

Photos by L.M. Diepenbrock

Figure 1. Lebbeck mealybug infestations and feeding damage can occur on fruit (severe case shown, A), leaves (B) and stems (C).

Biological controls for lebbeck mealybug

By L.M. Diepenbrock

Lebbeck mealybug (*Nipaecoccus viridis*) was first identified in Florida citrus in 2019 in Highlands County. It has now been documented in commercial citrus groves in 11 counties and in dooryard citrus plantings in two counties.

While lebbeck mealybug can feed on most of the above-ground parts of a citrus tree, it is most damaging in the canopy, where it feeds on fruit, leaves and stems (Figure 1). One of the biggest management challenges is detecting populations before they explode to damaging levels. Crawlers are very small and blend in with the tree's bark, making them hard to find. Growers occasionally notice when they

have a few ovisacs appearing, but the population usually goes unnoticed until fruit, leaf and/or stem damage is visible.

WHAT IS EATING LEBBECK MEALYBUG?

Research from other countries where the lebbeck mealybug is established consistently shows that this pest is not easily managed with insecticides alone. Lebbeck mealybug requires predatory insects to reduce populations to levels where damage is minimal.

With any recently established invasive pest, there is often no predator that specializes in consuming them. This is not exactly the case with the lebbeck

mealybug because a small ladybeetle known as mealybug destroyer (*Cryptolaemus montrouzieri*) is present in Florida (Figure 2A, page 24). These beetles consume a variety of insects but prefer mealybugs and will recruit to areas with heavy mealybug infestations. However, waiting for mealybug populations to become high enough to naturally recruit can be problematic because the ladybeetles may not arrive in time to prevent damage.

Along with this specialist predator, there are also several generalist predators. These are predatory insects that do not prefer a food source and eat whatever is available to them. In this category, two species of predatory

flies (larvae are predators, figures 2B and 2C, page 24), a predatory caterpillar (Figure 2D, page 24) and lacewing larvae, better known as trashbugs (not pictured), have been collected in Florida.

PREDATOR RESEARCH

There are likely other generalist predators consuming lebeck mealybugs in groves. To determine what else might be eating them, Kristen Gaines [University of Florida Institute of Food and Agricultural Sciences (UF/IFAS) graduate student] has developed a DNA primer that is specific to lebeck mealybug and can be used to detect mealybug DNA in the guts of predators. This is a time-consuming process, but hopefully will help determine other predators that may be useful in managing mealybug infestations.

In the trees where ants were excluded, a higher number was seen of insects that are likely consuming mealybugs.

Gaines' research is also showing that ants can play a critical role in giving predatory insects access to mealybugs. Several species of ants farm mealybugs. The ants collect the mealybugs' sugary waste product known as honeydew and in return protect their mealybug "livestock." An experiment excluded ants from half of the trees sampled to determine whether this was occurring. In the trees where ants were excluded, a higher number was seen of insects that are likely consuming mealybugs.

Because there are a wide variety of ants in Florida, research needs to determine if all ants provide this protection or just certain species. UF/IFAS researchers teamed up with Joshua King, who studies ants at University of Central Florida (UCF), to help identify what species of ants are associated with lebeck mealybugs. In the first sampling



Pioneering the Future

Multi-K™, Haifa's flagship potassium nitrate brand, is the basis of a whole line of plain and enriched potassium nitrate products, designed for optimal plant nutrition.

Learn about our water soluble and controlled release fertilizers:
www.Haifa-Group.com

FOUR GENERATIONS of FLORIDA CITRUS NURSERIES

Now accepting orders for 2021/2022 delivery



EXCLUSIVE LIFETIME REPLACEMENT POLICY.
Every tree is hand nurtured and inspected.
We have all available greening tolerant rootstocks,
UF varieties, USDA varieties as well as all old varieties.

Call Chris at (407) 404-0355

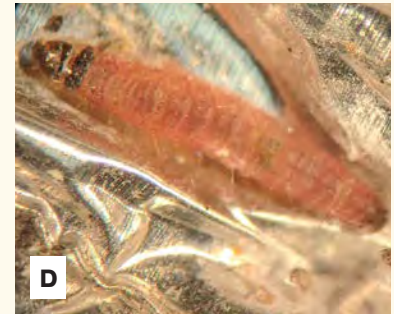
www.blue-heron-nurseries.com

BLUE HERON NURSERIES

WINTER GARDEN, FLORIDA www.blue-heron-nurseries.com



Reg. # 48006420



All photos by L.M. Diepenbrock, except Figure 2C is by Matt Bertone

Figure 2. Lebbeck mealybug predators include mealybug destroyer adults and larvae (A), predatory flies (B and C) and a predatory caterpillar (D).

site (Highlands County, fall 2019), most of the ants collected were red imported fire ants (*Solenopsis invicta*).

To better understand the relationship between red imported fire ants and lebbeck mealybug, UF/IFAS and UCF labs began a three-month study in late January. This project is examining the impact that different kinds of fire ant management have on the lebbeck mealybug population and the establishment of predatory insects. Updated information from this study will be provided in the spring.

DEVELOPING A MANAGEMENT PLAN

Management of lebbeck mealybug is going to require a multi-pronged approach. Predators are needed. To support those predators, more aggressive ant species, like red imported fire ants that farm mealybugs, must be managed. There is a need to balance using appropriate insecticides while maintaining predators in the system. It is not known yet if the right selection of predators that can reduce lebbeck mealybug populations enough not to cause damage is present. However, anecdotally, researchers have seen



Photo by L.M. Diepenbrock

Figure 3. This tree trunk has masses of mealybug destroyer pupae.

groves where the specialist mealybug destroyer has established (Figure 3) and reduced mealybug populations enough that growers could gain a foothold with managing the pest. Unfortunately, there is no quick fix to getting control over lebbeck mealybug. But researchers are making progress

each week to better understand this pest, its predators and what combination of management actions are needed to support Florida citrus production. 🍊

L.M. Diepenbrock is an assistant professor at the UF/IFAS Citrus Research and Education Center in Lake Alfred.