

The Latest Miticides



Carmine spider mite. (Photo courtesy of Oliver Siapno)

Recent trials measure efficacy for some of the latest miticides.

By Jim Bethke,
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I wonder how many times an author has written a sentence of his own volition, while continuing to read about the issue and comes across the exact same words written by someone else long ago. That just happened to me, and it goes to show you how often spider mites have been written about and how often the same words are used to help describe them. Therefore, I will dispense with any lengthy mite biology and description.

I've read some pretty bizarre things on the Internet. Did you know that man has evolved from worms or giant dinosaur fleas? In spite of the sheer entertainment the Internet can provide, it is a good source of information for the major mite pests of ornamentals, especially from sources located at the major universities.

However, here, I would like to avoid the readily available information about mites and concentrate on the efficacy and use of the newer products that have made their way to the market in the last few years as well as a few that are still in development.

Let me begin by briefly introducing the problem. Mites are often listed in the top five most serious arthropod pests of ornamental production probably because there are many phytophagous mites and because there is a pest mite for just about every part of the plant, be it flower, bud, leaf, root or bulb. Three common spider mites among many found on ornamentals are the two-spotted spider mite, *Tetranychus urticae*; the Lewis mite, *Eotetranychus lewisi*; and the carmine spider mite, *Tetranychus cinnabarinus*.

Damage from spider mites is caused by piercing mouthparts that suck the juices from individual cells, and although they are typically found on the undersides of leaves, they can cause irreversible spotting and stippling of the upper surface when populations are high, resembling the stippling caused by thrips. Other mites can cause stunting, chlorosis and deformation of plant parts. Sometimes the damage can be mistaken as damage caused by a plant pathogen.

SCOUTING

It is always a good thing to make sure you are treating for the correct pest. Many examples of treatment failure can be traced back to misidentification of the pest species. It is also important to know its life cycle, which will help determine when and with what to treat.

Scouting for mites is difficult to say the least. Most spider mites are visible to the naked eye, but just barely so. A hand lens should be used when randomly searching the greenhouse for mite infestations. However, most of the growers I'm familiar with use visual cues such as visible leaf damage to indicate an infestation and then flag areas that show damage followed by a spot treatment. Unfortunately, when damage of this nature is visible, the mite population is probably nearing very high levels and needs to be dealt with immediately. Waiting may be disastrous.

THE LATEST MITICIDES

Some of the more common and conventional miticides and a few still in development are listed and well described in Figure 1, right. I've not included every pesticide registered for use against mites in the table.

Herein, I have included the results from several trials we've conducted here at University of California, Riverside (UCR). I chose trials that present as much diversity as possible covering three plant types (chrysanthemums, roses and poinsettias), three pest mites (two-spotted spider mite, Lewis mite and broad mites), and as wide a range of miticides as I could.

TetraSan 5WDG (etoxazole) from Valent USA is federally registered in greenhouses only. It is not yet registered in California but should be approved some time next year. TetraSan is a mite growth regulator that inhibits the molting process through disruption of the cell membrane. Hence, it affects the immature stages of mites and not adults, and it may take a little longer to observe the effects on mite populations just like what you would expect from using a product like Hexygon. Hexygon as you can see from Figure 3, right, gradually took 28 days to eliminate the population.

Our trials indicate that TetraSan is very effective against Lewis mite on poinsettia (Figure 2, right) and citrus red mite on potted rough lemon. It also held broad mite populations in check on chrysanthemums (Figure 5, page 56). In this trial we made two applications of each of the miticides listed seven days apart. Unfortunately, none of the products completely eliminated the broad mites in that trial. As many of you are aware, broad mite is tough to control at times.

Ultiflora 1EC (milbemectin) from Gowan Company was submitted concurrently to California and EPA for both indoor and outdoor uses. Gowan is expecting registration any day now. Ultiflora is a naturally derived broad-spectrum miticide with activity on spider mites, eriophyids and tarsonemids. It is translaminar and acts on contact or by ingestion.

We used Ultiflora against two-spotted spider mites early on in its development. It performed excellently (Figure 3, right). It should not be used in rotation with Avid since it has similar chemistry. Avid is used as a standard in many of our trials.

Akari 5SC (fenproximate) is a contact miticide from SePRO with a unique chemistry, and it is presently registered for greenhouse use. A recent label expansion includes tarsonemids, both the broad and cyclamen mite, as well as eriophyids. The label will also include an expanded list of crops and mealybug suppression, which we've noted in some of our trials on roses here at UCR.

Against spider mites, we've noted that fenproximate works very well, and it will be an important product in rotation for that difficult-to-kill mite.



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A new name you may begin to hear is Shuttle 15SC (acequinocyl) from Arvesta Corporation (formerly Tomen Agro). Shuttle has a unique mode of action and should provide control of most of the important mite pests at all life stages. It is a mitochondrial electron transport inhibitor (METI) like Akari, but it has a different site of action compared to other electron transport inhibitors. At present there are no indications of cross-resistance, but time will tell. Federal registration of Shuttle is expected any time for greenhouse and outdoor ornamentals.

We've only completed one trial so far with Shuttle and have one in progress, and like Akari, it is very effective against spider mites. With its unique chemistry, it will also provide another option for rotation.

Forbid 4F (spiromesifen), is being developed as a miticide/insecticide by Bayer Crop Science. It is a new chemical class from the cyclic tectronic acids, which interferes with lipid biosynthesis. It has activity on mites and whiteflies and has been tested extensively on vegetables. Unfortunately, I can't yet give you an evaluation of how well Forbid performs, but we have a trial in progress against the two-spotted spider mite on roses that I will be reporting on later this year.

Floramite has been around for a while now, but relatively recently,

Crompton/Uniroyal Chemical reformulated the product from a wettable powder (WP) to a soluble concentrate (SC). The new SC formulation has a better wetting agent, and we've observed slightly better activity with it compared to the WP as can be seen in Figure 2, below, where they were used against Lewis mites on poinsettias.

MANAGING MITICIDES

Resistance to miticides is enhanced by a number of factors. Apparently, mites are more capable of developing resistance because they are haplodiploid, which means that they can express resistance in their genome more rapidly. They have a high rate of reproduction and a short generation time. In other words, they can become a reproductive adult in just days at warm greenhouse temperatures. Lastly, most mite populations in greenhouse production are under heavy selection pressure because pesticides are applied often. These factors demand that miticide selection be made in a prudent manner.

Figure 1. Common miticides for ornamental use.

Trade Name	Common Name	Mode of Action*	Company	REI	Mite Stage Effected	Registration Update
Avid 0.15EC	abamectin	6	Syngenta	12	eggs and immatures	Registered GH and outdoors
Akari 5SC	fenproximate	21	SePRO	12	immatures and adults	Registered for GH, outdoor is pending
Floramite SC	bifenazate	25	Crompton Uniroyal	12	all	Registered GH and outdoors
Forbid 4F	spiromesifen	23	Bayer Crop Science	--	immatures and adults	In development
Hexygon 5DF	hexythiazox	10A	Gowan Company	12	eggs and immatures	Registered GH and outdoors
Mesurool 75W **	methiocarb	1A	Gowan Company	24	all	Registered GH and outdoors
Ovation SC	clofentezine	10A	Scotts-Sierra	12	eggs and immatures	Registered GH and outdoors
Pylon	chlorfenapyr	13	Olympic Horticulture	12	immatures and adults	Registered GH
Sanmite 75WP	paridaben	21	Scotts-Sierra	12	immatures and adults	Registered GH and outdoors
Shuttle 15SC	acequinocyl	24	Arvesta	--	all	In development
M-Pede	49% potassium salts	***	Dow Agrosciences	12	immatures and adults	Registered GH and outdoors
TetraSan 5WDG	etoxazole	10B	Valent USA	12	eggs and immatures	Registered GH and outdoors
Ulitiflora 1EC	milbemectin	6	Gowan Company	--	eggs and immatures	Pending
Vendex 50WP-T/N/O **	fenbutatin-oxide	12B	Griffin LLC	48	all	Registered GH and outdoors

*The Insecticide Resistance Action Committee mode of action classification is used in making decisions about rotation of pesticides. Pesticide use and rotation within the same classification should be avoided.
**Restricted use pesticide
***None listed

Figure 2. Lewis Mite on Poinsettias. Means within groups of bars followed by the same

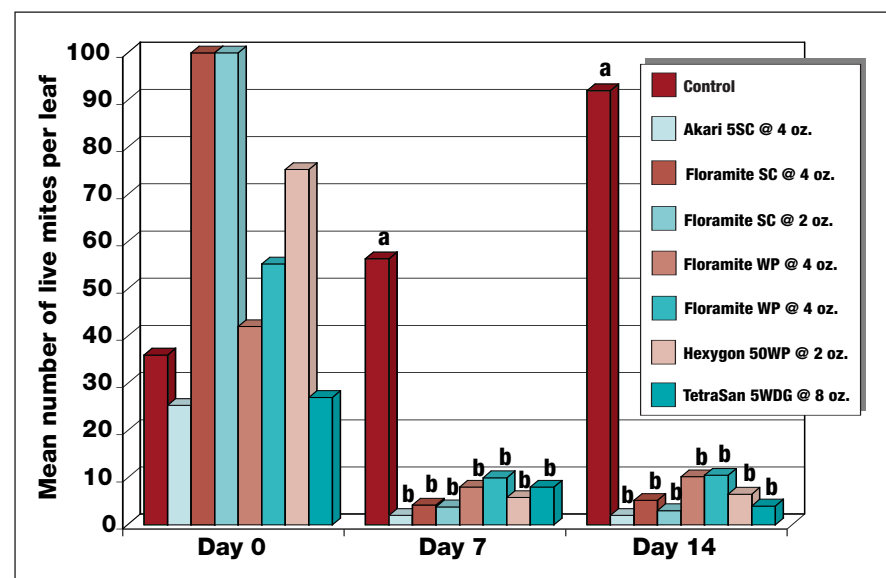
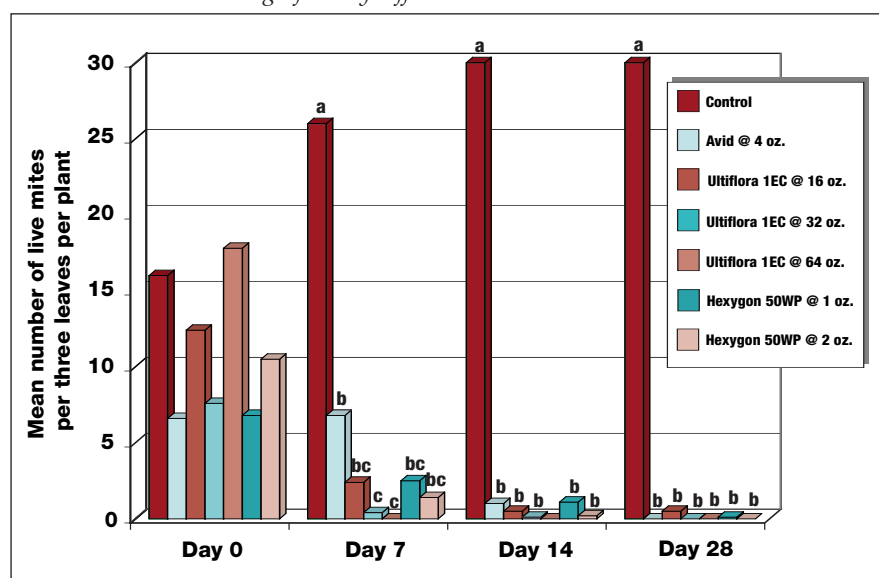
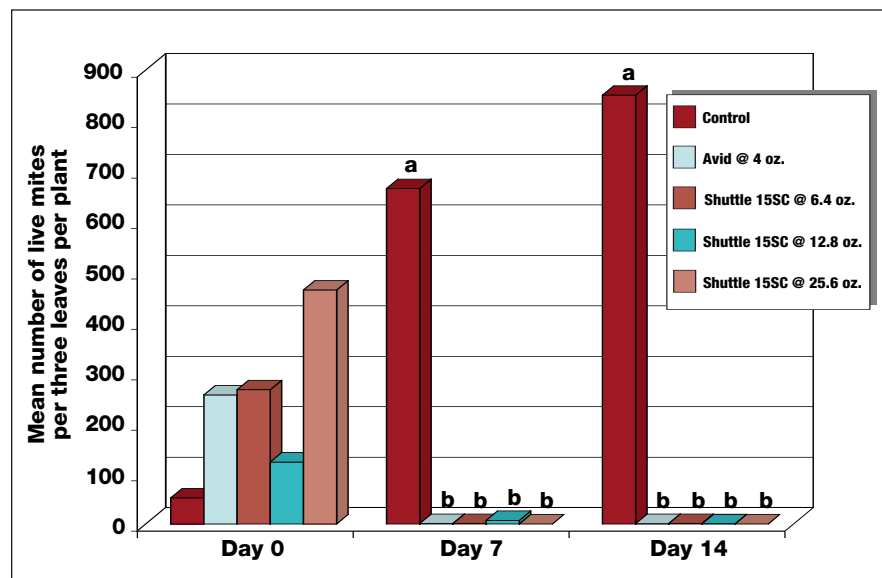


Figure 3. Two-spotted spider mite on mums. Means within groups of bars followed by the same letters are not significantly different.



pests & diseases

Figure 4. Two spotted spider mite on potted roses. Means within groups of bars followed by the same letters are not significantly different.



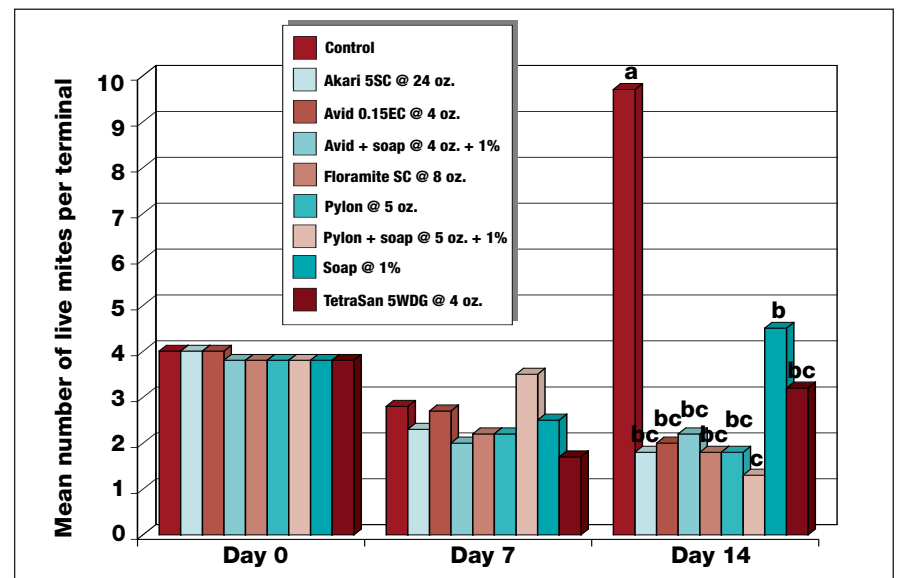
First, determine which developmental stage should be treated. If the population is small because it was noted early enough, it makes sense to use an ovicide/larvacide first. The adult population will be small at this point. Later, following up with a larvacide/adulticide should clean up the population. In a sense, the idea is to reduce the size of the next generation first as an egg or early nymph, and then any mites that have successfully developed afterward will be stopped by the later application.

If the population is heavy, or if the scouts missed a growing population, it may take the combined efficacy of both an ovicide and a product that can kill adults. For a heavy population, successive treatments alternating with ovicide/larvacide and larvacide/adulticide will be necessary probably in less than seven days.

Coverage is also an important issue. Is the miticide getting to the target organism? Avid, Pylon, TetraSan and Ultiflora have translaminar ability, but most of the others are going to need directional sprays usually toward the underside of the leaves to contact the pest mite. In addition, soap is a good product to use as a mite population knock down, so that a more conventional product can be used more effectively against a smaller population.

It bears repeating that the consistent use of one miticide or the repeated use

Figure 5. Broad mites on chrysanthemum. Means within groups of bars followed by the same letters are not significantly different.



of miticides in the same class will eventually produce a mite population that will be tolerant if not fully resistant to that miticide or entire class. If, as we recommend, miticides should be rotated every mite generation, then rotation to a new class should occur at nearly weekly intervals.

Also, most of these new compounds are marketed with a resistance management or IPM section on the label. Some of them like Hexygon can only be applied once a year. That kind of restriction on the label helps everyone, even if it seems too restrictive, because in the long run, following the label will ensure that all the miticides used in rotation will remain effective. [GPN]

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