

Two-Spotted Spider Mites (*Tetranychus urticae*)

Two-spotted spider mite (TSM), also known as greenhouse red spider mite or carmine mite, is one of the most common pests of protected crops in greenhouses and interior plantscapes. It also occurs on berry and fruit crops and many woody ornamentals grown outdoors.

Damage

TSM damage plants by piercing and sucking the contents of cells, which results in speckling on leaves as the cells turn yellow and die. Although most mites are on the undersides of leaves, the damage is visible on both leaf surfaces. As damage increases, the whole leaf may turn yellow and wither. The carmine strain of TSM causes more serious damage to tomato.

Yield losses start to occur in greenhouse cucumbers and tomato crops when about 30% of the leaf surface area is damaged. Ornamental plants attacked by TSM show leaf damage and reduced growth.

Description

Adult TSM are minute, 0.5 mm (1/50 inch) long, and a pale tan colour with two greenish black spots, one on each side of the abdomen. They have 8 legs and, under magnification, 2 red eye spots can be seen. Male TSM are half the size of the females. Diapausing adults are orange-red with dark side spots. The carmine strain of TSM found on tomatoes is a brick-red colour in the adult stage. Immature and larval mites have 6 legs and the spots are less visible.

Life Cycle

A complete TSM life cycle takes about 14 days at 21°C (70°F), 33 days at 15°C (59°F) and only 7 days at 30°C (86°F).

Females lay eggs on the lower leaf surface; larvae hatch from eggs in about 3 days.

Nymphs pass through two more stages before becoming adults.

Feeding and number of eggs laid by TSM females increases as temperature rises and humidity drops. Under hot, dry conditions, TSM populations can cause extensive damage and quickly get out of control.

When TSM populations are high, they disperse easily throughout the crop on air currents and are also carried along on workers' clothing as they handle plants.

TSM diapause in response to short days, lower temperatures or a deteriorating food supply. They travel up or down the plant, away from light, searching for protected places to hibernate, such as crevices in the greenhouse structure or at the soil line at the base of posts. This phase doesn't feed and is very difficult to control with either chemicals or biological controls.

Monitoring Tips

Inspect leaves under 10-15 X magnification for signs of TSM infestation.

Some growers use bean seedlings or climbing runner beans as trap plants to detect the first appearance of TSM on new crops. TSM damage is easy to see on bean leaves, which alerts growers that there may be mites present in the crop (the bean plants also serve another purpose as they are good nursery plants for predatory mites.)

Biological Controls

TSM can reproduce very rapidly on greenhouse cucumber so it is important to apply biological control agents as soon as mite damage is detected. A combined attack using the three biological controls listed below will provide the best results.

'Persimilis': The predatory mite, *Phytoseiulus persimilis*, is a very effective control for TSM on most plants. The life cycle of Persimilis is similar to that of TSM, but the predators develop twice as fast as the pest at moderate greenhouse temperatures. When TSM are first seen, introduce Persimilis onto all infested leaves. For release rates and details on using Persimilis see Sheet 200.

On greenhouse peppers and woody ornamental plants, introduce Fallacis predatory mites as well as Persimilis for control over a longer period. For release rates and details on Fallacis see Sheet 201.

'Stethorus': The lady beetle, *Stethorus punctillum*, feeds on all stages of TSM and can be used with other biocontrol agents. Stethorus is active over a wide temperature and humidity range (16-30°C and 20-90%RH). They should be released in mite infested sites as soon as TSM are detected (for details on Stethorus, see Sheet 207).

'Feltiella': The predatory midge, *Feltiella acarisuga*, may also be used to control TSM on cucumber. Feltiella feeds on all stages of TSM. Adults fly and are able to locate mite colonies from a distance. Feltiella do best at humidities over 50% RH and at high mite densities. They should be released early in the season once TSM becomes established.

Chemical Controls

Chemical control in conjunction with biological control is recommended if mites are clustering in balls or "stringing" down from the plant or if they are detected in high numbers without predators present. Fenbutatin oxide (Vendex[®]) will not harm predatory mites, but check compatibility list (Sheet 180) before using any pesticide with biological control agents.

It is important to finish each crop with low populations of TSM. High numbers at the end of the year result in the survival of many diapausing (overwintering stage) spider mites that will re-infest the next crop early in the season. If mites are still a problem in late July, a miticide should be applied in August to prevent diapausing mites from over wintering. Pesticides are less effective against the diapausing form of TSM present in the fall.

Other Measures

Thoroughly cleaning up the crop at the end of the season. Treat the greenhouse with naled (Dibrom[®]) after the last pick, before removing cucumber plants, and again after the greenhouse is empty. Wash the greenhouse structure with a strong detergent. Dormant oil sprays applied to cracks in concrete, posts and other mite hiding spots will reduce the number of diapausing mites in the greenhouse.

Do not maintain ornamental plants in vegetable greenhouses and remove weeds. Keep grass or vegetation mowed adjacent to the greenhouse.

Once biological control agents have been released, maintain warm temperatures (optimum 25°C) and high humidities (optimum 80-90% RH) to encourage the predators. Misting TSM infested sites with fine sprays of water will slow TSM reproduction and increase the feeding and reproduction of predatory mites.

Summary of IPM for Two-Spotted Mites

Remove weeds and mow vegetation around greenhouses.

Inspect plants for first signs of TSM.

SHEET 300 - TWO-SPOTTED MITES

If TSM populations are high, apply knock-down pesticides (Vendex®).
 Release mite predators at the first sign of TSM.
 Modify the environment to favour mite predators.
 At the end of a crop, do a thorough clean-up.

COMPARISON OF TWO-SPOTTED MITE PREDATORS

Characteristics	Persimilis	Fallacis	Stethorus	Feltiella
Release at low pest density	X	X	X	
Release at high pest density	X			X
Uses pollen as alternate food source		X		
Effective over wide range of humidity			X	
Requires >50% relative humidity		X		X
Requires >60% relative humidity	X			
Effective over wide range of temperatures		X	X	
Effective in cool conditions & outdoors		X		
Effective in warm conditions (with high RH)	X			
Diapauses in short day conditions		X	X	
Pesticide resistant		X		