The Mealybug Scourge

Obscure mealybug damage and sooty mold. (Photos courtesy of Jim Bethke)

Mealybugs have been on the top of discussion lists lately. Find out more about them and how to control them.

By Jim Bethke, Oliver Siapno and Richard Redak

Mealybugs really can be a scourge. It wasn't long ago the chrysanthemums in our greenhouse unexpectedly became infested with citrus mealybugs. We have no spray program here at the university because we actually want the pests for trials, so the infestation was opportunistic, and we began trials almost immediately. It wasn't long, however, before the mealybugs were actually killing off the plants and infesting the pots inside and outside and all around the benches. Additional plants in the greenhouse were infested, including heuchera and ceanothus. Only a few plants survived. What a mess. We did, however, get some really good data on mealybug control, so maybe it was worth it.

DESCRIPTION OF THE PEST

Mealybugs are homopterous insects like aphids and whiteflies. The homopterous insects all have a similar feeding behavior. Their mouthparts are stylets that pierce plants much like a mosquito pierces an avid hunter. They are seeking the phloem or xylem, the vascular system of the plant in which to feed. Some of the homopterans can inject a toxic-like compound into the plants, causing even greater damage than the typical visual feeding damage. Typical damage includes yellowing of host leaves; distorted growth; premature leaf drop; and with heavy populations, plant death. Like other homopterans (aphids, scales, whiteflies, etc.), mealybugs also produce large amounts of a sweet, sticky liquid waste product called honeydew on which can grow a very unsightly black fungus called sooty mold.

Areas of heavy infestations are unsightly and look grainy or mealy because of overlapping bodies and heavy coating of white powdery wax, hence the name mealybugs. In fact, it is common when a population gets this bad to recommend that the grower start over by destroying heavily infested plants rather than try to cure the problem.

Besides the heavy waxy coating, another character that distinguishes mealybugs from other insects is the presence of marginal filaments or a fringe of waxy hair-like structures that may be wedge-shaped or spine-like; those found at the end of the abdomen resemble tails. Both the fringe hairs and the tails can be key characters for identification.

Male and female mealybugs look similar as immatures, but as adults they are morphologically very different. When a male becomes an adult it forms a loose white cocoon much like those found in the pupal stage of insects that have complete metamorphosis, moths for instance. The males emerge as small, two-winged insects that resemble fungus gnats but are usually weak fliers like aphids and are usually lighter in color. They can be distinguished from other flying insects by the two long filaments or tails that extend from the end of their abdomens. Researchers here at

Figure 1. Selected pesticides used in recent trials against mealybugs.

Trade Name	Common Name	Company	Spectrum of Activity	Registration Update
Aria	flonicamid	FMC	Homopterans, thrips, others in testing	Registered GH
Discus	imidacloprid/cyfluthrin	Olympic Horticultural Products	Homopterans plus others	Pending, any day
Flagship 25WGD	thiamethoxam	Syngenta Professional Products	Hompterans, sawflies, plant bugs, fungus gnats	Registered GH and outdoors
Marathon II	imidacloprid	Olympic Horticultural Products	Homopterans, many beetle species, thrips, leafminers	Registered GH and outdoors
Pedestal 10SC	novaluron	Crompton Crop Protection	Aphids, thrips, whitiefies, armyworms, mealybugs	Registered GH and outdoors
Safari 20SG	dinotefuran	Valent USA	Homopterans, leafminers, lacebugs	Pending, any day
Tristar 70 WSP	acetamiprid	Cleary Chemical	Homopterans, citrus thrips, tentiform leafminer	Registered GH and outdoors

University of California-Riverside are deciphering the female pheromone that attract the males, and they hope that one day pheromones may be used in mating disruption and male trapping.

The adult female, on the other hand, looks like the immature form but is much larger. It may lay up to 600 eggs, usually in a cottony ovisac, which is a protective cottony mass that can cover the eggs as well as the female. Eggs hatch in 6-14 days, and the hatchlings are called crawlers like the first instars of scale insects and whiteflies. Crawlers will disperse for only a short distance from the egg sac and settle down to feed. They tend to cluster around and overlap each other for added protection from predators, parasites and the occasional contact pesticide application. They do not remain attached in the same spot during their lifetime like scale or whitefly, but can move to a new feeding site if disturbed or the food source changes for some reason. There may be as many as eight generations per year.

Early detection of mealybugs is very important, and monitoring requires regular inspection of host plants for waxy white deposits and the presence of ants and or sooty mold. Mealybugs prefer living in the tightest spaces on the plants such as buds, the base of stems and petioles, and the undersides of foliage. This behavior, as well as the waxy covering, makes it all the more difficult to contact mealybugs with pesticides. A contact spray often works inconsistently simply due to the fact that not every individual is contacted during application. Therefore, multiple applications are necessary to hold mealybug populations in check.

COMMON PEST SPECIES

Mealybugs are typically pests of foliage plants and plants that are maintained in the greenhouse for long periods like cut roses and other perennials. Unfortunately, the more common mealybug pests of ornamentals are prolific and polyphagous (feed on many different ornamental host plants).

Citrus mealybug. The most common mealybug pest of ornamentals is citrus mealybug, *Planococcus citri*. Underneath the white waxy coating, its body color is orange to purple with a dark line down the middle of the back. In addition, it has orange-colored body fluid when pierced. Citrus mealybugs are very prolific, producing 300-600 eggs. The female lays the ovisac beneath its body, and its body partially covers the ovisac. Adult females have a lifespan of 60-80 days.

Longtailed mealybug. The longtailed mealybug, *Pseudococcus longispinus*, is a little different from the citrus mealybug in that instead of laying eggs, females bear live young like greenhouse-dwelling aphids. They are visibly different from citrus mealybugs because of their grayish color and long waxy filaments (tails) that are longer than the length of the mealybug's body.

Obscure mealybug. The obscure mealybug, *Pseudococcus viburni*, resembles the citrus mealybug but lacks the stripes down the back and has a purple to clear body fluid. It also has long tail filaments, but they are only about half the length of the body or slightly longer. Obscure mealybug females cover most of their body and eggs with the cottony ovisac.

Madeira mealybug. The Madeira mealybug is a relatively new pest that is spreading across the country. It is exceptionally difficult to control with insecticides, and it may be suggested that if you are having problems with mealybugs now, whereas in the past they were more easily controlled, it well might be that this new species has displaced the more easily controlled population. Ron Oetting from the University of Georgia says that it is probably the most serious pest they have had to deal with in Georgia in many years. This mealybug appears to be very tolerant of most of the insecticides registered for mealybug use. Underneath its white waxy coating, the Madeira mealybug has a purple body color with two stripes down the back separating three rows of white tufts. The female Madeira mealybug covers its eggs and most of its body up to the head with its ovisac.

Pink hibiscus mealybug. The pink hibiscus mealybug, *Maconellicoccus hirsutus*, has become a very serious problem in Florida both as a quarantine pest and a very destructive pest. The pink hibiscus mealybug has very little waxy coating on its body and an underlying color of pink to red. It does not possess a fringe of white waxy filaments, tail like filaments, or stripes down its back. When pierced a pink to red body fluid is observed. The pink hibiscus mealybug occurs in both Florida and California, but in California it is only found in the Imperial Valley, which fortunately, is far away from the ornamental production areas along coastal California. For more information about the pink hibiscus mealybug or other mealybug pests of ornamentals, visit Lance Osborne's (professor of entomology at the University of Florida) mealybug Web site, ➧

Figure 2. Effect of selected insecticides on the citrus mealybug on potted roses.

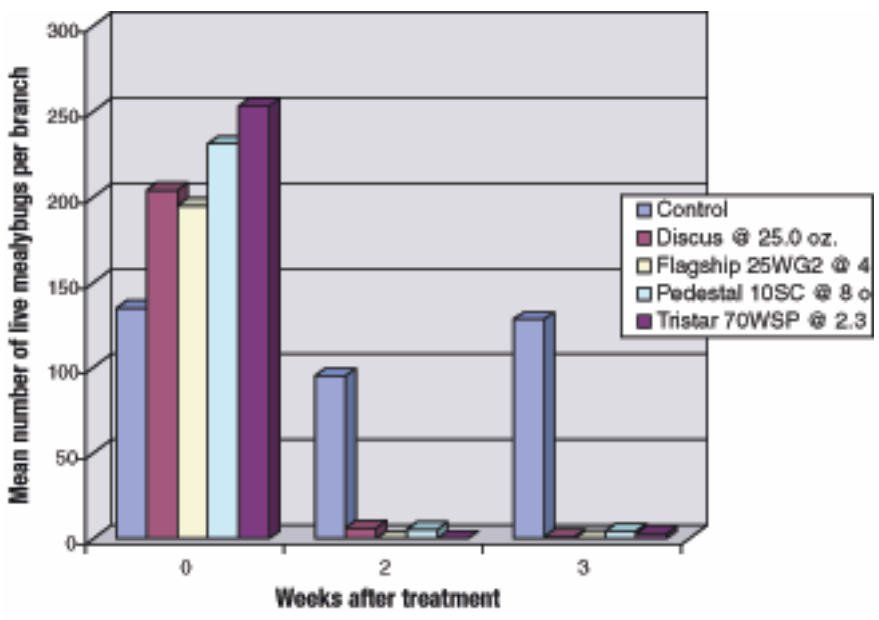
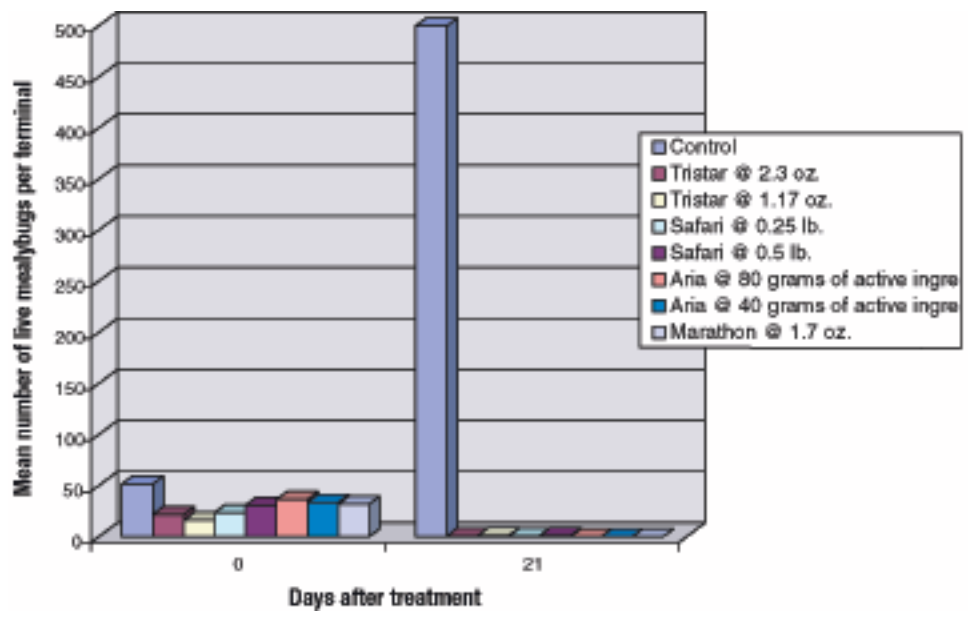
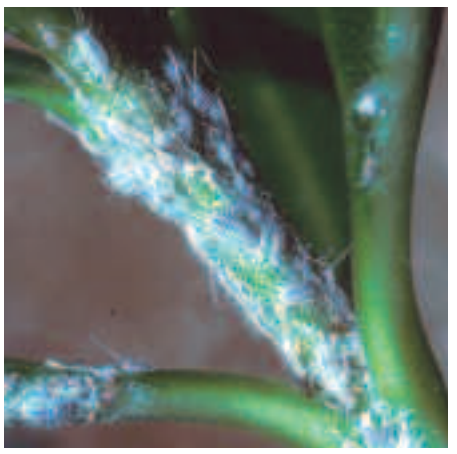


Figure 3. Effect of selected insecticides on the longtailed mealybug on chrysanthemum.





Top: Mealybug trial. ***Bottom:*** *Longtailed mealybug.*

www.mrec.ifas.ufl.edu/lso/Mealybugs.htm. In addition to the valuable information found therein, there are many links to other mealybug-related sites as well.

TRIAL SUMMARIES

Anyone who has conducted pesticide trials against mealybugs can tell you that the pests are difficult to contact due to the waxy covering on individuals and the fact that they have a tendency to overlap each other on the plant tissue. Although some may be killed on contact, many remain that are still feeding on the vascular tissues. Therefore, the neonicotinoids are a good option for control because they are systemic and get directly to the insect by way of the vascular tissues.

In the last few trials against mealybugs here at University of California-Riverside, we concentrated on the newer products and especially foliar applications of registered and soon-to-be registered neonicotinoids (see Figure 1, page 20). We found the neonicotinoids to be very effective against three of the more common mealybug pests of ornamentals: citrus mealybug, longtailed mealybug and obscure mealybug.

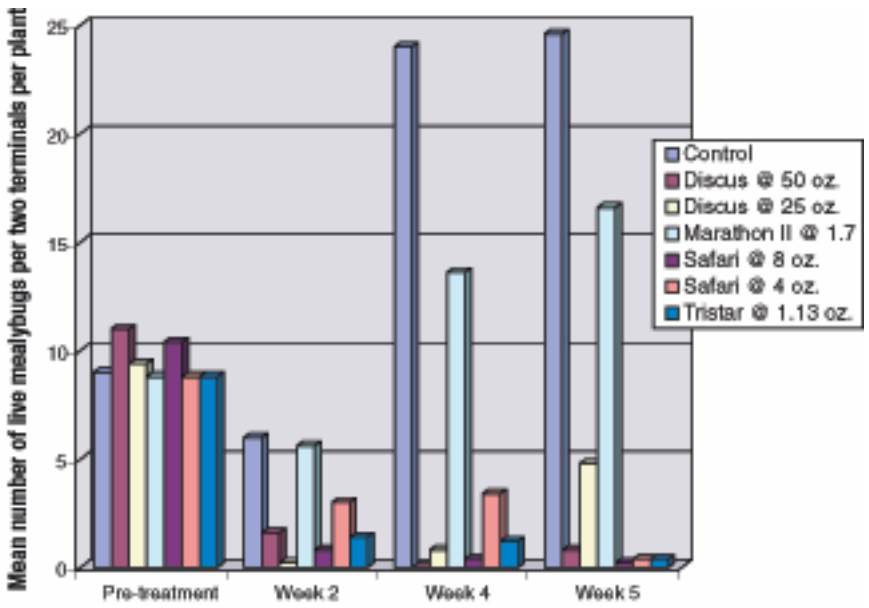
Results presented in Figure 2, page 21, are from a trial against the citrus mealybug on potted roses. We began this trial with a relatively heavy population of citrus mealybugs on the terminals of chrysanthemum plants. All live mealybugs were counted on a single terminal of the plant and the same terminal was observed two and three weeks after treatment. All treatments performed very well and were significantly different than the control both two and three weeks after treatment.

All treatments performed exceptionally well against the longtailed mealybug on chrysanthemum (see Figure 3, page 21). We recorded an average of about 35 mealybugs per treatment in the pre-treatment count, and 21 days after treatment there were almost no mealybugs seen on treated plants; whereas, a dramatic increase in the mean number of mealybugs was observed in the control.

We conducted a field trial against the obscure mealybug at a local nursery on 7½-gal. azaleas under shade. The azaleas are consistently infested with obscure mealybugs, and the grower was interested in any alternatives we might find to his current treatment regimen, Dursban or pyrethroids. We tagged two terminals per plant and allowed the mealybug population to grow to a level where we could obtain meaningful results. Needless to say this made the grower nervous, but hey, we are professionals. The trial began with approximately nine mealybugs per terminal. We made two applications in this trial, one immediately following the pre-treatment count and another two weeks following the first. We made observations of the marked terminals on weeks two, four and five after the first application.

The population on the control rose to approximately 25 mealybugs per terminal during the length of the trial. Unfortunately, in this trial Marathon II did not perform as well as it has in the past in our lab trials. Marathon II was only significantly better than the control on week four. All other treatments were significantly better than the control. Tristar, Safari and the high rate of Discus performed exceptionally well. Rate responses were observed for both Discus and Safari — the higher the rate the better they performed. The grower had not considered a foliar application of any of the neonicotinoids before, and now he can rotate a new control option into his program. ➧

Figure 4. Effect of selected pesticides on the obscure mealybug on azalea.



CONCLUSIONS

If you have mealybugs, the neonicotinoids appear to be an excellent option for control for a number of reasons. First, it is fortunate that these products can be applied as a foliar spray and not as a drench and still be highly effective. Second, it's tough to kill some mealybug populations with contact sprays without excessive measures, so it is also fortunate that the neonicotinoids are translaminar and systemic because they become readily available at the mealybug's food source, the vascular system. Lastly, if you are running a program of beneficials on common pests in your facility, and mealybugs are one of your common problems, we have observed good compatibility between some of the neonicotinoids and some of the more common beneficials used in greenhouses. More to come on that later. GPN

Jim Bethke is research associate, Oliver Siapno is laboratory assistant and Richard Redak is professor in the Department of Entomology at the University of California-Riverside. Jim can be reached by phone at (952) 827-4733 or E-mail at bethke@ucr.edu.

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