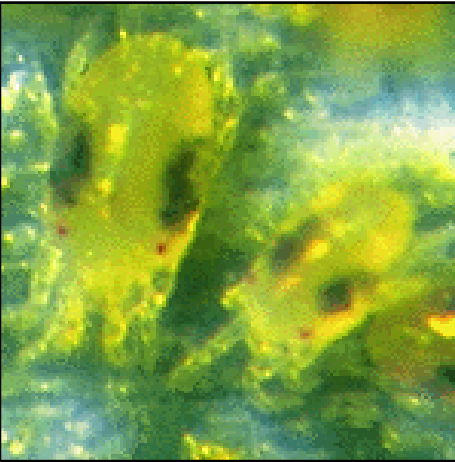


Managing Two-Spotted Spider Mites on Soybeans in Minnesota

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Prolonged drought always raises the threat of **two-spotted spider mite** (*Tetranychus urticae*) outbreaks in soybeans and corn. As the 2009 drought intensifies in Minnesota, spider mite infestations are reaching treatable levels. Since spider mite outbreaks are infrequent (1988, 2007), farmers and their crop management advisors may need a refresher on two-spotted spider mites, their population dynamics, scouting, treatment thresholds, and miticide selection. To make matters worse, the combination of spider mites and soybean aphids can create decision headaches.



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 move by spinning a silk thread that's caught by blowing wind.

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. This July's mild temps have been a blessing. Since 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.

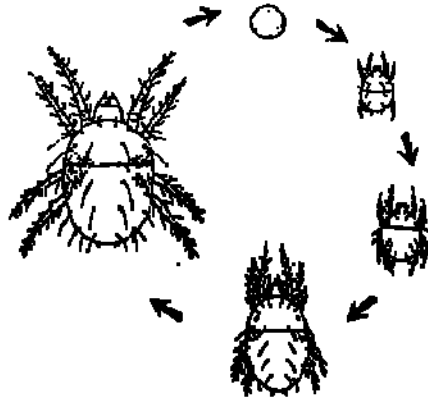
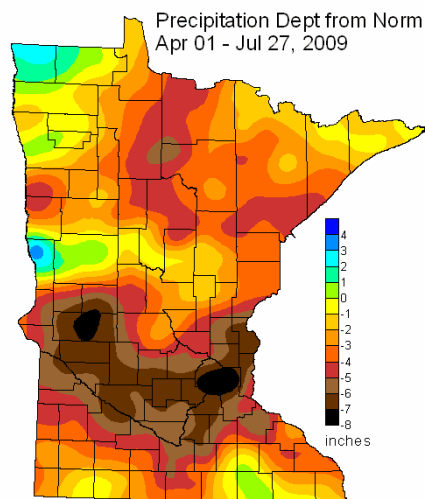


Figure 1. Life cycle of the two-spotted spider mite. Egg, larva, protozygote, deutonymph, and adult.

Why are problems worse in a 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.

1. *Drought stress 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 soybean under drought conditions.*



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2. *Drought stress improves the food quality of soybean for spider mites.*

3. *Drought 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.*

4. *Hot temperatures also speed spider mite reproduction so that predatory insects and mites can't keep up. This year we seem to be experiencing a cool drought so be grateful that the temperature effects aren't worse.*

How do spider mites injure plants?

Spider mites injure leaves by piercing cells and sucking out cell contents. This injury produces a white or yellow spots or "stipling" that is heaviest on the underside of the leaves (see photos of minor and extensive stipling). The leaves lose photosynthetic surface as feeding continues. Water loss from damaged leaf surface is uncontrolled. Research verifies that both photosynthetic rate and leaf water status decline with increasing levels of spider mite injury.



As colonies grow, feeding intensifies. Entire leaves progress from grayish green to yellow, brown or coppery, and then drop off. Damage begins in the lower canopy and progresses upwards. Spider mite feeding reduces effective leaf area and accentuates drought stress. The result is reduced pod set, fewer seeds, and smaller seed size. For farmers and crop advisors not familiar with spider mites, symptoms are mistaken for drought.

How do you scout for mites in soybeans?

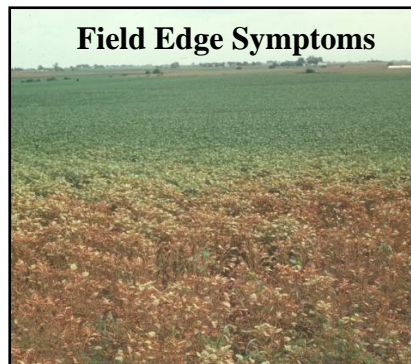
Infestations typically are first observed near field edges or where soybeans are stressed. If lower leaf loss, yellowed or browning spots are noted at the field edge, its time for some detective work.

- Examine plants at the field edge first, especially adjacent to roadsides, drainage ditches or alfalfa fields.
- Pull plants and examine the leaves from the bottom upwards.
- Look at the underside of leaves. Note stipling, webbing, and examine for mites with a hand lens or tap infested leaves over a white sheet of paper.
- Examine how far up the plant mites and symptoms have progressed.

If mite presence is verified, it's time to move further into the field. Move at least 100 feet into the field before making your first stop. Walk a "U" pattern checking at least 2 plants at each 20 locations.

When should spider mites be sprayed?

Only a 10-15% reduction in effective leaf area will justify a miticide spray. Damage is not reversible so it's important to protect the middle and upper canopy leaves. A building mite population reaches treatable levels when there is heavy stipling on lower leaves with some stipling progressing into middle canopy. Mites will be common in the lower canopy, present in middle canopy with scattered colonies in upper canopy. At this point, lower leaf yellowing is common with accelerated leaf loss in small areas.



What miticides work on spider mites?

While there are numerous insecticides labeled on soybean, only a few have adequate mite activity (see table below). Your choices are basically limited to chlorpyrifos, dimethoate, bifenthrin or mixtures containing these ingredients.

- 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 soybean aphids.
- Chlorpyrifos and dimethoate have performed well against two-spotted spider mite in Minnesota in previous outbreaks but don't count on control of heavy infestations. Both chlorpyrifos and dimethoate will not kill eggs and have a short residual, so hatching spider mites began rebuilding the population in a few days. Numerous reports of these insecticides failing to control heavy mite populations were reported in 2007.
- Don't bother with edge treatments... make the decision for the whole field.
- 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 for aerial application unless the canopy is open.

Table 1. Insecticides Recommended for Two-Spotted Spider Mites in Soybean (*Restricted Use Product)

Chemical Name	Trade Name	Rate (lb ai/A)	Re-Entry Period	PreHarvest Interval	Use Notes
Chlorpyrifos	*Lorsban 4E, Advanced *Chlorpyrifos 4E, Govern 4E *Hatchet 4E, *Nufos 4E *Warhawk 4E, *Yuma 4E	0.25 - 0.5 (8-16 fl oz)	4 days	28 days	Check 3-5 days after application. If new nymphs, switch product. Do not make a second application within 10 days. Do not feed or graze treated soybean plants.
Chlorpyrifos + Gamma-Cyhalothrin	*Cobalt 2.55E	0.26-0.52 (13-26 fl oz)	24 hrs	30 days	Do not graze or feed to livestock.
Dimethoate	*Dimethoate 4E, 4EC, 400 *Dimate 4E, 4EC	0.50 (16 fl oz)	48 hrs	21 days	Do not feed or graze within 5 days.
Zeta Cypermethrin + Bifenthrin	*Hero 1.24E	0.10 (10.3 fl oz)	12 hrs	21 days	Do not graze or feed treated forage to livestock. Do not make applications less than 30 days apart.
Bifenthrin	*Bifenture 2E, *Brigade 2E *Discipline2E, *Fanfare 2E *Sniper 2E, *Tundra 2E	0.08-0.10 (5.1-6.4 fl oz)	12 hours	18 days	Do not graze or feed treated forage to livestock. Do not make applications less than 30 days apart.

For further info on two-spotted spider mites see <http://www.soybeans.umn.edu> and click on the soybeans and spider mites button. University of Minnesota Extension is an equal opportunity educator and employer. © 2009, Regents of the University of Minnesota. All rights reserved