Biological Control of Two-Spotted Spider Mites on Homegrown Strawberries

Strawberries are a favorite fruit of many families in South Carolina. Every year, many home gardeners grow strawberries in their gardens or in containers. While several pests attack strawberry plants, the two-spotted spider mite (*Tetranychus urticae* Koch) is the pest that causes the greatest damage and is the most difficult to control. Two-spotted spider mites (TSSM) feed and live on the underside of leaves, making control of this pest very difficult. They reproduce quickly in warm temperatures. Because of these characteristics, good control of TSSM can be very difficult for home gardeners.

Commercial miticides that are effective in TSSM control are not available for homeowner use. Products that are available to homeowners may not be very effective.

Two-spotted spider mite (*Tetranychus urticae*).
Chad Smith, Coastal Research & Education Center, Clemson University

**Description**

An adult TSSM has a pale green body with two dark spots on its back, hence the name “two-spotted.” TSSM are very small in size (about \( \frac{1}{60} \) of an inch) making them difficult to see with the naked eye. The female TSSM is larger than the male.

TSSM with a pale green color are “active” (feeding and laying eggs). During winter, females change color to a reddish orange. TSSM with a reddish orange color are “dormant” and are not feeding or laying eggs.

**Effects of Temperature on Spider Mites**

Spider mites prefer hot and dry conditions. They are most active between 48 °F and 111 °F; however, they prefer temperatures between 55 °F and 98 °F. TSSM feeding and reproduction depends on body temperature, and the body temperature of the mite depends on air temperature.

Females can lay up to 100 eggs in an average lifetime of 68 days. Depending on day and night time temperatures, TSSM eggs will hatch between 3-19 days. At temperatures below 48 °F, a spider mite egg will hatch in about 19 days. At temperatures above 70 °F, spider mite eggs will hatch in 3-7 days.

TSSM goes through four stages of development from egg to adult. Spider mite eggs are round and clear. They are laid on the undersides of leaves. The first set of eggs is generally laid on the lowest leaves on the plant. When a spider mite egg hatches, it produces a young spider mite that starts to feed immediately.
Damage
Both adults and young feed on the underside of the plant leaf. TSSM feed by sucking plant juice. Symptoms of plants affected by TSSM are:
- Stunted growth
- Yellow mottling of leaves
- Small and misshaped fruits
- Bronzing of leaf underside (with severe feeding)

Biological Control
Biological control of TSSM offers homeowners the best option and safest way to control this pest. Biological control is safe for the homeowner, pets and the environment. Most of the miticides used in commercial strawberry production are not available for use by homeowners.

Predatory Mites: Two species of predatory mites that are effective in controlling TSSM on strawberries are *Phytoseiulus persimilis* and *Neoseiulus californicus*.

Timing the release of predatory mites is very important for successful control of TSSM. Before ordering the predatory mites, the homeowner must inspect the strawberry plants for TSSM or their eggs. There must be TSSM for the predatory mites to eat once they are released. If they don’t have a food source, the predatory mites will either die or migrate to other plants.

Check the undersides of strawberry leaflets for TSSM. Count the number of adults, crawlers (newly hatched immatures) and eggs present. If you find two or more adults with eggs per leaflet, order the predatory mites. The predatory mites will typically arrive one week after placing an order. Predatory mites should be released within 4 hours after receiving them. Predatory mites can be kept up to 24 hours in a refrigerator, but must be released within this time.

If the population of the TSSM is very high, homeowners can apply a 1% horticultural oil spray (Bonide All Seasons Spray Oil Concentrate, Ferti-lome Horticultural Oil Spray Concentrate, Monterey Horticulural Oil Concentrate, or Southern Ag Parafine Horticultural Oil, or Lilly Miller Superior Type Spray Oil Concentrate) or an insecticidal soap spray (Bonide Insecticidal Soap Concentrate, Natural Guard Insecticidal Soap Concentrate, Schultz Garden Safe Insecticidal Soap Concentrate, Safer Brand Insect Killing Soap Concentrate, or Espoma Earth-tone Insecticidal Soap Concentrate) to help reduce the TSSM population until the predatory mites arrive. Follow label directions for use.

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*Phytoseiulus persimilis*, a predatory mite.
Roger Francis, Charleston County, Clemson Extension

*Neoseiulus californicus*, a predatory mite.
Roger Francis, Charleston County, Clemson Extension
Sources of Predatory Mites: Some suppliers of predatory mites are provided at the following web sites:

www.beckerunderwood.com
www.biobest.be
www.goodbug.com
www.greenmethods.com
www.insectary.com
www.ipmlabs.com
www.koppert.com
www.natural-insect-control.com
www.sterlingnursery.com
www.syngentabioline.com
www.thebugfactory.ca

Other Beneficial Insects: Several other beneficial insects are predators on TSSM. Examples of these predators are shown below.

There are many species of lady beetles, such as this adult convergent lady beetle (*Hippodamia convergens*). Both the adults and larvae feed mainly on aphids, scales and mites. Frank Peairs, Colorado State University, Bugwood.org

Adult large big eyed bug (*Geocoris bullatus*). There are several species of big eyed bugs. Most are about 1/16-inch long and feed on numerous insect and mite pests of plants. Julieta Brambila, USDA APHIS PPQ, Bugwood.org

Adult damsel bugs (*Nabis* sp.) are slender and about 1/3 to ½-inch long. They are true bugs and have long needle-like mouthparts. Both the adults and nymphs (immatures) feed on many soft-bodied pests, such as aphids and spider mites. Frank Peairs, Colorado State University, Bugwood.org

Adult green lacewing. Two native North American species are the common lacewing (*Chrysoperla rufilabris*) and the eastern green lacewing (*Chrysopa ornata*). Frank Peairs, Colorado State University, Bugwood.org

Adult brown lacewing. There are many genera and species of brown lacewings, and both the adults and larvae are predatory on small insect pests, such as aphids and mites. Joseph Berger, Bugwood.org
Minute pirate bug (*Orius* sp.) feeding on a green peach aphid. Both adults and larvae feed by sucking juices from their prey, which includes spider mites, thrips, aphids and insect eggs.

Bradley Higbee, Paramount Farming, Bugwood.org

Adult syrphid flies or hover flies (*Helophilus* sp.) are brightly colored in yellow and black with patterns that mimic wasps. Their large compound eyes nearly cover their head. The legless larvae feed primarily on aphids, scales and thrips. Adults feed on nectar and pollen.

Whitney Cranshaw, Colorado State University, Bugwood.org