

## RECAP ON TWOSPOTTED SPIDER MITE MANAGEMENT – OUR HIGHEST PRESSURE PEST DURING THE 2012 DROUGHT – WHAT SHOULD YOU REMEMBER?

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Populations of the Twospotted spider mite, *Tetranychus urticae* Koch, increase during periods of hot, dry weather. Representative grain yield reduction potential in soybean (40-60%), field corn (23%) and silage corn (17%) are significant (Klubertanz, 1994; Bynum, pers. comm.).

Spider mites damage plants by piercing cells and sucking sap. Mites often go undetected until damage is severe because of their tiny size and because spider mite feeding and drought stress symptoms are similar. It is important to be aware of twospotted spider mite potential under these conditions, recognize plant damage symptoms, and be able to identify live mite colonies in the field.

Spider mite feeding results in reduced chlorophyll content of leaves with small white or yellow spots, referred to as “stippling”. These symptoms often start on the lower leaves in the canopy. Severe spider mite injury results from a combination of plant leaf cell and tissue disruption, along with water loss and heat stress typical of drought conditions.

Twospotted spider mites overwinter in Wisconsin as adult females in sheltered field margin areas. Spider mites reproduce quickly, with several overlapping generations within one growing season. Females can lay hundreds of eggs in a lifetime. Eggs hatch in 2-4 days; nymphs develop in 2-4 days; and adults can live up to 21 days with better survival in hot, dry environments. Depending on temperatures, twospotted spider mite generations are completed in 4-14 days with the fastest developmental rates above 91°F (Klubertanz, 1994).

Damage often begins along field edges where mites have migrated from adjacent fields, grasses and weeds, or in drier areas within a field. You may notice a semi-circle of yellowing plants along field edges or spots within the field. As populations increase and disperse, plant damage symptoms progresses upward in the canopy, plant leaves turn yellow to bronze and leaf drop can occur under heavy infestations.

Symptoms of twospotted spider mite feeding are often recognized before pest presence is confirmed. This is attributable to the small size of mites, feeding that occurs primarily on undersides of leaves, and sporadic nature of infestations. Adults are very small (less than 0.002 inch), yellow-green, with eight legs and two dark spots on the abdomen. Immature spider mites have 6 legs. A 10X magnification hand lens is necessary to see spider mite adults, nymphs and eggs on the underside of leaves. Webbing is often found on the underside of leaves.

### Spider Mite Management Recommendations in Soybean

Field scouting should begin along field margins where infestations are likely to start. Upper, middle and lower canopy leaves should be examined for stippling. Turn soybean leaves over to confirm presence of spider mites with a 10X magnification hand lens. Adults can also be detected

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by tapping soybean plants over a clipboard onto a white sheet of paper. Dislodged spider mites will be apparent by the dark abdominal spots observed as tiny specks moving on the paper.

No numeric economic thresholds have been developed for twospotted spider mite, infestions are sporadic and counting individual mites is not practical. In soybean, a 10-15% reduction in effective leaf area will justify insecticide application for mites from bloom (R1) through pod fill (R5) (Gray, 2005; DiFonzo, 2005). However, it is not easy to estimate 15% leaf discoloration. The following treatment guideline (Table 1) is recommended by extension entomologists throughout the Midwest for twospotted spider mite treatment timing in soybean.

Table 1. Treatment guidelines for two-spotted spider mite in soybean. (Cullen and Schramm, 2009).

<b>Presence of mites</b>	<b>Damage</b>	<b>Assessment</b>
Barely detected on undersides of leaves in dry locations or on edges of fields.	Barely detected.	1 - <i>Non-economic</i>
Easily detected on undersides of leaves in dry locations or on edges of fields. Difficult to find on leaves within the field.	Foliage green, but stippling injury detectable on undersides of leaves, although not on every plant.	2 - <i>Non-economic</i> , but keep monitoring
Plants are infested when examined closely.	Heavy stippling on lower leaves progressing to mid-canopy.	3 - <i>Treatment</i> is warranted, especially if many immatures/eggs are also present.
All plants heavily infested when examined closely.	Lower leaf yellowing. Stippling, webbing and mites common in mid-canopy. Mites and minor stippling on upper canopy.	4 - Effective <i>rescue treatment</i> may recover yield. Economic loss likely occurring at this level.
Mite colonies at high levels throughout the canopy.	Lower leaf drop common, yellowing and bronzing at mid-canopy.	5 - Rescue treatment may not protect remaining yield potential. However, new growth may resume if treated.

Before spot treatments are made, thorough monitoring of the field is recommended. Spider mite damage can progress quickly and edge treatments may not be effective. Treatment may be delayed if cooler temperatures with high humidity (e.g., morning dew) are expected. These conditions encourage growth of a mite-killing fungus in the field (see below).

It is important to understand which insecticides are labeled for twospotted spider mite on soybean and have efficacy against this pest. Insecticide active ingredient choices are largely limited to three active ingredients. These include the organophosphate active ingredients

chlorpyrifos and dimethoate, and the pyrethroid a.i. bifenthrin. Premixes combining any two of these active ingredients would also be an option. Among the pyrethroid class of insecticides, other than bifenthrin, pyrethroids generally do not have good efficacy against spider mites, and some pyrethroids (a.i. permethrin) are associated with an increase or flare-up of spider mite populations following treatment (Ayyappath et al., 1996).

### Spider Mite Management Recommendations in Corn

Twospotted spider mites do not usually cause economic damage in corn. However, during drought conditions when spider mites are active in soybean, yield loss potential may extend to corn.

Moderate infestations will result in leaf stippling and chlorotic spotting (pale yellow) on the leaf surface. Begin by checking for presence of spider mites on individual leaves on corn plants along field edges. Examine leaves from the lower canopy upwards and look for stippling and webbing on the underside of leaves. Use a 10X magnification hand lens and plant shake sample to confirm presence of live mites. Move into the field checking 2 plants at 20 locations.

Damage usually occurs after tasseling and effects on corn yield are more severe when mites damage leaves at or above the ear level. Severe infestations can cause entire leaves to turn yellow then brown, with symptoms usually beginning from the lower canopy and moving up. Grain corn is safe from further yield damage after full dent stage is reached.

There are more complex treatment threshold guidelines available (Porter et al., 2010), but a simple guideline is to treat corn when the lower one-fourth to one-third of the canopy is injured (stippling on most of the leaf surface area), mites are present in the mid-canopy and corn has not dented (Ostlie and Potter, 2012).

Insecticide product choices for twospotted spider mite in corn include the active ingredients dimethoate and bifenthrin. Chlorpyrifos is not labeled for twospotted spider mite in corn. Corn has additional options including the active ingredients propargite and spiromesefin (Cullen et al., 2012).

### Biological Control and Additional Resources

The most effective natural enemy of twospotted spider mites is a fungal pathogen, *Neozygites floridana*, that attacks all stages of mites and is host-specific to spider mites. Infected mites have a waxy or cloudy appearance and mite death occurs within 1-3 days of infection. Production of infective spores depends on environmental conditions which must be cooler than 85°F and with at least 90% relative humidity. At least 12-24 hours of such conditions are believed necessary for extensive spread of the disease, and spider mite populations may decline rapidly in response to fungal disease activity (Klubertanz, 1994). Predatory mites and insects are also able to suppress mites in non-drought years when these natural enemies can keep up with the mite populations.

Although rainfall reduces risk of damaging spider mite populations, thunderstorms alone will not eliminate infestations, particularly when rain arrives after large mite populations are established and when rain is followed by dry, hot conditions.

Familiarity with spider mite identification, injury symptoms, sampling methods, treatment guidelines, chemical control options and expectations, and natural control factors is important when monitoring soybean fields during periods of hot, dry weather. Additional resources to aid in twospotted spider mite management decisions include:

Spider mites in soybean – Integrated Pest Management. University of Wisconsin-Madison Integrated Pest and Crop Management. Field Diagnostic Video: <http://ipcm.wisc.edu/video/>

Cullen, E. and S. Schramm. 2009. Two-Spotted Spider Mite Management in Soybean and Corn. A3890. University of Wisconsin-Extension Cooperative Extension Publishing, Madison, WI. <http://learningstore.uwex.edu/Two-spotted-Spider-Mite-Management-in-Soybean-and-Corn-P1358C31.aspx>

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