

Mite Management in Corn and Dry Beans in the Panhandle

Jeff Bradshaw

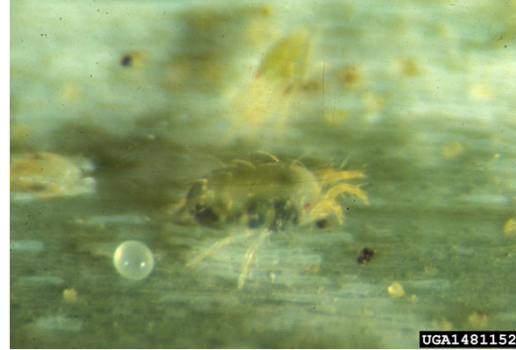
Entomology Specialist

In this session, you will ...

- Learn to identify common mites in corn and dry bean
- Recognize the conditions that favor pest mite outbreaks
- Understand tools, tactics, & strategies for pest mites IPM in corn and dry bean



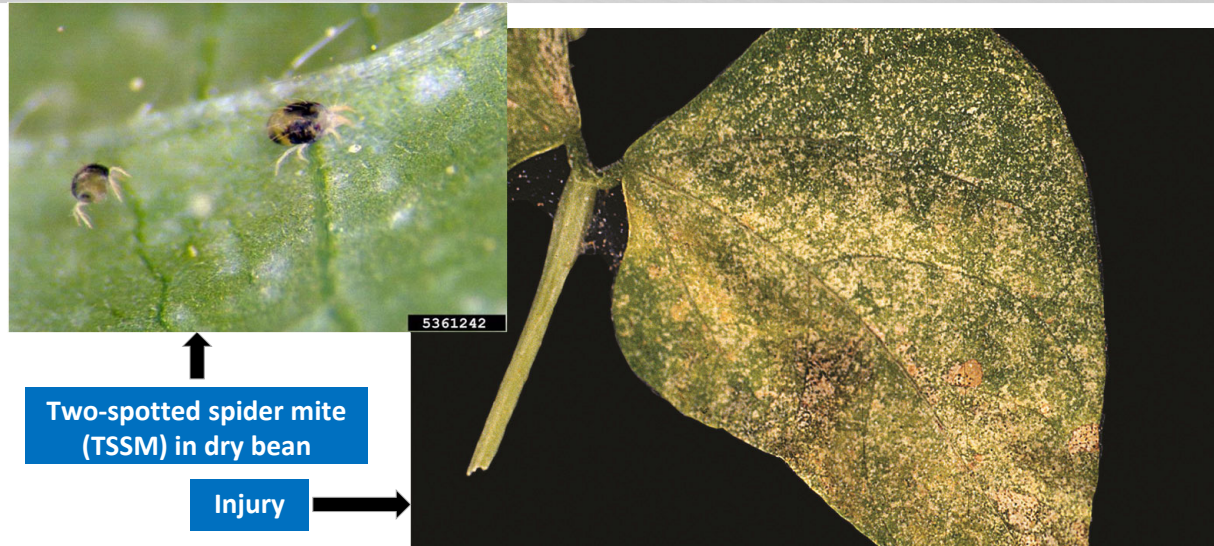
Two-spotted spider mite



Banks grass mite

~ 20 X
magnification

Note that after molt, both mites can be found without spots for a while.



The two-spotted spider mite is a minute arthropod found in colonies under webbing on the lower surface of leaves. Infestations are often associated with drought stress and hot, dry weather conditions.

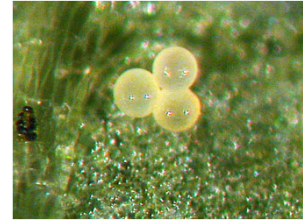
Overwintering female two-spotted spider mites are orange to orange-red in color

Newly-molted mites (from nymph to adult, for example) may lack spots

Damaged leaves will have a silvery or bronzed look. Little is known about the effect of spider mite feeding on dry bean yield and quality, but the earlier in crop development that infestation starts, the more likely it is that significant losses can occur.

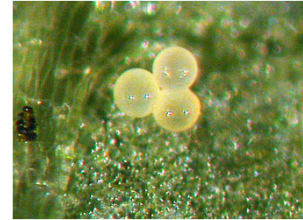
TSSM Biology

- Hosts; are *many*
- Disperse from overwintering sites in mid-summer



TSSM Life Stages

- Egg; oval and translucent
- Larvae; six-legged, translucent stage
- Protonymph; eight-legged stage
- Deutonymph; eight-legged stage
- Adult; eight-legged stage



TSSM Development

- Development time is dependent on many factors, but temperature is most important
 - Development threshold range: ~ 53.6°F to 104°F
 - Female TSSM can lay a maximum of 12 eggs/day at 77 °F

Relationship between temperature and development time (egg to adult) for two-spotted spider mite. (Sebelis 1981)

Temperature (°F)	Days
59	36.3
68	16.6
86	7.3

Crop Production Clinics

N EXTENSION



The banks grass mite is also a minute arthropod that is also found in colonies under webbing on the lower surface of leaves. Infestations are often associated with drought stress and hot, dry weather conditions.

Overwintering female banks grass mites are also orange to orange-red in color and can be commonly found overwintering in winter wheat.

Newly-molted mites (from nymph to adult, for example) may lack spots

BGM are not known to attack dry beans, but in corn typically infest from the bottom of the canopy to the top; therefore, severe injury in corn can appear that the crop is desiccating from the bottom up.

BGM Biology

- Hosts are primarily grasses: corn, sorghum, wheat and sugar cane
- Overwinter in late-season grasses such as winter wheat or grassy alternate hosts around fields
- Disperse in the spring and can build by late summer if conditions allow

Banks grass mite

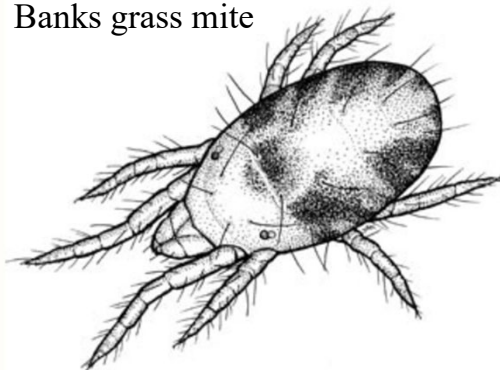


Illustration: Jim Kalisch

BGM Life Stages (same as TSSM)

- Egg; oval and translucent
- Larvae; six-legged, translucent stage
- Protonymph; eight-legged stage
- Deutonymph; eight-legged stage
- Adult; eight-legged stage



BGM Development

- Development time for BGM is roughly 7-14 days @ 70°F from egg to adult
- BGM emerge from overwintering sights earlier than TSSM

Banks grass mite injury in corn



Development of the BGM through its stages is similar to TSSM. However, BGM emerges earlier in the season. For example, it would not be unusual to find BGM infestations before corn begins to silk.

Pest Mite IPM

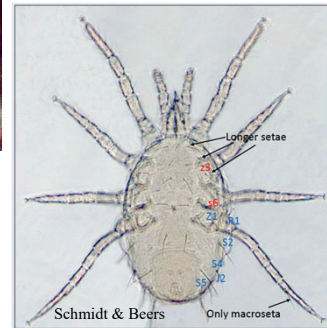
Biological Control

- Know the good from bad mites
- There are *many* species, but TSSM & BGM are unique looking
- Some predatory mites are less productive under low humidity than TSSM
- *Neoseiulus fallacis* is a common predatory mite throughout the high plains; capable of reproducing at lower temperatures

Predatory mite
(*Neoseiulus fallacis*)
feeding on TSSM



Slide mount of the predatory mite *Neoseiulus fallacis*

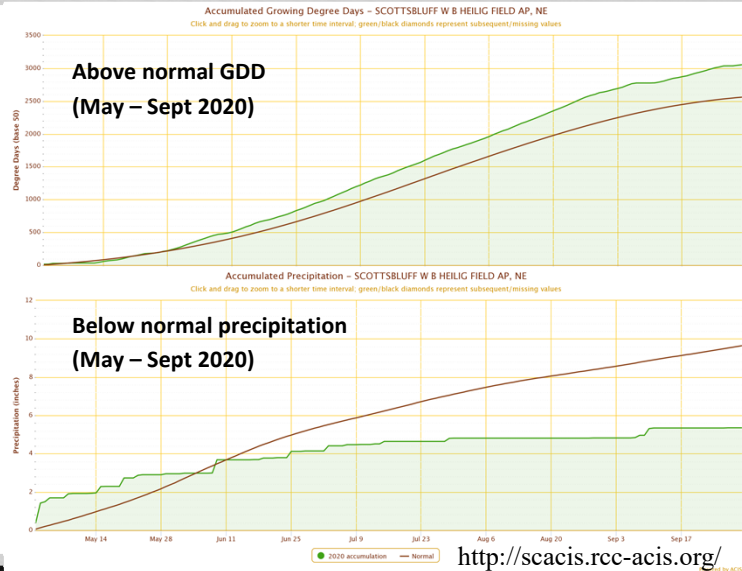


**** Important note for dry bean growers **** As ALS-resistant pigweeds cause us to shift weed-management plans, note that some ALS herbicides (such as Basagran) may be less toxic to mite predators such as *Neoseiulus fallacis*. This could facilitate late-season mite outbreaks in the future.

Pest Mite IPM

When is pest mite risk high?

- If temps are high ...
 - For example, August 2020 was the 2nd highest average mean temp on record at SCB airport station (76.5°F)
- ... and precipitation low
 - For example, August 2020 recorded 0 inches at SCB airport station
- *Drought stress*



Pest Mite IPM

When to act?

- BGM and TSSM in corn
 - Treat when injury to the lower 1/3 of canopy or small colonies in the middle canopy before hard dough stage
- TSSM in dry bean
 - No thresholds developed; consider treatment when stippling found in middle canopy or scattered colonies in the upper canopy

Products for spider mite control in corn and dry bean (adapted from Wright, Peterson, and Hunt; CropWatch, July 22, 2020)

MOA Class	Chemical	Crop	Target stage
Organophosphate (1B)	Dimethoate	Corn & dry bean	Adults/nymphs
Pyrethroid (3A)	Bifenthrin	Corn & dry bean	Adults/nymphs
Chloride channel activators (6)	Abamectin	Dry bean only	Adults/nymphs
Chitin synthase inhibitor CHS1 (10B)	Etoxazole (Zeal)	Corn only	Nymphs/eggs
Mitochondrial ATP synthase inhibitor (12C)	Propargite (Comite)	Corn only	Adults/nymphs
Tetronic and tetramic acid derivatives (23)	Spiromesifen (Oberon)	Corn only	Nymphs/eggs
	Hexythiazox (Onager)	Corn & dry bean*	Nymphs/eggs
Combination Products			
3A + 3A	Zeta-cypermethrin + bifenthrin (Hero)	Corn & dry bean	Adults/nymphs
1B + 3A	Chlorpyrifos + bifenthrin (Tundra Supreme)	Corn	Adults/nymphs





* Only labeled for dry bean use in Nebraska west of US 281.

Pest Mite IPM

How to take action?

1. Limit drought stress if you have irrigation
2. Cautious use of Pyrethroids and organophosphates
3. Products that control nymph and egg stages may be better control options
4. Cold weather fronts can reduce spider mite population growth

Table 1. Comparison of mite species

	Banks grass mite (BGM)	Two-spotted spider mite (TSM)
		
Appearance (adult females) Drawings by Jim Kalisch		
	Dark green pigment spots extend down length of body; body is more elongate	Dark green pigment in two distinct spots on front 1/2 of body; body more rounded
Webbing	Produces spider-like silk webbing	Produces spider-like silk webbing; tends to produce more webbing than BGM
Host Range	Almost exclusively grasses, such as corn and sorghum	Many grass species (corn, sorghum) plus soybeans, fruit trees, vegetables, and ornamentals
Timing	Appears earlier in the season	Tends to appear mid- to late-season
Location on Crop	Mostly lower leaves, moving upward as the infestation grows	Can feed over the entire plant
Overwintering Location	Primarily the crowns of winter wheat and native grasses	Primarily alfalfa and other broadleaf plants along crop field borders
Susceptibility to Insecticides	Moderately susceptible to many common miticides	Has developed resistance to some products; control is less consistent

Source: UNL Department of Entomology

Wright, Peterson, & Hunt 2020; CropWatch 2020

1. Irrigation will not control mite populations; however, limiting drought stress through irrigation can slow spider mite population development
2. Pyrethroids and organophosphates are ineffective on eggs AND are detrimental to natural enemies (flare mite populations)
3. Products that are specifically labeled as “miticides” that target nymphs/eggs may not have as immediate “knock-down”, but but may provide better long-term control of the spider mite population (e.g., Oberon and Onager). Since mites generally spread from field corners or edges, there is often time to act if the field infestation is identified early.
4. Cold weather fronts in the summer bring two things that work against spider mite population growth – rain and cooler temps. Cooler temps may more greatly slow spider mites relative to their natural enemies.

What's New in Insect Management in the Panhandle?

Jeff Bradshaw

Entomology Specialist

Conserving Beneficial Insects in Panhandle Cropping Systems

Jeff Bradshaw

Entomology Specialist

What are your most important crop insect management concerns that Nebraska Extension should address

- 1.
- 2.
- 3.

What are your most important crop weed management concerns that Nebraska Extension should address

- 1.
- 2.
- 3.

What are your most important crop disease management concerns that Nebraska Extension should address

- 1.
- 2.
- 3.



Session Goals

- Include 1-2 learning objectives (session goals) (what will participants be able to do or how might they apply information in the coming year)
- E.g. At the end of this session participants will be able to identify the ideal environmental conditions necessary to safely spray 2, 4-D.
- Helpful tips on writing session goals
(http://www.bu.edu/cme/forms/RSS_forms/tips_for_writing_objectives.pdf)
 - Step 1: Learning objectives begin with the phrase: "At the conclusion of this activity, participants will be able to..."
 - Step 2: Connect step one with an action verb which communicates the performance by the learner. Use verbs which describe an action that can be observed and that are measurable.
 - Active verbs <http://www.northeastern.edu/nuolirc/wp-content/uploads/2018/01/Blooms-Taxonomy-Handout.pdf>

Presentation Content

- Limit word content on slides (~3 bullets)
- Large pictures and figures
 - Simplify figures for ease of reading
- Provide summary notes for printout below in notes section (may be bulleted)

- Add presentation notes here.
- Provide information that is not obvious or easily understood from slide content

Take Home Points

- You should include 3-5 take home points at the end of your presentation.

Frequently Asked Questions

- Include 2-4 FAQs with answers for your presentation. These will help moderators facilitate discussion.
- These can be provided separate from presentation