

MITES

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Several species of mites can be severe pests of a wide variety of greenhouse crops. Two common mite pests, twospotted spider mites and cyclamen mites, will be covered here.

Twospotted Spider Mites

Identification. This pest is the most common species of the spider mite family, Tetranychidae, to infest greenhouse plants. These close relatives of insects are sometimes referred to as red spiders, although they are not spiders at all. They are minute arthropods, with the largest life stage (adult female) less than a millimeter in size. The body of the adult female and most immature stages is oval-shaped and usually appears light yellow to green with two large dark green spots on either side. All life stages have eight legs except for the larval stage, which has six.



Damage. Spider mites attack virtually every florist crop, including most species of foliage plants. These mites cause severe chlorosis in attacked plants because the mites feed by "stabbing" cells with their piercing mouthparts and sucking up the juices that exude. Spider mites remove chlorophyll from plant cells and reduce photosynthesis. Removal of chlorophyll produces the characteristic stippling or mottling of foliage and sometimes causes leaf drop. When populations of this pest are low, the mites prefer to attack the lower surface of leaves, but may move upward as populations increase. In severe infestations, the plants may be covered with the mites' characteristic webbing, which is why they are referred to as spider mites. Water-stressed plants are particularly susceptible to spider mites.

Biology. Survival and developmental time and reproduction are greatly influenced by environmental factors such as temperature, humidity, and host plant, with temperature being most important. Females lay eggs (up to 12 per day) on the undersides of leaves, usually in the fine webbing that the mites constantly produce. One female is capable of laying over 100 eggs during her lifetime. The eggs hatch in as few as 3 days, depending on temperature, and the newly hatched mites (called larvae) immediately begin to feed. After as few as 5 days, the mites pass through two nymphal stages and become adults. Females will begin laying eggs from 1 to 3 days after emerging as adults, and mating is not required. Egg to adult development may take as few as 7 days at 81° F, and about 20 days at 64° F. At warm temperatures, the mites' ability for rapid population increase becomes apparent. Spider mites do best under hot, dry conditions, and develop faster on water-stressed plants.

Pesticide resistance can be a common problem in spider mite control. Unfortunately, many strains of mites exist, and many of these strains are resistant to certain acaricides (miticides). Currently there are a variety of effective acaricides, but unless these chemicals are used carefully and sparingly, it is literally a matter of time before resistant strains evolve.

Management. Weeds serve as alternate food for spider mites and should be eliminated. A weekly routine plant inspection program is the best first step for spider mite management. The "scout" should inspect plants carefully for the first signs of leaf stippling caused by spider mites. Plants can be randomly chosen

from each bench for inspection, with lower leaf surfaces being examined for the presence of mites. Particular attention should be given to areas of the greenhouse where mites are most likely to be spread on workers' clothing, such as along walkways or near entrances. Attention should also be focused on plant species or varieties that are particularly susceptible to mite infestations, or in areas of a greenhouse that have a history of mite problems. Efficient and regular scouting can lead to early detection of an infestation, and an assessment of the location and number of infested plants. Sprays may then only need to be applied to the infested area, reducing application costs. Plants on which an infestation is detected can be marked and re-inspected with a handlens several days after a spray to evaluate the degree of control achieved. Some miticides are not effective against mite eggs, thus a repeat application may be needed after 5-7 days. Thorough coverage of upper and lower surfaces of all leaves is critical for effective mite control.

Promising research is under way to make biological control of spider mites an economic and practical reality on several crops. Other mite species are known to feed voraciously on spider mites and their eggs, and these beneficial species are commercially available and commonly used to control spider mites on greenhouse-grown vegetable crops in Canada and Europe. Research results at Cornell and elsewhere also appear promising for biological control of mites on roses, and biological control of mites on foliage plants in Florida looks promising in some situations. Further work is needed before a biological control program can be implemented for ornamental crops, but the spider mites' ability to develop pesticide resistance and other problems associated with chemical control makes such approaches to pest management virtually imperative in the near future.

Cyclamen Mites

Damage. Growers rarely see these microscopic, insidious pests. The damage they cause, however, can be extensive. The tiny mites hide in protected locations on the plant host and are most commonly found in buds, flowers, or in similar locations. They are serious pests of a number of flowering and foliage plants, including cyclamen, African violet, ivy, snapdragon, chrysanthemum, begonia, fittonia, and many others. The mites feed on plant cells, and foliage expanding from infested buds is curled and distorted. The leaf damage they cause is gross distortion of the tissues on which they feed, which also renders infested plants unsalable. It is possible that they also damage plants by injecting a toxin as they feed. Unfortunately, their extremely small size makes it difficult to detect an infestation prior to the onset of damage. The type of injury they cause can appear similar to thrips damage, phytotoxicity, or physiological disorders. Thus, plants that display curled, distorted leaves should be carefully examined for the presence of these tiny mites using a handlens, or preferably a dissecting microscope, in order to avoid inappropriate control actions.

Biology. Female cyclamen mites lay 1-3 eggs each day, and a total of 12-16 during their lifetimes. Mating is not required for egg production; unfertilized eggs develop into males, fertilized eggs develop into females. The eggs require 4 days to hatch at 70° F. The life cycle depends on temperature and may be completed in 1 to 3 weeks.

Management. These mites may be spread by air currents, by direct contact between plants, or by workers who handle infested plants. Chemical control can be difficult because the mites' reclusive habits make it difficult to reach them with acaricides; therefore, it is usually necessary to make 2 or perhaps 3 spray applications to achieve control of this pest. When feasible, the mites can be satisfactorily controlled by immersion of the infested plants in 43.5° C (110° F) water for 30 minutes. This is obviously not a practical means of control when large numbers of plants are involved, but can be very useful to eliminate these tiny pests from isolated infestations. Species of predaceous mites in the genus *Amblyseius* may also someday be useful for biological control.