



Phytoseiulus persimilis

Two-Spotted Mite Predator

DESCRIPTION:

P. persimilis is a tropical predatory mite that was one of the first greenhouse biological control agents available commercially. Adults are bright reddish orange, with long legs and pear-shaped bodies, 1/50 inch (0.5 mm) long. Immature predators are a pale salmon color. Eggs are oval and <1/50 inch (0.3 mm) long.

Both adult and immature predators move rapidly over the leaves and both feed on two-spotted mite eggs, nymphs, and adults. Unlike its prey, *P. persimilis* does not spin webbing.



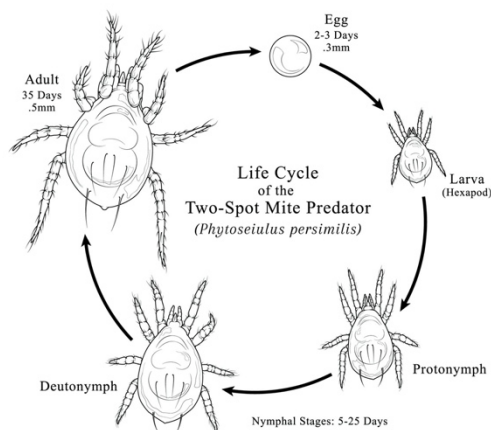
Phytoseiulus persimilis

TARGET PEST:

Two-Spotted Spider Mite (*Tetranychus urticae*)

LIFE CYCLE:

A complete life cycle takes from 5 days at 86°F (30°C) to 25 days at 59°F (15°C). There are 4 times more females in the population than males (a sex ratio of 4:1). Females lay 2-3 eggs per day for an average of 60 eggs over their 35-day lifetime. The eggs hatch in 2-3 days. They are oval and twice the size of two-spotted mite eggs. Newly hatched predators do not eat, but later stages and adults feed on all stages of prey. Each predator consumes between 5-30 prey (eggs or mites) per day. *P. persimilis* does not diapause, therefore remains active year-round in greenhouses.



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USE IN BIOLOGICAL CONTROL:

P. persimilis is very effective against two-spotted spider mites in greenhouse vegetables and ornamentals, interior plantscapes, and conservatories (for more information, see Two-Spotted Spider Mites). It is also used in warm climates on field crops, such as strawberries.

Optimum conditions are 68-81°F (20-27°C) and relative humidity over 60%. At temperatures of 64-81°F (18-27°C), the predators reproduce faster than spider mites. At warmer or cooler temperatures, however, the spider mites reproduce faster.

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MONITORING TIPS:

P. persimilis are usually easy to tell from their prey, which are slow moving, pale green mites with two darker spots on their sides. In winter, some two-spotted mites turn a reddish color, but they can still be distinguished from the predators by their slower movements.

PRODUCT INFORMATION:

P. persimilis is sold either in a granular carrier (usually vermiculite) or on bean leaves. *P. persimilis* in vermiculite is available in high-density mixtures for hotspots, and low-density formulations. Low-density formulations are only for use before spider mites are detected in the crop. Once spider mites are detected it is essential to establish predators as soon as possible by introducing *P. persimilis* either on leaves or in the hotspot formulation.

P. persimilis should be applied the same day they are received as the quality of the product drops with storage. If *P. persimilis* must be stored, hold only at 50-59°F (10-15°C). Temperatures above or below that range cause mortality.

Using the Vermiculite Product:

When *P. persimilis* are refrigerated they tend to clump together. If the package is cold, lay the container on its side at room temperature (out of direct sunlight), for 15-20 minutes, to allow the mites to warm up and move apart. Check the product by sprinkling some of the vermiculite onto a sheet of white paper; the active predators should be easy to see.

Low-density formulation:

Apply before mites are detected. Gently rotate the bottle to mix the mites with the carrier and distribute the contents over the plants.

High-density hotspot formulation: Apply when mites are detected. Gently rotate the bottle and apply predators to each infested leaf.

Using the Bean Leaf Product:

Place leaf pieces from the container onto each infested leaf of crop plants. The bean leaves eventually dry out and become inconspicuous. Advantages of this product are that all life stages, including males and females, are present, which

introduces all ages of predators into a crop. It provides ideal humidity and a food supply for the predator in transit, eliminating the stress of the vermiculite product. It can be used in interior plantscapes where the vermiculite carrier would be unsightly.

Note that although the bean leaves contain a few two-spotted mites, this does not add to the pest problem because the predators quickly eliminate them. The presence of this food enables *P. persimilis* to start reproducing immediately, which improves biological control.

INTRODUCTION RATES:

P. persimilis is most effective when applied at the first sign of a two-spotted mite infestation. Because of its high reproduction rate, *P. persimilis* usually exhausts its food supply and eventually dies out, therefore repeated introductions are recommended until all sites with spider mite infestations have *P. persimilis* present.

General Introduction Rates:

•0.5 *P. persimilis*/sq. ft or 20 *P. persimilis*/infested leaf, weekly, as needed. Apply predators to each infested plant.

Specific Crop Programs:

•Greenhouse cucumbers — 0.6 *P. persimilis*/ sq. ft, or 100 *P. persimilis*/infested plant, weekly or as needed. For larger areas use 24,000/acre (60,000/hectare).
•Greenhouse tomatoes — Apply at a ratio of 1 predator to 10-20 spider mites. The glandular hairs on tomato leaves are toxic to *P. persimilis* so females will lay fewer eggs than on other crops. For best results, use the predators shipped on bean leaves, as these are easier to apply to tomato leaves than vermiculite. When its food becomes scarce, *P. persimilis* disperses throughout the crop. The predator moves better within a crop when the leaves of adjacent plants are touching. It tends to move upward on plants, so it can be applied to the trunks of large plants in interior plantscapes.

When predators are found on each infested leaf, it usually means that the biological control

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program will be successful. It may take another 2-6 weeks for new plant growth to show improvement, depending on growth rates.

FOR BEST RESULTS:

If spider mite numbers are high (there is visible webbing and clusters of mites stringing down from leaves), use a compatible pesticide, such as fenbutatin oxide or insecticidal soap, to reduce pest numbers before releasing predators.

P. persimilis needs a relative humidity greater than 60% to survive, particularly in the egg stage. In low humidity conditions, raise the humidity by lightly misting plants or wetting walkways. Where humidity above 60% RH can be maintained, the predator *Feltiella acarisuga* can also be used with *P. persimilis*. Where humidity is below 60% RH, the predatory beetle *Stethorus punctillum* can be used with *P. persimilis*. *Stethorus* feeds on all stages of spider mite and is effective at detecting individual mite

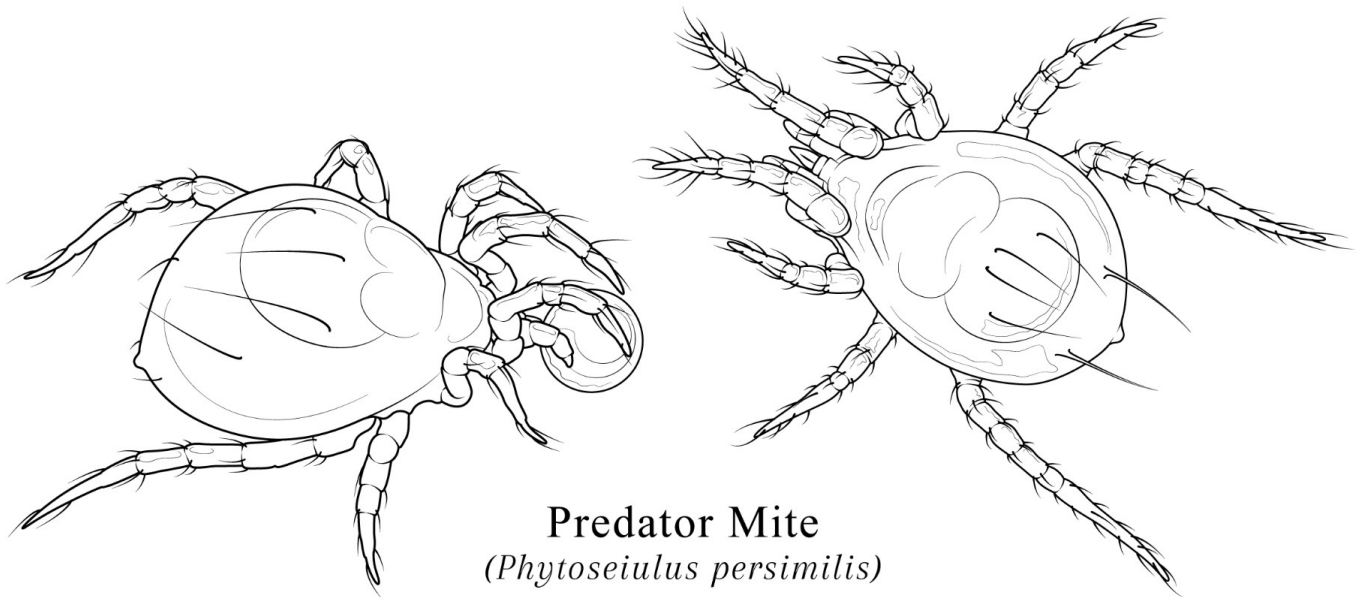
colonies (see *Stethorus*).

If average temperatures are often below or above the 68-81°F (20-27°C) range for optimum use of *P. persimilis*, introduce *Amblyseius fallacis* along with *P. persimilis* (see *Fallacis*).

USING CHEMICALS:

For effects of pesticides on *P. persimilis*, contact Sound Horticulture. The pesticide fenbutatin oxide can be used with *P. persimilis* for additional control of spider mites if hotspots develop. It does not harm *P. persimilis*, but avoid over spraying, which reduces the *P. persimilis* food supply and their ability to reproduce. Spreader-stickers, supreme oils and soaps are harmful to the *P. persimilis* contacted by the spray, but have little residual activity.

**Content Courtesy of
Applied Bio-nomics Ltd**



Predator Mite
(Phytoseiulus persimilis)

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