

SPIDER MITES

Integrated Pest Management for Home Gardeners and Landscape Professionals

Mites are common pests in landscapes and gardens that feed on many fruit trees, vines, berries, vegetables, and ornamental plants. Although related to insects, mites aren't insects but members of the arachnid class along with spiders and ticks. Spider mites (Figure 1), also called webspinning mites, are the most common mite pests and among the most ubiquitous of all pests in the garden and on the farm.

Webspinning spider mites include the Pacific spider mite, twospotted spider mite, strawberry spider mite, and several other species. Most common ones are closely related species in the *Tetranychus* genus and can't be reliably distinguished in the field. However, there is little need to do so, since their damage, biology, and management are virtually the same.

IDENTIFICATION

To the naked eye, spider mites look like tiny, moving dots; however, you can see them easily with a 10X hand lens. Adult females, the largest forms, are less than 1/20 inch long. Spider mites live in colonies, mostly on the undersides of leaves; a single colony may contain hundreds of individuals (Figure 2). The names "spider mite" and "webspinning mite" come from the silk webbing most species produce on infested leaves (Figure 3). The presence of webbing is an easy way to distinguish them from all other types of mites and small insects such as aphids and thrips, which can also infest leaf undersides.

Adult mites have eight legs and an oval body with two red eyespots near the head end. Females usually have a large, dark blotch on each side of the body and numerous bristles covering the legs and body. Immatures resemble adults (except they are much smaller), and the newly hatched larvae have only six legs. The other immature stages have eight legs. Eggs are spherical and translucent, like tiny droplets, becoming cream colored before hatching (Figure 4).



Figure 1. Spider mites.



Figure 2. Mite colony on underside of leaf.



Figure 3. Webspinning mites can produce copious amounts of webbing.



Figure 4. Twospotted spider mite eggs.

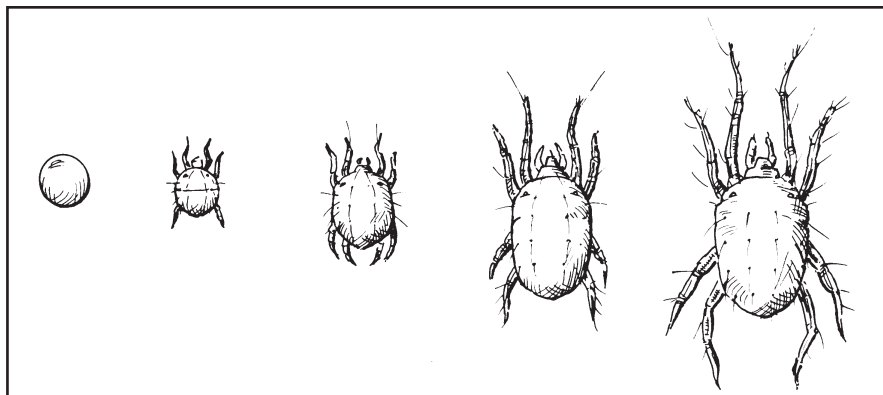


Figure 5. Spider mite life cycle, development of a typical plant-feeding spider mite—egg, larva, two nymphal stages, and adult.

LIFE CYCLE

In some parts of California, spider mites may feed and reproduce all year on plants that retain their green leaves throughout the winter. In colder areas and on deciduous trees that drop their leaves, webspinning mites overwinter as red or orange mated females under rough bark scales and in ground litter and trash.

They begin feeding and laying eggs when warm weather returns in spring.

Spider mites reproduce rapidly in hot weather and commonly become numerous in June through September. If the temperature and food supplies are favorable, a generation can be completed in less than a week (Figure 5). Spider mites

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prefer hot, dusty conditions and usually are first found on trees or plants adjacent to dusty roadways or at margins of gardens. Plants under water stress also are highly susceptible. As foliage quality declines on heavily infested plants, female mites catch wind currents and disperse to other plants. High mite populations may undergo a rapid decline in late summer when predators overtake them, host plant conditions become unfavorable, and the weather turns cooler as well as following rain.

DAMAGE

Mites cause damage by sucking cell contents from leaves. A small number of mites usually isn't reason for concern, but very high populations—levels high enough to show visible damage to leaves—can damage plants, especially herbaceous ones. At first, the damage shows up as a stippling of light dots on the leaves; sometimes the leaves take on a bronze color. As feeding continues, the leaves turn yellowish or reddish and drop off. Often, large amounts of webbing cover leaves, twigs, and fruit. Damage is usually worse when compounded by water stress.

Loss of leaves won't cause yield losses in fruit trees during the year of infestation unless it occurs in spring or very early summer, but it may impact next year's crop. On annual vegetable crops—such as squash, melons, and watermelons—loss of leaves can have a significant impact on yield and lead to sunburning. On crops such as sugar peas and beans, where pods are attacked, spider mites can cause direct damage. On ornamentals, mites are primarily an aesthetic concern, but they can kill plants if populations become very high on annual plants. Spider mites are also important pests of field-grown roses.

MANAGEMENT

Spider mites have many natural enemies that often limit populations. Adequate irrigation is important, because water-stressed plants are most likely to be damaged. Broad-spectrum insecticide treatments for other pests frequently cause mite outbreaks, so avoid these pesticides when possible. Sprays of water, insecticidal oils, or soaps can be used for management. Always monitor mite levels before treatment.

Monitoring

Mites are tiny and difficult to detect. You'll usually notice plant damage such as stippled or yellow leaves before you spot the mites themselves (Figure 6). Check the undersides of leaves for mites, their eggs, and webbing; you'll need a hand lens to identify them. To observe mites more closely, shake a few off the leaf surface onto a white sheet of paper. Once disturbed, they will move around rapidly. Be sure mites are present before you treat. Sometimes the mites will be gone by the time you notice the damage; plants will often recover after mites have left.

Biological Control

Spider mites have many natural enemies, which limit their numbers in many landscapes and gardens, especially when undisturbed by pesticide sprays. Some of the most important are the predatory mites, including the western predatory mite (Figure 7), *Galendromus* (formerly *Metaseiulus*) *occidentalis*, and *Phytoseiulus* mite species. Predatory mites are about the same size as plant-feeding mites but have longer legs and are more active; they also are more teardrop-shaped than spider mites.

Various other insects are also important predators—sixspotted thrips (*Scolothrips sexmaculatus*) (Figure 8), the larvae and adults of the spider mite destroyer lady beetle (*Stethorus picipes*), the larvae of certain flies including the cecidomyid *Feltiella acarivora* (Figure 9), and various general predators such as minute pirate bugs, bigeyed bugs, and lacewing larvae. Western flower thrips, *Frankliniella occidentalis*, can be an important predator on spider mite eggs and larvae, but this species will also inflict severe damage to plants if mites aren't present on which to feed.

The purchase and release of predatory mites can be useful in establishing populations in large plantings or orchards, but the best results are obtained by creating favorable conditions for naturally occurring predators, such as avoiding dusty conditions and insecticide sprays. The major predator mites commercially available for release are the western predatory mite and *Phytoseiulus*.



Figure 6. Feeding by webspinning mites first appears as leaf stippling.



Figure 7. The western predatory mite, shown here attacking a two-spotted spider mite, is an important predator.



Figure 8. The six-spotted thrips feeds on spider mites and their eggs.



Figure 9. Larvae of predatory midges, such as this *Feltiella* species, prey on spider mites.

The western predatory mite is more effective under hot, dry conditions. These predators don't feed on foliage or become pests; thus if pest mites aren't available when predatory mites are released, the predators starve or migrate elsewhere.

If you wish to establish predators in a heavily infested orchard or garden that has few predators, use a soap spray or selective miticide to bring pest mites to a lower level and then release predatory mites. A good guideline is that one predator is needed for every 10 spider mites to provide control. More than one application of predatory mites may be required if you want to reduce pest populations rapidly. Concentrate releases in hot spots where spider mite numbers are highest. Once established on perennials, predatory mites may reproduce and provide biological control indefinitely without further augmentation unless nonselective insecticides are applied that kill the predators.

Cultural Control

Cultural practices can have a significant impact on spider mites. Dusty conditions often lead to mite outbreaks. Apply water to pathways and other dusty areas at regular intervals. Water-stressed trees and plants are less tolerant of spider mite damage. Be sure to provide adequate irrigation. Midseason washing of trees and vines with water to remove dust may help prevent serious late-season mite infestations.

In gardens and on small fruit trees, regular, forceful spraying of plants with water often will reduce spider mite numbers adequately. Be sure to get good coverage, especially on the undersides of leaves. If more control is required, use an insecticidal soap or oil in your spray, but test the product on one or two plants to be sure it isn't damaging to them. (See Chemical Control below.)

Chemical Control

Spider mites frequently become a problem after applying insecticides. Such outbreaks are commonly a result of the insecticide killing off the mites' natural enemies but also occur when certain insecticides stimulate mite reproduction. For example, spider mites exposed to carbaryl (Sevin) in the laboratory have been shown to reproduce faster than untreated populations. Carbaryl, some organophosphates, and some pyrethroids

apparently also favor spider mites by increasing the level of nitrogen in leaves. Insecticides applied during hot weather usually appear to have the greatest effect, causing dramatic spider mite outbreaks within a few days.

If a treatment for mites is necessary, use selective materials, preferably insecticidal soap or insecticidal oil. Both petroleum-based horticultural oils and plant-based oils such as neem, canola, or cottonseed oils are acceptable. There are also a number of plant extracts formulated as acaricides (a pesticide that kills mites) that exert an effect on spider mites. These include garlic extract, clove oil, mint oils, rosemary oil, cinnamon oil and others. Don't use soaps or oils on water-stressed plants or when temperatures exceed 90°F. These materials may injure some plants, so check labels and/or test them out on a portion of the foliage several days before applying a full treatment. Oils and soaps must contact mites to kill them, so excellent coverage, especially on the undersides of leaves, is essential, and repeat applications may be required.

Sulfur sprays can be used on some vegetables, fruit trees, and ornamentals. This product will burn cucurbits and other plants in some cases. Don't use sulfur unless it has been shown to be safe for that plant in your locality. Use liquid products such as sulfur and potash soap combinations (e.g., Safer Brand 3-in-1 Garden Spray) rather than sulfur dusts, which drift easily and can be breathed in. Don't use sulfur if temperatures exceed 90°F, and don't apply sulfur within 30 days of an oil spray. Sulfur is a skin irritant and eye and respiratory hazard, so always wear appropriate protective clothing.

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WARNING ON THE USE OF CHEMICALS

Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in the original, labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Pesticides applied in your home and landscape can move and contaminate creeks, rivers, and oceans. Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits or vegetables ready to be picked.

Do not place containers containing pesticide in the trash or pour pesticides down the sink or toilet. Either use the pesticide according to the label, or take unwanted pesticides to a Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Household Hazardous Waste Collection site nearest you. Dispose of empty containers by following label directions. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

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