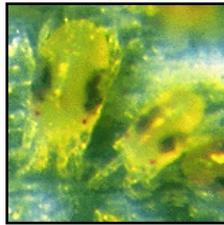


# Managing Two-Spotted Spider Mites on Soybeans

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Prolonged drought raises the threat of **two-spotted spider mite (*Tetranychus urticae*)** outbreaks in soybeans and corn. As the 2012 drought intensifies in Minnesota, infestations are reaching treatable levels. Spider mite outbreaks are rare but have occurred more frequently in recent years (1988, 2007, 2009 and 2010). Farmers and their crop management advisors may need a refresher on two-spotted spider mites, population dynamics, scouting, treatment thresholds, and miticide options. To make matters worse, trying to manage both spider mites and soybean aphids creates 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 disperse by spinning a silk thread that’s caught by the wind.

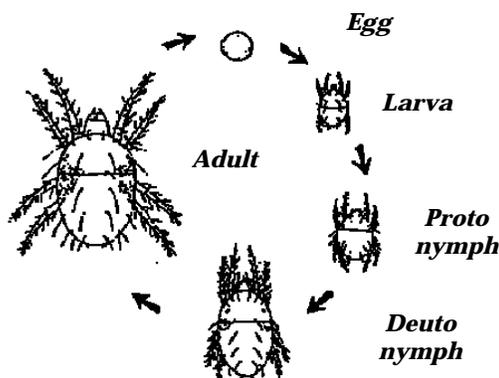


Fig. 1: Life cycle of the two-spotted spider mite

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 to 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 soybean under drought conditions.
- *Improves the food quality of soybean*
- *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.*

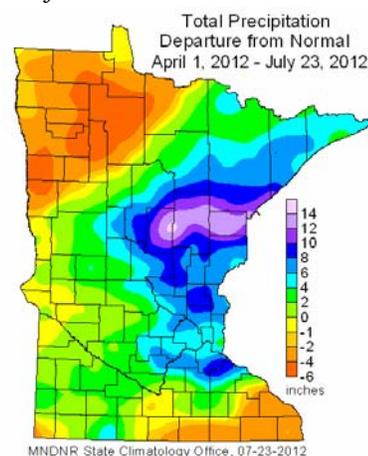


Fig. 2: Intensifying drought increases risk of two-spotted spider mite outbreaks in soybeans and corn.

## 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 photo). Leaves lose photosynthetic surface as feeding continues. Water loss from damaged leaf surface becomes uncontrolled. Both photosynthetic rate, and leaf water status, decline with increasing levels of spider mite injury.



As colonies grow, injury 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 simply mistaken for drought.

## HOW DO I SCOUT FOR SPIDER MITES?

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, it's time for some detective work.

- Examine plants at the field edge first, especially adjacent to roadsides, drainage ditches or alfalfa.
- Pull plants and 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 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.

Check fields every 4-5 days when drought persists. Under these conditions, infestations can develop quickly.

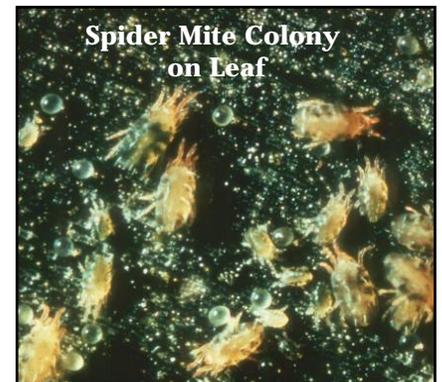
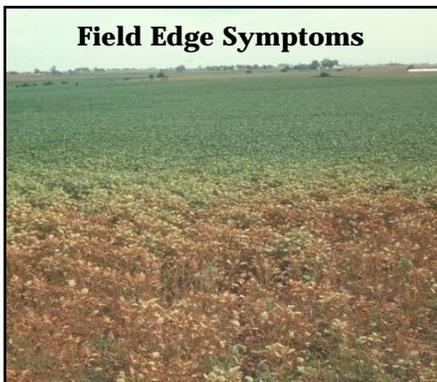


### Two-Spotted Spider Mite Infestation Scale (0-5)

*Potter and Ostlie 1988*

0. No spider mites or injury observed.
1. Minor stippling on lower leaves, no premature yellowing observed
2. Stipling common on lower leaves, small areas or scattered plants with yellowing
3. Heavy stippling on lower leaves with some stippling progressing into middle canopy. Mites present in middle canopy with scattered colonies in upper canopy. Lower leaf yellowing common and some lower leaf loss. **(Spray Threshold)**
4. Lower leaf yellowing readily apparent. Leaf drop common. Stipling, webbing and mites common in middle canopy. Mites and minor stippling present in upper canopy. **(Economic Loss)**
5. Lower leaf loss common, yellowing or browning moving up plant into middle canopy, stippling and distortion of upper leaves common. Mites present in high levels in middle and lower canopy

**Fig. 3:** When scouting fields for spider mites, note leaf loss, stippling on leaves, and presence of mites on plants.



## When Should Spider Mites be Sprayed?

Full Pod (R4) and Beginning Seed (R5) stages are critical in determining soybean yield. Spider mite feeding reduces photosynthetic area and accentuates drought stress. The result is reduced pod set, seed number, and seed size. If leaves drop or plants are killed, pod fill is stopped in its tracks. Pods on mite-stressed plants are more likely to shatter, which compounds yield loss. Only a 10-15% reduction in effective leaf area, yield losses will justify an insecticide / miticide application. Unfortunately it's not easy to estimate a 15% reduction in effective leaf area.

**When a soybean field reaches a 3 on the scale above, spray to protect middle and upper canopy leaves.**

Damage is not reversible so it's important to protect the middle and upper canopy leaves. At a rating of 3, there is heavy stippling on lower leaves with some stippling progressing into middle canopy and very little in the upper canopy. At this point, mites will be common in the lower canopy, present in middle canopy with scattered colonies in upper canopy. Some lower leaf yellowing will be common with accelerated leaf loss in small areas. Note: In cooler weather, these symptoms will be less pronounced.



**Fig. 4:** Thorough miticide coverage is critical for control of two-spotted spider mite outbreaks in soybeans and corn: preferably 5 gpa by air and 20 gpa by ground application.

## WHAT MITICIDES WORK ON SPIDER MITES?

While there are numerous insecticides labeled on soybean, only a few have adequate mite activity (see Table 1 on next page). Your choices are basically limited to chlorpyrifos, dimethoate, bifenthrin or mixtures containing these ingredients. Many of the

insecticides labeled against soybean aphid are either ineffectual against spider mites, or may even aggravate the situation. Most newer pyrethroid insecticides labeled for soybean (Asana XL, Warrior T, Proaxis, Delta Gold, Mustang Max, Baythroid), older pyrethroids (Ambush, Pounce, Pydrin), and their generic counterparts are weakly effective, neutral or even "flare" spider mites. Flaring, the rise of sprayed populations above untreated levels, occurs because these insecticides remove predatory mites and insects, and may even stimulate more rapid reproduction.

The insecticides labeled for two-spotted spider mites in soybean appear in Table 1.

### 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 7-10 days 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. Neither product kills mite eggs, so hatching spider mites began rebuilding within a few days. Numerous reports of these insecticides failing to control heavy mite populations were reported in 2010. Bifenthrin has a longer residual and may control hatching eggs for a few days. Residual of all products is shortened by high temps.
- 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). At lower water volumes, performance may suffer.
- Re-scout treated fields in 5 days after application to determine if egg hatch and re-building populations might require re-treatment. Continue scouting on regular schedule until soybeans reach stage R6.5, or environmental conditions become unfavorable for mites.
- Do not re-spray with the same product. Switch products (and mode-of-action) between applications to ensure that miticide resistance will not develop.

**Table 2: Miticides Recommended for Two-Spotted Spider Mites in Soybean (\*Restricted Use Product)**

CHEMICAL NAME	TRADE NAME	APPLICATION RATE (LB AI/ACRE)	RE-ENTRY INTERVAL	PRE-HARVEST INTERVAL	USE COMMENTS
Chlorpyrifos	*Lorsban 4E, *Lorsban Advanced *Chlorpyrifos 4E, *Govern 4E *Hatchet 4E, *Nufos 4E *Warhawk 4E, *Yuma 4E	0.25 - 0.5 (8-16 fl oz)	24 hrs	28 days	Check 3-5 days after application. If new nymphs, switch product. Do not make a second application to spider mites. Do not make more than within 10 days. Do not feed or graze treated soybean plants.
Chlorpyrifos + Gamma-Cyhalothrin	*Cobalt 2.55E *Cobalt Advanced	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	*Bifenthrin 2E, *Brigade 2E *Discipline 2E, *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.

**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 web site:**  
[http://www.soybeans.umn.edu/crop/insects/spider\\_mites.htm](http://www.soybeans.umn.edu/crop/insects/spider_mites.htm)