

GROWERTALKS

Pest Management

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Using Predatory Mites to Manage Pests

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With growers facing ongoing challenges to manage greenhouse pests, such as insecticide or miticide resistance, a number are turning to biological controls to help them.

Species of predatory mite, including *Neoseiulus cucumeris*, *Amblyseius degenerans*, *Amblyseius swirskii* and *Stratiolaelaps scimitus*, are sold under different trade names. (Remember that these mites are predators and don't damage plant foliage like spider mites.)

Different species of predatory mites consume different pests and sometimes only specific stages of the pest, so it's important to select the right mite for the job. Different predatory mites also differ in their adaptation to different environmental conditions, so their performance may vary between different crops and seasons.

Predator mites are generally supplied in ready-to-release specialized vessels that include sprinkle containers, slow-release sachets and even touch pen applicators for individual plant use (such as in interiorscapes). The carriers used with the predatory mites may contain flour mites that serve as food on which the predators can feed while in transit and shortly after being applied to the crop. Like the predators, the flour mites won't damage plants.

Predator mites have relatively long legs and are well-adapted to searching plants for prey. If there are sufficient pests to eat, the predator mites may start to lay spherical white eggs on the crop. These eggs will hatch after a few days, leading to a second generation of predators that will continue to consume the pests until they're gone. When there's nothing to eat, the predators will die. Hence, you should release predator mites when you can maximize their impact and minimize costs. We will illustrate this approach to you with our work with a cooperating grower who had problems of spider mite on dieffenbachia.

When working with living predator mites, the length of time predators can survive without prey varies among the species. Some, like *Phytoseiulus persimilis* are voracious predators, but quickly expire when starved, while others, such as *Neoseiulus* (= *Amblyseius*) *californicus*, eat more slowly but can survive for longer with little food. Thus, the former is a good choice against an existing spider mite infestation, while the latter may be more useful in helping to keep a crop free of pest mites.

Since growers work hard to have very few pests in their greenhouses, the predators often won't have much to

eat. However, predators may be sustained on a pollen diet. Indeed, some pest management specialists recommend adding pollen as a supplemental (non-pest) food source to sustain the predators while they search for pests. Pollen is a cheap and versatile food source for many natural enemies.

We'll illustrate this approach in our report to manage Western flower thrips with predator mites that we conducted with support of a potted chrysanthemum grower.

Research example #1: Controlling spider mites on dieffenbachia

A greenhouse study was conducted with a cooperating grower in Texas to evaluate the predatory mite *Phytoseiulus persimilis* against a natural infestation of two-spotted spider mites on dieffenbachia. We compared control achieved with predatory mite releases to the standard spray practices of the grower over a 10-week period in the spring.

Materials and methods

Dieffenbachia Camille were arranged on 30 benches (each 50 ft. with approximately 300 pots). Plants were divided into three size classes (based on height and width), i.e.; 51, 72 and 113 cubic inches for small, medium and large plants at the start of the study. At the end of the study (Week 10), plants were 74, 106 and 142 cubic inches, respectively.

On half of the benches, we released predators (8,000 per week). Mites in vermiculite carrier were sprinkled on every tenth plant at the rate of 20 predators per 10 plants. Predator mites were supplied by an insectary in sprinkle vials containing 2,000 predators.

The grower followed standard spray practices to control spider mites on the other half of the benches (weekly miticide rotations, abamectin [Avid] + Mavrik [tau-fluvalinate]), bifenazate (Floramite), neem oil (Triak 70) and acephate (Orthene). To evaluate the effectiveness of the program, the number of spider mites was counted on five leaves from 10 plants (i.e.; 50 leaves per bench) weekly throughout the study.

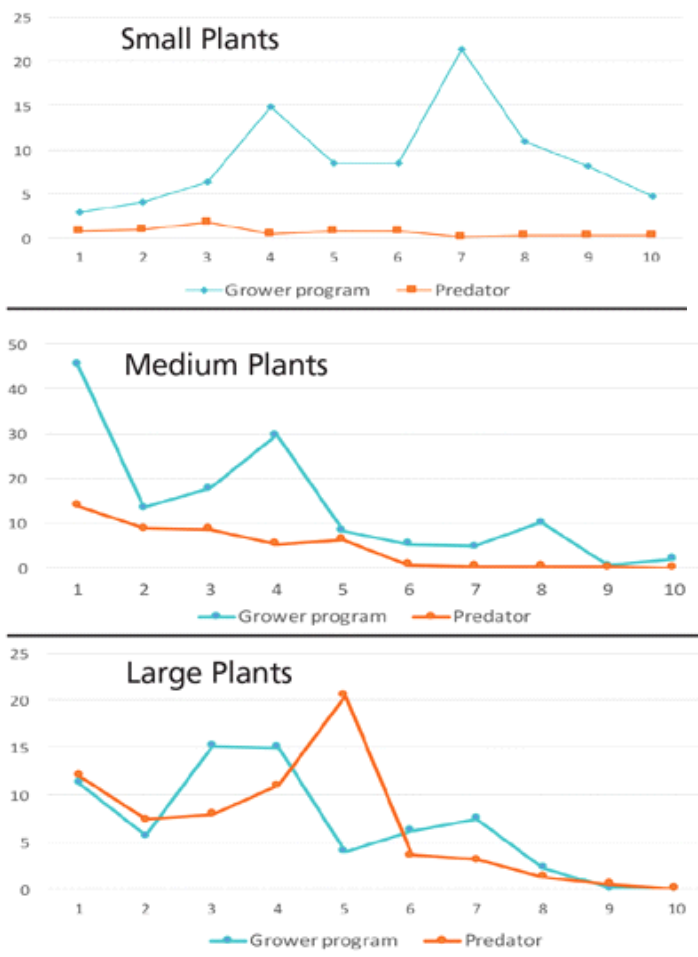
Results

In our study, the predators successfully controlled spider mites over 10 weeks and were at least as effective as the grower program. Predators were most effective on smaller plants (maintaining < 1 spider mite per plant), but became somewhat less effective on larger plants. A decreased effectiveness on larger plants may reflect less efficient searching with the larger surface area.

Spray coverage for miticides on foliage similarly declines with larger and more densely spaced plants. Based on our study, we estimated comparable costs between using the predator mites and the spray program used by the grower, i.e.; \$425 for the mites (40 vials of 2,000 mites) versus \$513 for nine sprays (\$288 materials, plus \$255 for application). Additional labor for the grower to apply the predators would need to be factored in, but applying the mites is faster than preparing, spraying and clean up associated with each insecticide application.

Figure 1. Spider mite control on dieffenbachia with the predatory mite P. persimilis. Bar graphs show the average number of spider mites (five sampled leaves) weekly from 9,000 plants that were either

treated with predators or sprayed according to the grower program. Costs of both programs were similar.



Research example #2: Controlling thrips with predatory mites and pollen

We conducted a trial with a cooperating grower to evaluate another predatory mite (*Neoseiulus cucumeris*) to manage Western flower thrips on chrysanthemums. We also evaluated whether the addition of supplemental pollen as alternative food for the predators improved the effectiveness of the predatory mite.

Materials and methods

Three-week old chrysanthemum plants (Pomona, Charm, Miramar cultivars in 6-in. pots) were arranged on 16 benches, each containing 24 plants. All plants were pre-infested one-week prior to the study by applying equal numbers of Western flower thrips (six per plant).

Benches were randomly assigned to four treatments: predators, pollen, both predators and pollen, or neither. To apply these treatments, half of the plants (eight benches) received 5 ml. of the predatory mite mixture (roughly 50 mites/plant) once at the start of the trial. Half of these predator-plants (four benches) were dusted weekly with apple pollen (Antles Pollen Supplies Inc., Wenatchee, Washington) applied with puffer at a rate of 2.6 oz./1,000 sq. ft.

As controls, we also dusted plants (four benches) not receiving mites, while additional plants (four benches) receive neither mites nor pollen. We monitored our experiment weekly over five weeks by brushing three plants per block over a white board and counting the numbers of dislodged thrips and predator mites. To prevent mites from dispersing, all plants were isolated in 5-gal. buckets ventilated with thrips-proof mesh.

Results

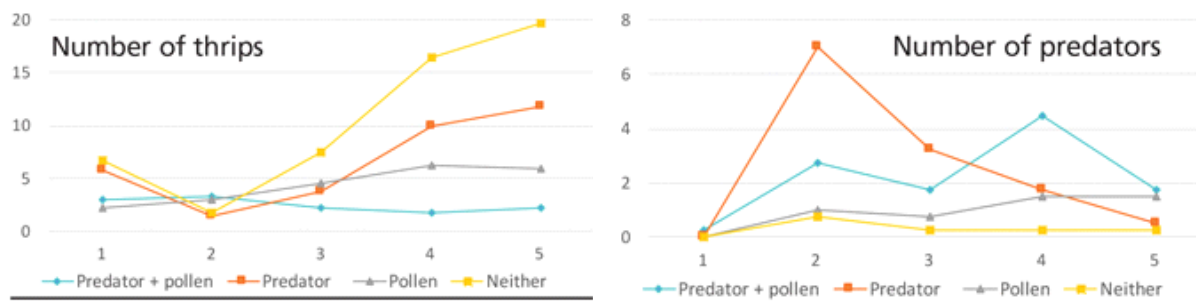
By week 3, the number of thrips were always reduced on plants that received predators. However, fewest thrips were recovered on plants that also received pollen.

For example, by week 5, thrips numbers were reduced by 87% in plants where both predators and pollen were applied, compared with only 41% in plants with just predators applied, suggesting that supplemental pollen enhanced thrips control with predatory mites. Plants receiving both predators and pollen also maintained higher numbers of predators at weeks 4 and 5, compared with predator-only plants, suggesting that the pollen enhanced their survival over several weeks.

Thrips also were reduced in plants receiving pollen only, possibly a result of some predator mites being inadvertently moved or dispersing from the mite-treated plants. This assumption is supported by mite numbers recovered on pollen-treated plants shown in Figure 2.

Based on our study, we estimate costs of releasing *N. cucumeris* mite at \$0.06 per pot, plus \$0.22 per pot for additional pollen. One worker can apply mites by hand to 300 pots per hour and pollen to 1,600 pots per hour.

Figure 2. Thrips control on chrysanthemum with the predatory mites N. cucumeris. Bar graphs show the average number of thrips and predator mites collected from three plants/block over five weeks. Plants were either treated with predators, predators plus pollen, pollen or neither.



Conclusions

Our examples demonstrate that predator mites can be as effective as miticide sprays, provided they're used correctly. Advantages of using the mites include no need for protective clothing, the lack of spray residue and worker entry limitations, and resistance management for chemical miticides. Several companies sell predator mites for different pests. Pollen, which may enhance control in some crops, can also be obtained from multiple sources.

Our research suggests that growers should adopt biological control early and when plants are still small, rather than run the risk of pest populations building up, rendering biological control less effective. **GT**

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