

## Targeting the White Menace:

# Mealybugs

Mealybugs plague greenhouse and interiorscape growers, and they can be difficult to control. But with the right combination of control tactics, growers can successfully rid their crops of these pests.

By Casey Sclar

**M**ealybugs are difficult to control because of their ability to reproduce rapidly and protection by a white waxy coat. At Longwood Gardens, we grow plants in a variety of indoor environments. There is a vicious cycle that exists between stock plants, cuttings, production plants and display plants. We are constantly battling mealybugs.

The purpose of this article is to introduce the mealybug species most commonly found in greenhouses and interiorscapes and to discuss mealybug management strategies. Relying on any one tactic alone is insufficient. True success with mealybug management requires a war on all fronts. A combination of cultural, biological and chemical control tactics is necessary.

### Who Are the Common Enemies?

Three different species of mealybugs are most commonly found in greenhouses, lathouses and shadehouses, interiorscapes and conservatories. All species described will go through their life cycles faster in warmer temperatures. They commonly have generation times of 30 to 40 days, depending upon temperatures. Eggs laid by females hatch in seven to 10 days.

Long-tailed mealybug (*Pseudococcus longispinus*) is widely distributed in United States conservatories and interiorscapes. They have two long, tail-like projections, hence the "longtail" name. Eggs are laid and hatch very soon after. The lack of a waxy egg sac actually makes them easier to control compared with other mealybug species. Their host range is usually restricted to palms, cycads and other tropical/subtropical plants.

Introduced from Mexico or South America, the Madeira mealybug (*Phenacoccus madeirensis*) has spread throughout U.S. greenhouses but is particularly problematic in the eastern United States. Madeira populations are often first identified because they contain a high population of winged males. They are generally a dull gray color under the white wax. They've been found to infest all types of greenhouse crops, even poinsettias and chrysanthemums. Their egg sac is longer and denser than other mealybugs', and these egg sacs and male "pupal cases" may be found all over plants and greenhouse surfaces. Each Madeira mealybug female is capable of laying more than

200 eggs and completing development in a month, depending on temperature.

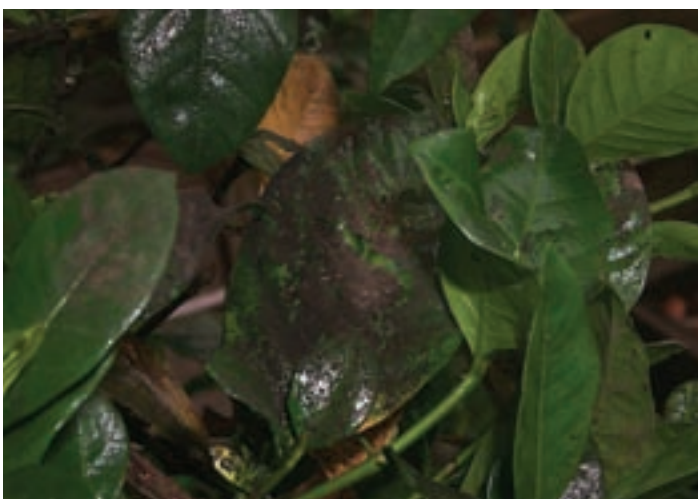
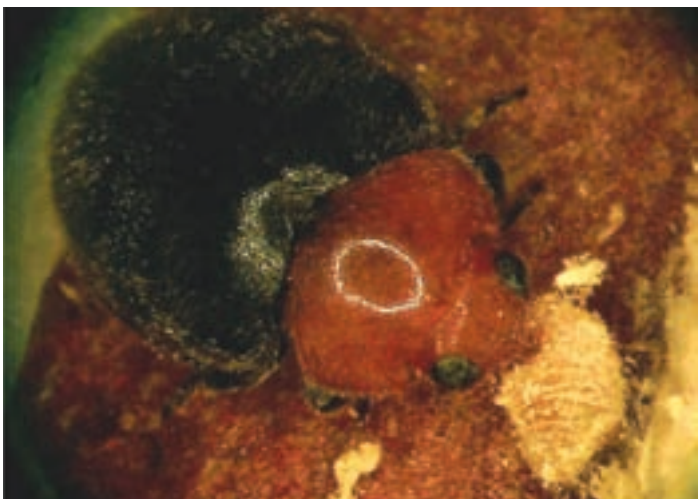
Citrus mealybug (*Planococcus citri*) is the most common species found. Easily recognized by a thin purple stripe down the middle of their back, they are densely covered with white wax and have very short tails. Females form a fluffy white egg sac that is about twice the length of their body, shorter than that of the Madeira mealybug. Each citrus mealybug female can lay up to 600 eggs — no wonder they are hard to get rid of! Unlike the Madeira, males are rarely encountered with citrus mealybug.

Although these three species seem to be the most common overall, several other mealybug species feed on leaves, shoots and roots of greenhouse plants. Among these species are pink hibiscus mealybug, solanum mealybug, solenopsis mealybug and many others. A great web resource for mealybug biology information is <http://mrec.ifas.ufl.edu/LSO/Mealybugs.htm> by Dr. Lance Osborne of the University of Florida.

### Strengthen Your Defenses: Cultural Control

Cultural control of mealybugs is the first and most important line of defense. It begins with rigorous maintenance and close inspection of all incoming stock plants and propagation areas. Rejecting an infested plant in this stage can prevent a huge problem later. The amount of effort and repeat pesticide applications necessary to clean up heavily infested plants is simply not worth it (and practically impossible to achieve). A grower should ensure that plants are well-watered but not overfertilized. Certain species of plants are more prone to infestation (e.g., coleus, gardenia), and eliminating their use may be a valid solution to persistent problems. At the very least, they should be monitored closely.

Cuttings from infested stock plants may be the source of your mealybug problems. Mealybug crawlers prefer to move and feed the terminal growth of the plants — so the problem is continuous. Years ago, we attempted to treat cuttings with alcohol and bleach dips, but the cuttings were burned at the rates necessary to achieve any mealybug control (more than 50 percent alcohol or 25 percent bleach). ▀



**Top:** Long-tailed mealybugs lack a waxy egg sac, making them easier to control than other species.

**Top Middle:** Citrus mealybug is the most common species and is recognizable by a thin purple stripe down the middle of its back.

**Bottom Middle:** Mealybug destroyers, *Cryptolaemus montrouzieri*, are the most important mealybug predators.

**Bottom:** Sooty mold from fungus growing on mealybug infested leaves.

## grower 101

Exposing cuttings and even whole plants to low temperatures helps drastically reduce mealybug survival in our experience. Several subtropical plant species can tolerate “chilling” for short periods — we use more than 36 hours at 36° F — with no damage and superior

mealybug control. Unfortunately, not all plant species can withstand this. In contrast, university research groups in Maryland and Hawaii have achieved mealybug control with hot water (120° F) baths.

Recent work in our group has focused on reducing mealybugs

MEALYBUG DESTROYER MORTALITY 2003					
TREATMENT	RATE/ 100 GALLONS	% MORTALITY AT DAT			
		1	7	14	21
Permethrin Pro	8 fl. oz.	98a	100a	100a	100a
Marathon II	1.7 fl. oz.	50a	40a	42a	40a
Sunspray Oil	2% v:v	2b	8b	4b	26b
Akari	24 oz.	10b	8b	8b	22b
Aria	2.1 oz.	0b	14b	6b	14b
Azatin	16 fl. oz.	0b	2b	4b	12b
H <sub>2</sub> O (control)		0b	4b	4b	10b

Data in columns followed by the same letter are n, s, d, from control by Dunnett's Procedure (a = 0.05). RCB Design; N = 5 replications. Treatments applied 5/27/03 with hand sprayer for 5 sec. ea. 5 Beetles per unit (petri dish) fed untreated mealybugs @ 2, 9, and 14 DAT

Table 1.

with the use of compost and compost tea made from our own compost. In our experience, compost tea provides good mealybug reduction equivalent to that of horticultural oil and better than that of pyrethroids.

Sanitation is paramount in mealybug prevention. This includes cleaning benches and greenhouses before incoming plants are placed, and removing debris on a regular basis. We found that female mealybugs lived on watered pot sections without a host plant for an average of 10 to 19 days, with crawlers still being produced up to 45 days afterward. They live on containers, walls and benches. The day we saw hatched crawlers on stainless steel flashing, we gained a new respect for them. As part of this study, we witnessed no difference in mealybug egg mass survival on recycled fiber pots as opposed to plastic or clay containers.

Prevent the spread of mealybugs with adequate plant spacing. Proper spacing helps promote air circulation, obtain thorough spray coverage and assist monitoring. Finding and culling/treating the one or two “hotspot” plants throughout the crop reduces infestations. We have also tried blasting mealybugs off plants with a strong stream of water — this works best with small infestations. It can harm fragile plants and may also spread unhatched mealybug eggs.

Lowering the temperature in the greenhouse during cooler months reduces mealybugs. Keeping heat setpoints low (55° F days or even lower, if possible, at night) for a substantial amount of time slows mealybug development and reduces reproduction. Crop scheduling, fertility programs and other factors may prevent this, but reducing mealybugs this way may also lower your carbon footprint.

### Start a Counteroffensive: Biological Control

Mealybug biological control works well with plants in our conservatories. A necessary precursor was avoiding any broad-spectrum pesticides. Places where plants reside for long periods (“permanent”



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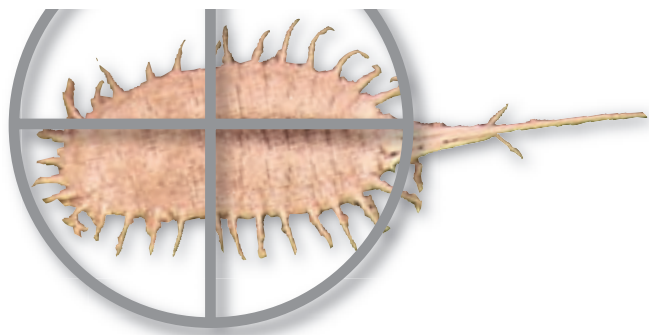
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plantings) enable the establishment of biological control and are inherently more successful. Where new plants are constantly being removed or replaced, large portions of the display lack ecological stability and success with biocontrol is lessened. However, removing plants is in itself a great cultural control.

The mealybug destroyer, *Cryptolaemus montrouzieri*, is the most important mealybug predator. Both adults and larvae of this lady beetle relative feed on mealybugs. Destroyers feed on the three species of mealybugs discussed here in our experience, although some growers report having less success with them on long-tailed mealybug. Mealybug destroyers are relatively expensive. They cost anywhere from \$200 to \$300 per 1,000 adults (not including shipping). Consistency is a problem; if a shipment doesn't arrive on time, it may force us to abandon a release program or switch temporarily to another tactic. Most shipments are of adults; there are a few places that sell mealybug destroyer larvae at a premium, about twice the adult price.

At Longwood Gardens, a destroyer release program runs two to five weeks, depending on temperatures. If the infested area is heavily concentrated with mealybugs, we may begin the program with an application of horticultural oil to reduce initial populations and then begin releases one week afterward. During the following weeks, we release 500 to 2,000 destroyers per 1,000 square feet of infested area, depending on greenhouse size and plants to treat. Release rates from different insectaries vary between five and 10 beetles per square yard. After several releases, mealybug destroyer larvae may appear. Training personnel to recognize mealybug destroyer larvae is important. Their similar appearance to mealybugs can make them the unfortunate targets of cultural or chemical tactics. Blending chemicals with biological control is always a concern. Table 1 shows how one spray of different products impacted mealybug destroyers.

Lacewing larvae (*Chrysoperla sp.*) can also be used to prey on mealybugs and are often less expensive to obtain initially than mealybug destroyers. However, they must be re-released more frequently. Release rates are higher than those for mealybug destroyers. An average of 650 lacewing larvae are released per 50 square feet. We've

successfully used them on long-tailed mealybug and to mop up heavy infestations of other mealybugs. They do not persist as long as mealybug destroyers. **GPN**

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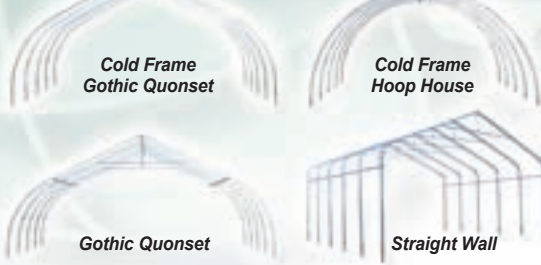
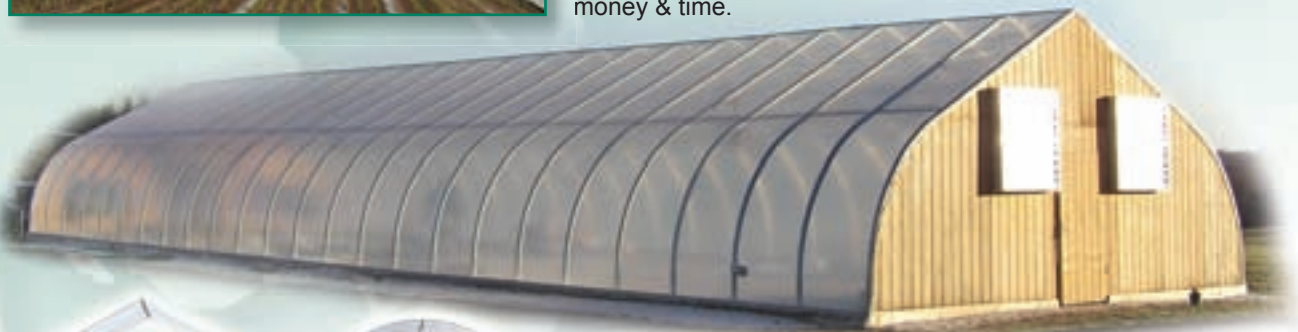
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