybean, but may overlook infestations in corn where significant yield loss can also occur. This publication provides information on two-spotted spider mites, their population dynamics, scouting, treatment thresholds, and miticide selection for Minnesota field corn.

WHAT ARE TWO-SPOTTED SPIDER MITES?

Two-spotted spider mites are minute (<0.002 inch), greenish, yellowish to orange arachnids with two dark spots on their abdomen. Note their 8 legs, not 6 as in insects. Spider mite adults are ca. half the size, or less, of the smallest soybean aphid nymph. These mites attack a wide variety of plants, including several crops (soybeans, dry beans, alfalfa, and corn), vegetables, ornamentals, and trees. Mites overwinter as eggs and move to crops from permanent vegetation. Hatching mites colonize the undersides of leaves. Look closely, you might even see the webbing that earns them the name “spider” mites. They disperse by spinning a silk thread that’s caught by the wind.

Fig. 1: Life cycle of the two-spotted spider mite

Spider mites have a straightforward life cycle, progressing through three stages between egg and adult (see Fig. 1). Depending on temperature, development takes 5 to 19 days. Hotter temperatures (>90°F) speed reproduction while cooler temps slow it down. Recent hot temps have accelerated reproduction. With females producing up 100 eggs each (see spheres on photo), it’s easy to understand how populations can explode, increasing up to 70X in as little as 6-10 days.

WHY ARE PROBLEMS WORSE IN DROUGHT?

Spider mite populations are held in balance by natural enemies, weather and host quality. Drought triggers spider mite outbreaks in soybean and corn by upsetting this balance in four ways.

- Accelerates spider mite movement to soybean and corn from surrounding permanent vegetation and alfalfa as it dries down or is cut for hay. Cutting initiates mass movement into adjacent corn under drought conditions.
- Improves the quality of corn as a host
- Diminishes or stops the activity of fungal diseases that attack mites, such as Neozygites. Disease outbreaks are fostered by cool, highly humid conditions that favor spore formation and mite infection. Hot dry weather stops these diseases.
- Speeds spider mite reproduction so that predatory insects and mites can’t keep up.

HOW DO SPIDER MITES INJURE PLANTS?

Spider mites injure leaves by piercing cells and sucking our cell contents. This injury produces a white or yellow spots or “stipling” that is heaviest on the underside of the leaves (Fig. 2). Leaves lose photosynthetic surface as feeding continues. Water loss from the damaged leaf surface becomes uncontrolled. Both photosynthetic rate and leaf water status decline with increasing levels of spider mite injury.

As mite colonies grow, feeding damage intensifies. Entire leaves progress from grayish green to yellow, brown or coppery, a symptom that growers may mistake for drought-related “firing” of lower leaves (Fig. 3). Spider mite feeding reduces effective leaf area and accentuates drought stress. The result is fewer kernels, and smaller seed size.
HOW DO I SCOUT FOR SPIDER MITES?

Infestations are typically noted first near field edges, particularly where the ordering vegetation is mowed or hayed, or areas within the field where corn is drought stressed. Because natural enemies are removed, fields with previous insecticide or fungicide applications may show early mite population increases. As with soybeans, infestations progress from the bottom of the plant upwards. The first sign may be accelerated lower leaf loss. Unfortunately, in a drought, accelerated lower leaf loss, or “firing”, is also expected. If accelerated lower leaf loss, yellowed or browning lower leaves are noted at the field edge, it’s time for some more work.

Scout plants at the field edge first, especially adjacent to roadsides, drainage ditches or alfalfa.

- Examine the leaves from the bottom upwards.
- Look at the underside of leaves. Note stippling or webbing. Examine for mites with a hand lens or tap infested leaves over a white sheet of paper.
- Determine how far mites and symptoms have progressed up the plant.

If mite presence is verified, it’s time to move further into the field. Move well into the field (90 feet or more) before making your assessment stop. Walk a “U”, checking at least 2 plants at each 20 locations. Check fields every 4-5 days when drought persists. Under these conditions, infestations can develop quickly.

When Should Spider Mites be Sprayed?

Damage typically occurs after tasseling. The primary concern is loss of photosynthetic leaf surface. The management goal is to simply keep leaf damage or defoliation from reaching the ear leaf. There are more involved thresholds but a simple guideline is to treat when the lower one-fourth to one-third of the canopy is injured, mites are present in the middle one-third of the canopy and corn has not dented. Make the treatment decision for the whole field, not field borders.

Before spraying spider mite infestation in corn, answer three questions:

1. Are most of the plants infested with live mites and exhibit leaf injury?
2. Is hot, dry weather forecast for the next few days?
3. Are you seeing few predators?

When evaluating mite injury in drought stressed corn, you also need to be aware of crop insurance and other economic parameters.

Do not assume that a single rainfall event will stop a mite outbreak.

Be careful when reading spider mite information on the web. Most of the mite research is from the central and southern plains and is primarily directed toward Bank’s grass mite, rather than two-spotted spider mite. Bank’s mite and two-spotted spider mites do not respond the same to miticides and southern population of both species have developed resistance to several products after repeated use.
Because of the relative infrequent nature of mite outbreaks and few foliar insecticide applications to corn and soybeans (until recently), we have had a fairly “naïve” spider mite population with respect to miticides. As a result, miticide applications have been working better for us than in the central and southern plains. This situation could deteriorate with unnecessary or over-use, such as adding insecticide to a fungicide spray just to “clean up the field.”

WHAT MITICIDES WORK ON SPIDER MITES?

Mite control options are more diverse in corn. While chlorpyrifos is not labeled for spider mites on corn, additional miticides labeled in corn include propargite, spiromesifen and etoxazole. These miticides can also kill mite eggs but are slow acting and are best used as a preventative, rather than rescue treatments. For these products to be effective, you need to catch a developing infestation very soon. Unfortunately, you have less confidence that continuing drought conditions will produce an economic spider mite infestation.

Important Points about Miticides:

- Most pyrethroid insecticides, except bifenthrin, are not terribly effective against two-spotted spider mites in Minnesota. By eliminating natural enemies, these products may actually “flare” spider mites so check for mite problems within a couple of weeks after spraying for other corn insect problems. Fungicide applications also have the potential to increase mite populations by reducing mite parasitizing fungi.
- Dimethoate has performed well against two-spotted spider mite in Minnesota in previous outbreaks but don’t count on control of heavy infestations. Dimethoate will not kill eggs and has a very short residual. Hatching spider mites began rebuilding the population in a few days. Bifenthrin has a somewhat greater residual and when coverage is good, may control more hatching eggs.
- Miticides primarily rely on direct contact to kill mites. Since mites usually occupy the underside of leaves, thorough coverage is critical. Do not skimp on water. Use 20 gpa for ground application; 5 gpa aerial application.
- Re-scout treated fields within 5 days of application to determine control success and whether hatching eggs will require re-treatment. Populations can rebound and fields can become re-infested. Continue scouting on regular schedule until corn dents or environmental conditions become unfavorable for mites.
- Do not re-spray with the same product. Switch products (and mode-of-action) between applications to minimize the chances of miticide resistance developing.

The insecticides labeled for two-spotted spider mites in corn appear in Table 1.
Table 1: Miticides Recommended for Two-Spotted Spider Mites in Field Corn (*Restricted Use Product)

<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>TRADE NAME</th>
<th>APPLICATION RATE (LB AI/ACRE)</th>
<th>RE-ENTRY INTERVAL</th>
<th>PRE-HARVEST INTERVAL</th>
<th>USE COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethoate</td>
<td>*Dimethoate 4E, 4EC, 400 *Dimate 4E, 4EC</td>
<td>0.50 (16 fl oz)</td>
<td>48 hrs</td>
<td>21 days</td>
<td>Do not feed or graze within 5 days.</td>
</tr>
<tr>
<td>Zeta Cypermethrin + Bifenthrin</td>
<td>*Hero 1.24E</td>
<td>0.10 (10.3 fl oz)</td>
<td>12 hrs</td>
<td>21 days</td>
<td>Do not graze or feed treated forage to livestock. Do not make applications less than 30 days apart.</td>
</tr>
<tr>
<td>Bifenthrin</td>
<td>*Bifenture 2E, *Brigade 2E *Discipline2E, *Fanfare 2E *Sniper 2E, *Tundra 2E</td>
<td>0.08-0.10 (5.12-6.4 fl oz)</td>
<td>12 hrs</td>
<td>30 days</td>
<td>Do not graze or feed treated forage to livestock. Do not make applications less than 30 days</td>
</tr>
<tr>
<td>Propargite</td>
<td>Comite 6.5 EC</td>
<td>1.6-2.4 (2-3 pt)</td>
<td>7 days</td>
<td>30 days</td>
<td>Apply early in infestation Do not feed livestock on treated area</td>
</tr>
<tr>
<td>Spiromesifen</td>
<td>Oberon 2SC</td>
<td>0.089-0.25 (5.7-8.5 fl oz)</td>
<td>12 hrs</td>
<td>5 days</td>
<td>Maximum of 2 application/year Maximum of 0.27 lb ai (17 fl oz) /year</td>
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<tr>
<td>Etoxazole</td>
<td>Zeal</td>
<td>0.045 -0.135 (1.-3.0 fl oz)</td>
<td>12 hrs</td>
<td>21 days</td>
<td>Maximum of 2 application/year Maximum of 0.27 lb ai (6 fl oz) /year Do not reapply within 14 days</td>
</tr>
</tbody>
</table>

Please note: The information provided in this table is summarized from miticide labels to help make decisions regarding product selection. Labels change so read and follow label directions on the product you purchase. The label is the ultimate authority for its application to two-spotted spider mites and may differ from the information provided in this table. Read and follow label directions!

For more information on two-spotted spider mites and their management see the following website: [http://www.soybeans.umn.edu/crop/insects/spider_mites.htm](http://www.soybeans.umn.edu/crop/insects/spider_mites.htm)