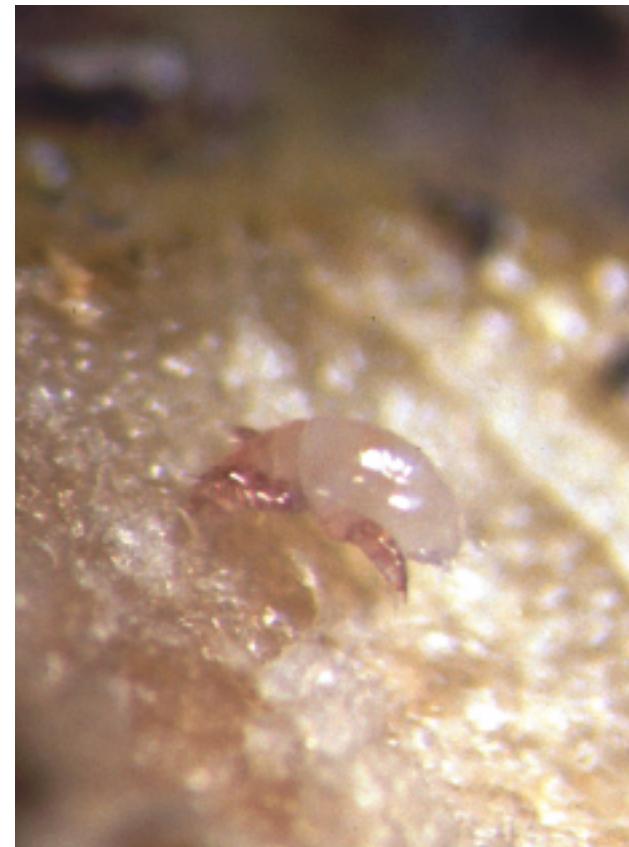


Managing Mites

With so many miticide choices, which product do you use and when do you use it?

By Daniel Gilrein



Top right: Bulb mite; Above: Bulb mite injury (tunneling) in stem of Easter lily. (Photos courtesy of Daniel Gilrein)

The greenhouse environment is not only nearly ideal for growing plants; it can produce outstanding pest infestations, as you surely have discovered. Mites seem to be one of the great levelers among growers, common to many greenhouse crops and production systems around the world. They are most notorious in long-term, protected growing situations such as greenhouse tomatoes, stock plants or cut flowers but are also often seen at home on bedding plants and even happily attack plugs, although they rarely have sufficient opportunity to do so.

About 10 years ago, the situation for greenhouse mite control was looking rather bleak, with just a few dwindling options available such as Pentac and Kelthane, several pyrethroids, Thiodan, diazinon and insecticidal soap. Some of these products have been phased out (Pentac and diazinon/Knox-Out, for example) and the future of others is in question.

Today, the situation is dramatically different. The good news is that more than 15 miticides are now available for greenhouse use, with no small credit due to the industry in Japan, where mites are apparently important pests. Most of the chemicals have different modes of action, and did I forget to mention that many are quite effective?

Several are even compatible, to a degree at least, with biological control programs, and entomologists are happy to be seeing a lot more interest from growers in that area. Most of these new miticides have relatively short re-entry intervals and good plant safety records.

If all this sounds too good to be true, it's because we're not quite finished. The first comment I usually hear from growers relates to sticker shock: no longer are we seeing \$8 per 100 gal. of dilute spray; \$20-80 for low

Figure 1. Some of the main mites on greenhouse crops. For information on various mites, go to <http://mrec.ifas.ufl.edu/lso/>.

Spider mites	
Two spotted spider mite	<i>Tetranychus urticae</i>
Carmine spider mite	<i>Tetranychus cinnabarinus</i>
Lewis spider mite	<i>Eotetranychus lewisi</i>
Acarid mites	
Bulb mite	<i>Rhizoglyphus robini</i> , <i>Rhizoglyphus echinops</i>
Tarsonemid mites	
Broad mite	<i>Polyphagotarsonemus latus</i>
Cyclamen mite	<i>Phytonemus pallidus</i>
Eriophyid mites	
Purple or ribbed tea mite	<i>Calacarus carinatus</i>
Fuchsia gall mite	<i>Aculops fuchsiae</i>
Gardenia bud mite	<i>Colomerus gardeniella</i>
Tomato russet mite	<i>Aculops lycopersici</i>



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Figure 2. Sample list of miticides for greenhouse production.

PRODUCT	MITE(S) CONTROLLED	REI*	NOTES
Apply early in infestation			
Hexygon (Gowan Company)	Spider mites	12	Do not rotate with Ovation. Apply only once per crop cycle or per year for crop cycles longer than one year.
Ovation (Scotts Company)	Spider mites	12	Do not rotate with Hexygon. Bright color may be noticeable on light flowers and foliage. Apply only once per crop cycle.
Sanmite (Scotts Company)	Spider, broad mites	12	Do not rotate with Akari. Helps control whitefly. Apply only once per season.
TetraSan (Valent USA)	Spider mites	12	Translaminar activity. Apply no more than twice per cropping cycle or per six months.
For quicker knock down			
Akari (SePRO)	Spider mites	12	EPA designated "reduced-risk." Do not rotate with Sanmite. Do not apply more than twice per crop or growing season, or in succession.
Pylon (Olympic)	Spider, tarsonemid, eriophyid mites	12	Translaminar activity. Not highly effective against Lewis mites. Note plant sensitivity precautions. Do not apply twice in succession to the same crop or three times during a growing cycle. See other resistance-management information on label.
Avid (Syngenta)	Spider, tarsonemid, eriophyid mites	12	Translaminar activity. Some ferns and shasta daisy are sensitive. Note resistance-management recommendations.
Floramite (Crompton/Uniroyal)	Spider mites	4	EPA designated "reduced-risk." Adjust water to below pH 7 and add conditioner if hardness levels are high. Do not make successive applications or more than two applications per crop per year.
Kelthane (Dow AgroSciences)	Spider, tarsonemid, eriophyid mites	48	Maximum two applications per crop or season. 50WSP formulation is currently registered.
Vendex T/N/O (Griffin LLC)	Spider mites	48	Restricted-use. Test first before large-scale use. <i>Do not</i> mix with oil or apply to poinsettias or chrysanthemums in bloom. Temperatures should be over 70° F for best results.
Thiodan, Thionex (FMC, Makhteshim)	Cyclamen, tomato russet mites	24	Restricted use. Both EC and WP formulations available; use WP on sensitive crops.
Pyrethroids	Spider mites	12-24	Includes Tame, Talstar GH, Mavrik, Scimitar. Broad mite also on Scimitar and Talstar labels. Some products may be restricted-use. See labels for other restrictions.
Short-residual activity			
Insecticidal soap; M-Pede (Dow AgroSciences)	Spider mites	12	Test before large-scale use. Note plant sensitivity precautions.
Ultra-Fine Oil	Spider mites	4	See list of labeled crops. Note label cautions on frequency and environmental conditions during application. Test before large-scale use.
Triact 70 (Olympic)	"Mites"	4	Test before large-scale use. Note plant safety cautions.
Hexacide (EcolPM)	"Mites"	1	"Minimum-risk" product (no EPA registration required). Test before large-scale use. "Meets requirements for National Organic Program."
GC-Mite (JH Biotech)	Spider, rust (eriophyid)		"Minimum-risk" product (no EPA registration required). Test before large-scale use. OMRI-listed (for organic growers). Buffer water to pH 3.5 - 7.5.

NOTE: Before using any product on a large scale, be sure products are registered in your state, read labels carefully and test for phytotoxicity on a representative portion of the crop.

*REI = Re-entry interval (in hours)

application rates is more typical. Despite this new reality, I strongly recommend that growers do not base miticide selection on price alone, since many of these newer products are long-residual (weeks of activity for some). Other changes with miticides include restrictions on numbers of applications per crop, similar modes of action and fewer broad spectrum products. So, when there is a mite problem, 15 choices and all these new considerations, which product do you use?

SELECTION GUIDELINES

The first step in choosing a miticide is to determine what kind of mite problem you have; local or state diagnostic labs can help. Next, assess the severity: Is there a need for immediate knock down or are mite levels still low and early in the infestation, when certain materials work very well? A hand lens is useful here. Finally, consider crop sensitivity and application history (miticides used previously on the crop). This should whittle down the list to a few choices where other considerations (Is contact activity sufficient or is translaminar activity needed? Will residue be an issue? Is this also to be used in landscapes? Is compatibility with biological control important?) plus price can guide the selection.

TWOSPOTTED SPIDER MITE

For the most part, when we think of mites, the usual suspect is twospotted spider mite, sometimes known as red spider. This name refers to the red-orange color female mites develop during short-day conditions (less than about 13 hours). Usually, these mites are a pale yellowish or whitish color with two indistinct dark green spots on either side of the abdomen. They spend most of their time under leaves and prefer protected areas along veins or in concave hollows. They are quite small, only about 0.02 inches long, not easily noticed until sufficient numbers have caused obvious damage. During warm conditions (90° F) the time from egg to adult is only three and a half days, and under such conditions, populations explode.

Twospotted spider mite has a very wide host range — perhaps hundreds of different plants, including many weeds. They can over winter on plants and debris outdoors or in protected greenhouses, so cleaning up weeds and washing house benches and structures should be a priority where sensitive crops are grown. Early symptoms include a pale flecking or stippling, yellowish blotches and some distortion of young growth. When numbers

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build to very high levels there may be webbing and mites clustering at high points in an attempt to disperse; plants may even be killed.

OTHER SPIDER MITES

Carmine spider mite. It looks somewhat like a dark red version of twospotted spider mite and was found on zonal geraniums submitted to our diagnostic lab. We suspect they may have been at least partly to blame for some brown spotting and yellow blotches on lower leaves. There was also light edema evident.

Lewis mite. Lewis mite has been a problem in the last few years on poinsettias. Under magnification, they slightly resemble twospotted spider mite but are somewhat smaller, narrower and have several small dark green spots instead of just two. Lewis mites only seem to like a few kinds of plants. There was a recent report on zonal geraniums. We found they could indeed survive for a time on some ivy and zonal cultivars, but the damage was extremely light and infestations did not persist. On poinsettia, injury appears as an extremely fine speckling or stippling, giving an overall appearance of nitrogen deficiency. Unfortunately, by the time damage is apparent the mite numbers are already quite high. I recently spoke with a grower who noticed a group of poinsettias lighter in color than the surrounding plants but did not investigate until webbing and brown spots were starting to appear. The decision at that point was to discard the worst of the lot, which is sometimes the best strategy. ▶



Top: A comparison of poinsettias, healthy (left) and damaged (right), by Lewis spider mite; Bottom: View of *Salvia farinacea* showing typical injury from broad mite (stunting and curling of foliage), side view.

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BROAD/CYCLAMEN MITES

In the last few years, I have received more plant samples infested with broad or cyclamen mites than throughout the previous 12 years. Clearly these tarsonemid mites are becoming more of a problem. The most likely explanation is that tarsonemid mites are more typically associated with vegetatively propagated material than seed-grown crops.

Broad and cyclamen mites are *not* spider mites and are not necessarily controlled with the same materials used for spider mites, although there are some exceptions. They have a fairly wide host range, including many common greenhouse crops such as cyclamen, gerbera, begonia and impatiens. I have seen broad mite cause a russetting or fine flecking on New Guinea impatiens flowers and stems. Last year *Salvia farinacea* seemed to be a favorite target for broad mite. Young leaves took on a gray-green cast with downward curling and stunting. On African violet, cyclamen mite injury closely resembles that caused by foliar nematode. Typical damage is stunting or distorted young leaves, though larger buds or the growing point may even be killed.

These mites are extremely tiny, and we use high-power magnification to detect them, prying apart the smallest leaves to look for them. Under conditions of high humidity, they can also be found on older leaves. Sometimes, the mites themselves are hard to find, especially if some kinds of miticides have already been applied. We have been able to confirm broad mite infestation in such cases by locating eggs or their remnants, which have distinctive hobnail ornamentation. Unfortunately, early signs of infestation are not obvious. In several cases, growers were quite surprised how suddenly the damage became apparent, naturally coinciding with the busy spring shipping season.

BULB MITES

Already this spring I have had the first inquiry concerning bulb mite on Easter lily. With the decline in methyl bromide soil treatment it might be a good idea to stay alert for signs of this problem, although it has fortunately not been common. Infestations are probably brought on by bruising or damage of bulb scales, including that caused by fungus gnat larvae. I have also found bulb mites on gladiolus corms and tulip bulbs, and they have been reported on a variety of other bulbs and roots, including dahlia tubers.

Injury might be first apparent above ground as a yellowing or decline of the plant due to the damage below. The bulb, corm or tuber will show rotten areas or portions of scales excavated by mite



Zonal geranium leaf underside showing symptoms we associate with twospotted spider mite injury.

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activity. I have even seen bulb mites moving upward in Easter lily stem pith, leaving a brown trail of hollow dead tissue as they went.

According to older fact sheets and reports, Kelthane bulb dip was the standard treatment, although labels no longer allow this use because it was messy and growers wondered what to do with the leftover dirty pesticide suspension. At the present time, it appears the only possible treatment for post-planting suppression may be a drench with DuraGuard (Whitmire Micro-Gen), which allows such use for a broad range of soil-borne organisms (check with local authorities for latest options).


LESSER KNOWN MITES

It has been many years since I have encountered some of the following lesser-known eriophyid mites on any greenhouse crop. These mites rival tarsonemids in small size and can cause some unusual plant symptoms, depending on the mite species, that can easily be mistaken for a plant disease.

Fuchsia gall mite is sometimes a pest in greenhouse crops but more often in outdoor landscape plantings in the coastal western United States. The most common symptom of Fuchsia gall mite is a distortion and stunting of terminal growth. Apparently,

hummingbirds are implicated in the outdoor spread of this pest. Some work is being done on breeding mite resistance into hybrid fuchsias for landscape use.

Tomato russet mite, causing yellowing or curling of foliage, is an occasional problem in greenhouse tomato production. It also feeds on related plants such as nightshade and petunia and probably survives like twospotted spider mite in unheated greenhouses over the winter.

The last of the eriophyids is purple tea mites. They have caused recent concern in spathiphyllum crops, causing a bronzing between veins on leaves. There are undoubtedly other eriophyids we will find on greenhouse crops, especially as the popularity of vegetatively produced material increases. 

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