

MANAGING THE MITE

By Stuart McMillan

Most gardeners and many farmers have probably run into problems with plant-feeding mites at some point in time, and some face them as a recurring problem. Others may have just scratched their heads and wondered why the plant that was formerly healthy is now so sickly and not even known the cause of the problem.

There is a huge variety of mites, most of which cause no problem to crops. Many are predatory and

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are quite helpful, but a few types of mites regularly cause damage to susceptible plants. One of the worst culprits is the two-spotted spider mite; it can feed on many different vegetables (cucumbers, peppers, tomatoes, beans), fruits (strawberries, pears, raspberries) and flowers. Its been reported on over 180 plants so chances are if you grow something, the spider mite probably feeds on it. Their numbers can grow quickly, especially in warm weather when they can go from egg to adult in under a week.

The most obvious sign of a problem is the telltale webbing, similar to a spiders' web, covering new shoots. When populations of

spider mites get out of hand, the entire plant can be covered in fine webs. It is far more effective to control pest mites before they ever reach that level of infestation.

Early identification of mite damage can be done through the appearance of the leaves. Mites suck plant juices and cause white spotting on the surface of the leaf. If damage similar to this is also accompanied by black spots beneath the leaves, the cause may well be thrips and not mites. As the problem grows, the leaves start to lose colour and drop off. Sharply striking a branch over a sheet of

white paper can help make mites more visible. To the naked eye, mites appear like moving specks the size of a grain of salt. Predatory mites may be slightly larger than plant-feeding mites and move much quicker. Under magnification, you can see that predatory mites have mouths that extend forward to pierce prey. The mouths of pest mites point downward to feed on plants.

Since early control is so important, detection of problems before they reach epidemic proportions is vital. If you are growing a crop that is prone to

Beneficial organisms that prey on mites

Amblyseius are predatory mites which are active from 8°C to 35°C. They are not cannibalistic, eat a wide variety of mites and can also survive on pollen. *Amblyseius* can go without food for prolonged periods. For these reasons, they can be introduced as preventative action before spider mites are detected.

Phytoseiulus mites prey only on mites. They require a relative humidity greater than 65% and temperatures above 20°C to be effective. If they have those environmental conditions, along with pest mites to feed on, their numbers can grow rapidly and offer control for the rest of the season.

Feltiella acarisuga (gall midge) larvae feed only on mites and eat mite eggs, nymphs and adults. They are effective at a wide range of temperatures and humidity, and go through their life cycle more quickly at higher temperatures. *Feltiella* eats five times as many spider mites per day than *Phytoseiulus*. The adults of *Feltiella* are able to fly and detect spider mite colonies; this gives them an advantage over mites that can only walk. *Feltiella* can be safely combined with predatory mites, as they do not seem to prey on the predatory mites.

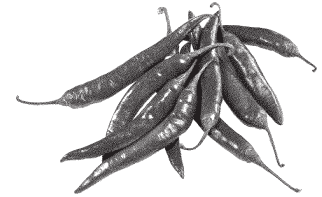
Minute pirate bugs have been recorded eating thirty mites a day, but will find other food if mites aren't around. Both juveniles and adults are active searchers for mite colonies.

Spraying for mites

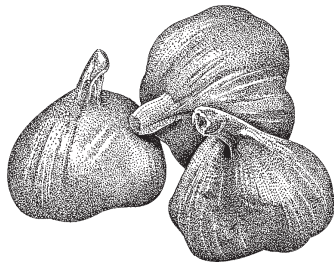
Since nearly all of these sprays work by contact, it is important to coat the underside of the leaves as well as the top. A finer mist gives better coverage and more effective control. A good sprayer that either works upside down or has a spray nozzle attached to a flexible hose gets the job done right. When using new products, it is best to test on a small area as some products may damage weakened plants. One should be cautious about spraying once fruit set has occurred as the spray may affect the taste or smell of the crop.

Insecticidal soap: Insecticidal soap is slightly different from common dish soap, as it does not have nearly as many added fragrances or other chemicals. It can control mites and other small soft-bodied pests such as aphids, scales and thrips. In general, it does not affect beneficial insects.

Cayenne: A blend of one hot Chile pepper or a teaspoon of cayenne powder in a cup of water can be used to control mites and many other pests, particularly small insects.



Hot pepper wax: This is a commercial product made by blending cayenne extract and food-grade wax. Because of the wax, the product stays on the plant for two weeks or more. The wax and the cayenne have a combined effect on the mites; the wax smothers them and the cayenne prevents them from eating. This does not have any impact on eggs though so repeat applications are needed.



Garlic: Add two mashed cloves to one litre of water, let stand over night, strain and spray plants without dilution. Or, mix 25 ml of garlic oil with 4 ml of alcohol and 4 L of water. Some growers have found garlic solutions to be highly effective while others have not.

Horticultural oil: Horticultural oils are usually refined petroleum oils, such as mineral oil, which may include an emulsifier to allow the oil to mix with water. Dormant oil refers to a horticultural oil that is applied when a plant is dormant, such as a fruit tree in the winter. Used at rates of 1–2%, horticultural oil can be used safely during the growing season.

In the spring and fall, rates of 3–4% are more effective for killing eggs and dormant adults. It kills small insects that crawl on the leaf surfaces but does not have a strong effect on larger or flying insects. It does kill predatory mites, so do not release them before applying horticultural oil.

Neem: Neem is an insecticide derived from a tropical tree that is being used in various parts of the world. It works as a stomach poison in some insects. Neem has been used by some growers to control mites, but it is uncertain if neem kills mites or just slows their development.

Essential oils: A variety of essential oils have been suggested for mite control, including dust mites in the home, varroa mites in bee hives, and plant-feeding mites. For example, cinnamon oil works on many small insects and has an effect that is visible within hours, whereas other methods take a long time (during which mite damage continues). Cinnamon oil spray also controls mite eggs and certain foliar diseases like powdery mildew. An added advantage is that, when used regularly, the whole greenhouse smells like apple pie. However, this could be a downside to its use in crops where their odour is important. Essential oils are diluted at rates ranging from 0.5% up to 10% depending on the oil, the plant and the pest.

N.B. – The Pest Management Regulatory Agency approves pesticides for use in Canada. Many of the products listed above are not approved and therefore prohibited as pest management products under the National Standard of Canada.

infection, a good scouting plan is important. For example, scouting for spider mites in strawberries may involve walking in a diagonal line across the plantings and collecting one mature leaf from every second row. If after gathering sixty leaves and more than 25% have at least five mites present, control may be warranted. Other sources have suggested that control might not be needed if one predatory mite is found for every ten pest mites. Different crops and regions may have different control thresholds, but establishing a scouting plan suitable for your own operation is essential if you have had problems with mites.

Keeping plants well watered can minimize mite problems.

Mites first appear on stressed plants because these plants are more nutritious for mites and their plant defences are weakened. Reducing plant stress should be the first control method but that is easier said than done. Water stress is frequently associated with mite infestation, so keeping plants well watered can minimize mite problems.

Dustiness causes other mite control challenges leading some growers to water roads and try to reduce traffic speed next to fields. When dust collects on the webs, mites are protected from control sprays and the dust discourages predators.

Plants that are not exposed to predator populations are more at risk of developing a mite problem;

this is why greenhouse plants are so susceptible to mites. Predators of mites may be vulnerable to chemical controls intended for other pests. Frequently, outbreaks of pest mites are a response to other pest controls used, including some organically approved substances, such as rotenone, which is known to kill many beneficial insects.

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Re-establishing the populations of mite predators can be a highly effective control technique. These predators come in many shapes and sizes. A few types of predatory mites are available for purchase but different mites are suitable for different environmental conditions and infestation levels, so knowledge is essential. Mixes of different mite species each with their own niche are also available.

Maintaining high humidity is important for the success of biocontrol insects, but water has other uses in controlling mites. A blast of strong water to the foliage is enough to knock loose most mites and their webs. If the fall doesn't hurt them, it makes them more prone to being eaten by a predator on the ground or just makes them have to climb all the way back into the foliage. Removing the webbing also interferes with egg laying. Some growers have found using water alone can prevent the problem from getting out of hand.

Once the problem has been noticed, stripping the most

infected leaves can help reduce the mites from spreading. It is important to not compost the leaves since mites are hardy and can migrate to part of the compost where temperatures are lower, and later reinfect new plants. It is better to put the leaves in a plastic bag, tie it tightly, and throw the bag away. A small sacrifice to your garden's fertility can be a boon to your pest management.

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While mites can be problematic pests, the combination of management, biological and botanical controls can keep them in check. The best strategy is to minimize the problem before it grows too severe. That seems to be a strategy suited throughout the garden and beyond—the challenge is to achieve it.

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Information: <http://highplainsipm.org/HpIPMSearch/Docs/BiologicalOrganismSuppliers.htm>

Stuart McMillan, a contributing editor to TCOG, works as an organic inspector in the Eastern prairies. He is available for comments and questions at organicinsp@gmail.com.