

Phytoseiulus-System

Red spider mite is a pest that spares few greenhouse crops. Especially in dry and warm weather, spider mite population may increase very rapidly. For several years the predatory mite *Phytoseiulus persimilis* is used to control red spider mites.

RED SPIDER MITE

The red spider mite or two spotted spider mite (*Tetranychus urticae*) is a feared pest on several crops all over the world. At first sight it is not easily distinguished from the carmine spider mite (*Tetranychus cinnabarinus*), that sometimes occurs on tomato, carnation or other ornamentals.

Spider mites are not insects, but arachnids. They have eight legs, except as a nymph. The colour varies from light to dark green, but it can sometimes also be brown or orange. They have two typical dark spots on the abdomen. The male is a little bit more mobile, smaller and more slender than the oval female. The female deposits round eggs of about 0.14 mm on the underside of the leaf. Out of the egg a larva with 6 legs hatches that immediately starts sucking plant sap. Subsequently the larva develops into a protonymph, followed by a deutonymph and adult stage. The development stages are separated by a quiescent stage, during which the mite settles immobile on the leaf with its legs drawn in. Once the mite has become adult, it takes another 0.5 to 3 days before the female lays eggs (pre-oviposition period). The total development time varies with temperature, humidity and host plant. In an experiment on rose leaf, development took 7 days at 30°C (86°F), 17 days at 20°C (68°F) and 36 days at 15°C (59°F).

In a population there are approximately three times more females than males. Generally male spider mites can be found in close association with quiescent female deutonymphs, waiting for the latter to complete their development. Unfertilized females only give birth to males. The female lays her eggs during 10 days (at 35°C or 95°F) to 40 days (at 15°C or 59°F). At 20°C (68°F) she lays about 40 eggs in total, but under optimal circumstances this can mount up to 100. Especially at dry and warm weather red spider mites can reproduce very rapidly.

Red spider mites suck plant sap for food. Plant cells turn yellow, which can be seen on the upper surface of the leaf as small yellow spots. This reduces the photosynthetic area of the leaf and creates physiological imbalance. Moreover, the webs made by spider mites reduce the aesthetic value of ornamentals.

In autumn, when the temperature and photoperiod drops, fertilized females enter diapause and turn orange-red. They hide in cracks in the greenhouse, but appear again early in the following season when circumstances improve.

PHYTOSEIULUS PERSIMILIS

The predatory mite *Phytoseiulus persimilis* probably originates from Chile, but has currently been spread by man, on purpose or accidentally, throughout most of the world.

A *Phytoseiulus* mite deposits its eggs in or close to a spider mite colony. They are distinguished from spider mite eggs by their oval shape, the light-orange colour and because they are twice as big. The nymph, who has six legs, does not eat. Similarly to spider mites, the larval stage is followed by the protonymph, deutonymph and the adult stage. Between the latter stages there is no quiescent stage. Once they have become adults, it takes about 2 days (at 20°C (68°F)) before the predatory mites start laying eggs. The development time under normal circumstances is shorter than for spider mites, and takes about 5 days at 30°C (86°F), 9 days at 20°C (68°F) and 25 days at 15°C (59°F).

Without fertilization the female cannot lay eggs. At 20°C (68°F) she deposits about 54 eggs during 22 days, but this can mount up to 75 eggs. So under normal circumstances a *Phytoseiulus* population grows faster than a spider mite population. At higher temperatures (above 30°C or 86°F) or at dry weather (humidity below 60 %) the spider mite is favoured and biological control is difficult. At low humidity the egg of the predatory mite shrivels.

The menu of *Phytoseiulus* consists almost exclusively of spider mites. Only in case of lack of food the predatory mite eats its relatives. An adult *Phytoseiulus* devours all stages of spider mites, while *Phytoseiulus* nymphs only feed on spider mite eggs, larvae or protonymphs. The daily consumption of an adult *Phytoseiulus* amounts to about 20 spider mite eggs or nymphs, 13 protonymphs or 5 adults.

Thanks to the fast development and the voracious appetite, predatory mites can completely wipe out a spider mite colony. Although *Phytoseiulus* nymphs still stay at the same spot, adults readily move to other hot spots. If the plants touch each other, the predatory mite can spread relatively easily in the crop.

APPLICATION

Phytoseiulus can be applied on several greenhouse vegetables and ornamentals such as sweet pepper, cucumber, melon, eggplant, strawberry, bean, gerbera, rose and several potted plants. On tomato Biobest advises the use of the specially developed Phytoseiulus-T-System.

For a successful biological control it is important to detect the pest presence on time and to act immediately. As a spider mite population grows faster in summer and it is then more difficult to keep pace with, it is advised to control them early in the season as soon as the first spider mites wake up from hibernation.

After detecting the first spider mite hot spots, *Phytoseiulus* is released as soon as possible. Depending on the crop and the circumstances, an overall introduction of 3 - 6 *Phytoseiulus*/m² is advised. On and around the infested plants ± 20 predatory mites/m² are released.

In order to be sure to obtain a biological balance early in the season, some growers prefer the Pre-Phytoseiulus-System. This consists of one tube of *Phytoseiulus* mites and two tubes of spider mites. On one plant two doses of spider mites are released on two different spots. In one of both introduction spots, one dose of *Phytoseiulus* is added. The predatory mites first exterminate the first spider mite colony and then go looking for other spider mite colonies. Thanks to this early balance spider mite hot spots are minimized.

In normal conditions *Phytoseiulus* is able to protect the crop from spider mites for the rest of the cropping season. However, when the weather is dry and warm, problems can arise. Experience has shown that in this case, the activity of *Phytoseiulus* can be optimized by increasing the ambient humidity by spraying water with high pressure and through a fine nozzle.

Together with *Phytoseiulus*, the gall midge *Feltiella acarisuga* can also control spider mites. A final option is chemical corrections with selective acaricides such as fenbutatin-oxide (Torque), hexythiazox (César, Nissorun, etc.) or clofentezin (Apollo).

PHYTOSEIULUS-SYSTEM

Phytoseiulus persimilis is packed per 1000 or 2000 predatory mites (nymphs + adults) in vermiculite in a tube. Before sprinkling the tube is gently rotated. The material is distributed on the lower leaf of the plant.

Phytoseiulus-System can be stored briefly at 6 - 8°C (43 - 46). Store the tubes horizontally.

ADVANTAGES

- **Applicable in several crops;**
- **Eats all spider mite stages;**
- **Fast development;**
- **Spreads well in the crop;**
- **Long-lasting protection;**
- **Easy to handle.**