Persimilis
Predatory mite

Biocontrol organism

- *Phytoseiulus persimilis*

This mite has been produced commercially for over 20 years in Australia. It feeds voraciously on all stages of twospotted mite, and this has led to its use in a wide range of crops.

Persimilis thrives in warm, humid and semi-shaded conditions.

The adult is orange, whereas the younger stages are clear. Both forms are pear-shaped and fast-moving. Its eggs are oval, tinged with orange, and twice the size of spider mite eggs.

Target pests

- Twospotted mite *Tetranychus urticae*
- Bean red spider mite *Tetranychus ludeni*

Pests controlled by persimilis include twospotted mite, the major target pest, and the less important bean red spider mite. Both belong to a group of eight-legged, plant-feeding mites called spider mites. Twospotted mite is a major pest of many crops in a range of climates.

The twospotted mite is usually pale green with two dark patches on its back. In cold weather, however, they may turn red. The adults are about 0.5 mm in length and are best viewed with a hand lens. Their eggs are round and pearly white.

Twospotted mites prefer the underside of leaves. They suck out the leaf cells, causing minute yellowish feeding marks which may join together, causing the leaves to shrivel and die.

This pest is difficult to control by chemical means because of its short life cycle and resistance to chemicals. It is also difficult to obtain good spray coverage on many crops.

Adult persimilis feeds on twospotted mite eggs, young and adults. Even though persimilis is only slightly larger than the mites on which it feeds, an adult can destroy twenty young or seven twospotted mite adults per day. At a temperature of 25°C, the predatory mite multiplies twice as rapidly as its prey.

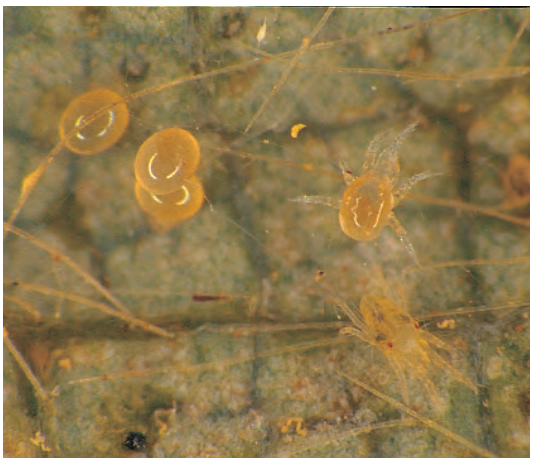

Plate 29: Persimilis mite eggs and young persimilis mite (*top*); and young twospotted mite (*bottom*)

Suitable crops/environments

Persimilis does well in humid areas and in crops with heavy foliage. It is used successfully in many crops, including strawberries, raspberries, eggplants, tomatoes, capsicums, greenhouse vegetables, cut flowers, ornamentals, hops, blackcurrants, papaws, pome fruit, stone fruit and grapes (in humid environments), and field crops such as corn and soybeans.

Before release

Chemical residues toxic to the predatory mite must have had time to degrade before the predator is released. The synthetic pyrethroids and some organophosphates may need up to 8 weeks to break down in protected environments.

There is a range of less hazardous chemicals which are preferred if spraying is necessary. For detailed information relating to the toxicity of chemical residues, contact the predator suppliers.

Inspect crops regularly for the presence of mites, especially on the windward side, in dry spots and at edges. Introduce predators while twospotted mite infestation is still in its early stages. For instance in strawberries, introduce predators when four out of thirty full leaves inspected have mites present.

If a 'hot spot' is detected early and treated quickly, the predators will move from that spot and follow the mites as they spread. Check the surrounding vegetation for sources of spider mite and treat these areas also.

In crops that invariably have problems with spider mite, such as strawberries, 'hot spots' can

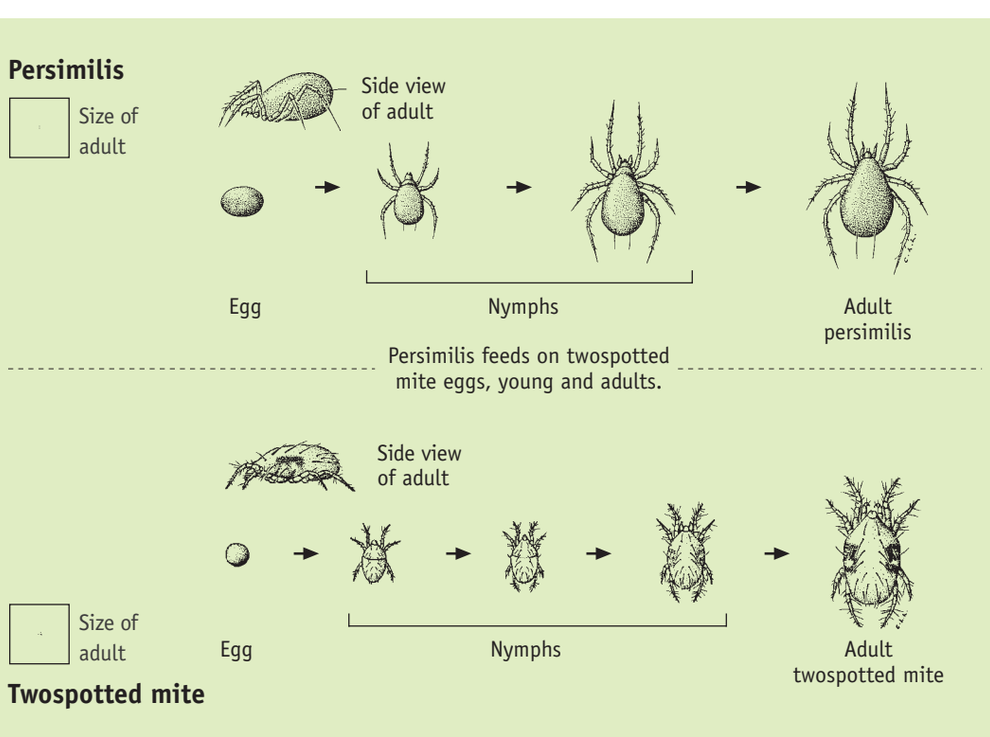

Figure 7: Life cycles of the predatory persimilis mite and of twospotted mite

be artificially created and used to rear predators in the field. Place bean leaves with persimilis and twospotted mite into designated sites within the young crop. Initially the spider mite may get a little ahead of the predator, but this will provide a good food source on which the predator can multiply and then disperse through the crop. Details about the best timing and method of release for various crops are available from suppliers.

In mite-susceptible crops such as roses and ornamentals, in protected environments, regular introductions have proved the most effective. The crop is regularly monitored and hot spots noted or tagged so that, when the regular order arrives, these spots can be treated before things get out of hand.

If overhead irrigation is required, it should be applied before introducing predators rather than shortly after. Likewise, if it is raining or rain seems imminent, delay release until the plants are dry. Predators can be stored at 7–10°C for up to 7 days.

At release

Persimilis is dispatched on bean leaves in packs of 10 000. These include persimilis adults, nymphs and eggs, plus small numbers of twospotted mites as food for the persimilis. Each pack contains over 300 individual leaves. Place these leaves into the foliage of the infested plants.

Recommended release rates

Field crops: One pack of 10 000 per 1000–2000 m².

Strawberries: One pack of 10 000 per 3000–5000 plants.

Ornamentals and cut flowers: One pack of 10 000 per 200–500 m².

Plate 30: Persimilis mites are supplied on bean leaves, which are placed among foliage.

Regular releases into ornamentals: One pack of 10 000 per 1000–1500 m² per month.

Calculate how many bean leaves carrying persimilis are available for the crop area, and ditribute the leaves evenly through the infested areas. It is important to place extra bean leaves in heavily infested areas (the 'hot spots'). Gently separate the bean leaves carrying persimilis and tuck them into the foliage at the level of the twospotted mite infestation, and where they will be protected from direct sun. If you have any extra leaves, go back over the areas with higher pest numbers.

Often it is not necessary to treat an entire crop with persimilis. If you can locate the source of the infestation (e.g. the windward side bordering another crop), it may be sufficient to treat those areas only.

After release

Persimilis will be difficult to find for a week or so after introduction; they disperse quickly in search of food. Mark a few places where predatory mites were released, especially where you know there are good numbers of spider mites. These sites can

be regularly checked to assess spider mite numbers as well as establishment of predatory mites. Expect spider mite numbers to keep increasing at first after the predator is released.

Predatory mites will soon appear among twospotted mite colonies and should be easily found after 4 weeks. Twospotted mite numbers will then level off, and after about 8 weeks will fall to a low level.

Persimilis mites tend to feed and multiply in an area until spider mites are close to being eliminated, before they disperse in search of more spider mite colonies. They will move into the surrounding vegetation if it contains spider mites. This helps form a barrier against future infestations.

Reinfestations by spider mites can occur, especially in greenhouse crops. Predatory mites may still be present in small numbers and may increase to quell the outbreak, often unnoticed by the grower. Regular checks should be maintained to assess the presence or absence of both spider mites and predators. A decision can then be made whether to apply a miticide, introduce more predatory mites, or leave things as they stand.

Many cut-flower growers and nurseries have adopted the 'regular release' or 'dribble' method of introducing predators. This ensures that there are always predators present to move into any new mite infestations.

Cultural practices to aid persimilis establishment

Persimilis thrives in warm to hot, humid conditions, whereas twospotted mite does best in very hot, dry conditions. Plants close together or with dense foliage will automatically provide the microclimate favourable to the predator.

Plants or varieties with a more open habit, or plants exposed to wind, are less favoured by predators. Such areas should be checked regularly for mites, especially during hot, dry conditions. Some overhead watering will improve the environment for predators during dry periods.

Chemical use

Care should be taken with the use of chemicals. All insecticides should be avoided until 2 weeks after predator release. Fungicides (except Benlate, Morestan and Afugan) are generally of low toxicity to persimilis. Carbaryl is a relatively safe chemical insecticide to use with persimilis but is very toxic to most other beneficial insects. See the chemical toxicity table for more details.

Plate 31: Predatory persimilis mite feeding on twospotted mite

Plate 32: Twospotted mite damage on roses (*left*); and severe twospotted mite damage on French beans (*right*)

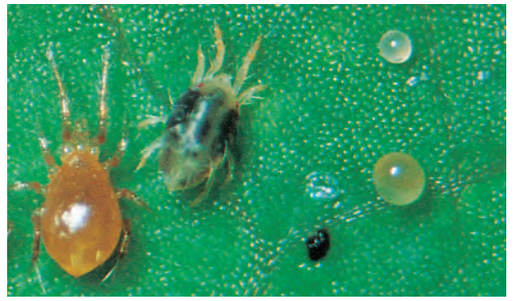

Plate 33: Persimilis adult (*left*); twospotted mite (*centre*); twospotted mite egg (*top right*); and persimilis egg (*lower right*)

Persimilis is usually found under the lower leaves where the twospotted mites gather, so if sprays of low to moderate toxicity are applied to the upper foliage, predators may not be greatly affected.

If, despite the release of predators, twospotted mite increases to damaging proportions, a compatible miticide can be applied to reduce mite numbers; this will allow the predators to catch up and eliminate the remaining mites. Spot spraying is preferable to blanket spraying. Fenbutatin oxide (Torque), hexythiazox (Cabre), abamectin (Vertimec) and propargite (Omite) are the safest miticides to use with persimilis.

Additional information

Persimilis is not suitable for controlling mites in tree crops in dry climates. The predatory mite typhlodromus is suitable for such conditions (see page 41).

Other natural enemies of twospotted mite

Black ladybird *Stethorus fenestralis*
Ladybirds *Coccinella repanda*, *Harmonia conformis*
Hoverfly larvae *Syrphus* spp.
Native predatory mites *Amblyseius* spp.
Predatory mite *Typhlodromus occidentalis*
Predatory thrips *Scolothrips sexmaculatus*