FUN FACTS

Ballooning. Spider mite aggregations (thousands) can form a ball of silk that can travel by wind hundreds of feet away.

Blazing Breeders. The TSSM can birth one hundred offspring in its lifetime. For a TSSM to go through its entire life cycle, temperature has a significant effect. At 75°F, their entire life cycle can take as little as five days. At 48°F, it can take up to twenty days. If two spider mites and their offspring are allowed to breed at these temperatures for thirty days, the colder ones produce one hundred offspring while the warmer ones can end up producing a whopping 31.25 billion. If we lined up all of these mites, the cooler ones would be the length of a matchstick and the warmer ones would wrap around the Earth.

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PHOTO CREDITS

1 Image number 5424184 (twospotted spider mite [Tetranychus urticae Koch]) courtesy of David Cappaert, Bugwood.com, licensed under a Creative Commons Attribution-Noncommercial 3.0 License. No warranties are given. The license may not provide all of the permissions necessary for one's intended use. No alterations to the original image have been made. https://www.invasive.org/browse/detail.cfm?imgnum=5424184.

2 Image number 5393987 (spider mites [Genus *Tetranychus* Dufour]) courtesy of David Gent, USDA Agricultural Research Service, Bugwood.com, licensed under a Creative Commons Attribution 3.0 License. No warranties are given. The license may not provide all of the permissions necessary for one's intended use. No alterations to the original image have been made. https://www.invasive.org/browse/detail.cfm?imgnum=5393987.

3 Image number UGA1234228 (spider mites [Family Tetranychidae]) courtesy of Clemson University, USDA Cooperative Extension Slide Series, Bugwood.com, licensed under a Creative Commons Attribution 3.0 License. No warranties are given. The license may not provide all of the permissions necessary for one's intended use. No alterations to the original have been made. https://www.insectimages.org/browse/detail.cfm?imgnum=1234228.

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ALWAYS read and follow the instructions printed on the pesticide label. The pesticide recommendations in this UI publication do not substitute for instructions on the label. Pesticide laws and labels change frequently and may have changed since this publication was written. Some pesticides may have been withdrawn or had certain uses prohibited. Use pesticides with care. Do not use a pesticide unless the specific plant, animal, or other application site is specifically listed on the label. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

Trade Names—To simplify information, trade names may have been used. No endorsement of named products is intended nor is criticism implied of similar products not mentioned.

Groundwater—To protect groundwater, when there is a choice of pesticides, the applicator should use the product least likely to leach.

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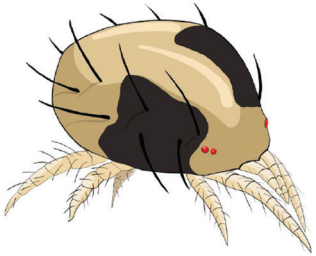
BUL 1085

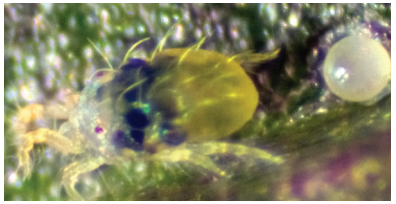
A VISUAL GUIDE TO TWO-SPOTTED SPIDER MITES IN HOPS

University of Idaho Extension

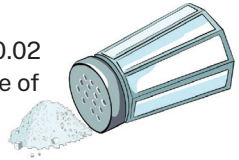
TWO-SPOTTED SPIDER MITE ANATOMY



A drawing composition of the anatomy of an adult two-spotted spider mite (TSSM). Note the two large black spots, coloration, and shape indicative of this species.



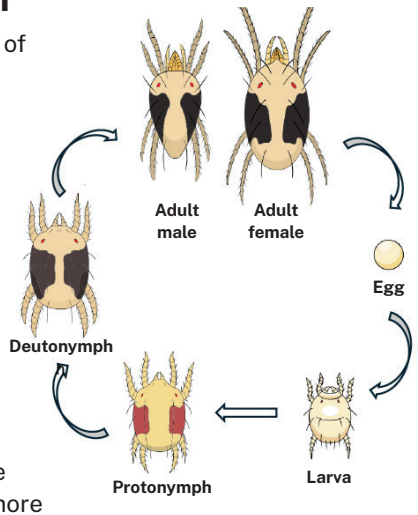
A picture of a TSSM under magnification.[1]



Adult female spider mites are approximately 0.5 mm (about 0.02 inches) in length, about the size of a grain of salt.

BIOLOGY

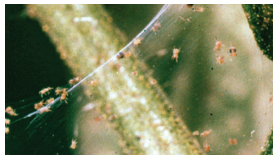
The life cycle of a TSSM. This species can have multiple generations per year based on food and weather conditions.



Overwintering. As fall approaches, TSSM change in color to a more reddish hue and hide beneath leaf litter and in the soil at a depth up to ½ inch until the spring.

DAMAGE AND SCOUTING

Feeding. TSSM prefer feeding on young and tender shoots. They feed by piercing the surface of a leaf, leaving small yellow spots called stippling.[2]



Webbing. When TSSM populations are high, they produce webbing as a form of protection from the elements and predators.[3]

Scouting. To scout for TSSM, remove leaves from various levels of the canopy. Samples usually start with at least fifty hop leaves per yard. Some farmers use a higher number of samples for estimates. Closely examine each leaf on the underside with a 10–20x magnification hand lens. Count the number of TSSM and after gathering many leaves calculate the average number of TSSM per leaf (i.e., total number of mites found divided by the total number of leaves examined).

Use this chart to help you decide whether to apply a treatment based on the number of mites per leaf. The more samples you collect from different parts of the field/canopy, the more accurate your estimate will be.

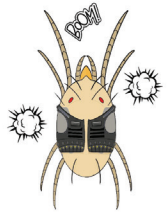
Timing:	Threshold:
Mid-June to Early July	1-2 adult females / leaf
Mid-July	5-10 adult females/ leaf

Threshold. The chart above represents a commonly accepted threshold used for TSSM treatment. When the threshold average is met, treatment is recommended. The threshold is the point at which it is more affordable to treat a crop than the amount of damage the crop will sustain.

TREATMENT

Though there are many pesticide products labeled for TSSM, avoid broad-spectrum pesticides (e.g., neonicotinoids, pyrethroids, organophosphates, carbamates) due to their effects on beneficial predators. Even targeted acaricides can harm predators. Rosemary oil and bifenazate have shown some efficacy at reducing TSSM populations while causing less harm to predators. These chemicals still need to be rotated to reduce resistance.

The TSSM is also notorious for expressing resistance to many chemistries. If you use pesticides, rotate chemistries to reduce the risk of resistance. Always read and follow the pesticide label. Scan the QR code for a list of pesticides for use in the Pacific Northwest.



https://pnwhandbooks.org/insect/agronomic/hop/hop-spider-mite

Release of Predators

Multiple predatory mite species can be purchased and released in hops. These include *Neoseiulus californicus*, *Phytoseiulus persimilis*, *Orius insidiosus*, and *Feltiella acarisuga*. These can help reduce spider mite populations and pesticide overreliance. Note that multiple releases per year may be necessary, since these predators are not known to establish.

Reducing Plant Stress

To reduce damage to hops from spider mites, ensure hops get sufficient water and fertilizer treatments. A healthy plant better tolerates damage and has better yields.