



Asian citrus psyllid nymphs, note the white waxy secretions produced by the nymphs.



Adult Asian citrus psyllid

Managing Asian citrus psyllid populations

By Philip A. Stansly and Michael E. Rogers

In August 2005, citrus greening disease, or “huanglong-bing,” was detected in South Florida and has since been confirmed in commercial citrus groves in five counties as of December 2005. Citrus greening is one of the most devastating diseases affecting all citrus varieties, resulting in small, bitter-tasting fruit and a sharp decline in tree health. A major route of spread of this disease is through its insect vector, the Asian citrus psyllid, *Diaphorina citri* Kuwayama.

Management of greening in other parts of the world includes propagation of disease-free nursery stock, removal of greening-infected trees, and control of psyllid populations on both young and mature citrus trees. Action should be taken at each stage of the citrus production system to reduce psyllid populations and thereby limit the negative impacts of this new disease on Florida citrus.

NURSERY STOCK

Psyllids are not very strong fliers and much of their distribution throughout the state is attributed to movement of psyllid infested ornamental plants, especially orange jasmine, *Murraya paniculata*. It is reasonable to assume that many of the early greening finds throughout the state (particularly in dooryards) can also be attributed to movement of infected plants or plants carrying infected psyllids. Starting

with clean trees is a must to keep greening out of disease-free groves. Therefore, budwood and nursery stock need to be protected from psyllids.

Greenhouses can provide some of the necessary protection from psyllids and other pests. Where screen is required for adequate ventilation on greenhouses, screen with a hole size of 530 x 530 microns, (32 x 32 threads/inch), will exclude psyllids from the greenhouse. However, a smaller hole size in at least one dimension such as 266 x 818 microns (50 x 24 mesh), will also exclude other pests such as citrus leafminer and aphids, thus reducing the risk from canker and citrus tristeza as well as greening. Inevitably, stray pests will manage to get into such structures. Use of a systemic insecticide (such as Admire®) applied to the potting media will provide further protection against these pests, thus minimizing the risk of infected nursery trees being moved to groves where the disease is not present.

NON-BEARING TREES/RESETS

Young trees that produce multiple flushes throughout the year are at greater risk of greening infection than mature trees because of the attraction of adult psyllids to the new flush. Even without greening, young trees in the field need to be protected for about four years from psyllids and leafminers to



Remains of Asian citrus psyllid nymphs that were parasitized by the wasp *Tamarixia radiata*; note the parasitoid emergence holes.



Small misshapen fruit from a greening-infected tree. Fruit has been cut to show the aborted seeds.

grow optimally. Again, drenching with systemic insecticides of the niconitoid type such as Admire will provide the longest lasting control for both pests with minimum impact on beneficials. Drenches are best applied once in the spring and possibly again in the fall, when the trees are flushing most and rainfall is less likely to move the material rapidly past the root zone.

Foliar sprays with different types of materials including oil can be used during the rainy season. When making multiple foliar applications within a season for psyllid control, rotate between products with different modes of action to reduce the likelihood of pesticide resistance development. See the updated chapter "Pesticide Resistance and Resistance Management" in the 2006 Florida Citrus Pest Management Guide for assistance with choosing products with different modes of action.

MATURE TREES

Management options for psyllid control on mature trees are much more limited than for smaller trees. Admire is not recommended because the maximum labeled rate is insufficient for trees greater than 6 feet in height. Currently, the only soil-applied insecticide that has been shown to suppress psyllid populations on large trees is Temik® (aldicarb). In a recent trial conducted in a block of mature Hamlin orange, Temik at the rate of 33lbs./A provided a significant reduction in the population of psyllid nymphs on treated trees. However, control of psyllids with Temik was not observed until at least 30 days after application due to the time required for the product to move from the roots up to the canopy of the tree. These results suggest that Temik should be applied to mature trees a minimum of 30 days prior to the initiation of flushing for psyllid control.

At present, the only other chemical control option for suppressing psyllids on mature trees is the use of broad-spectrum foliar insecticide applications. The currently recommended products for psyllid control listed in the 2006 Florida Citrus Pest Management Guide include Danitol (fenpropathrin), Provado (imidacloprid) and Lorsban (chlorpyrifos).

If greening is present in a grove or nearby, the best timing of foliar sprays for psyllid control is during the early season flush period when temperatures are at or below 90 degrees and psyllids are most abundant. Sprays should be timed to the presence of feather-leaf flush. Successfully controlling psyllids with foliar sprays on large trees is difficult, however, because of the unsynchronized sporadic flushing patterns within a grove and the short residual effects of these foliar

sprays. Successful suppression of psyllids during the early part of the year may result in lower populations throughout the rest of the summer when psyllids populations do not develop rapidly due to the higher temperatures, limited availability of new flush and abundant natural enemies.

If foliar insecticide applications are made, they should be used sparingly to minimize the impact on natural enemies that maintain psyllids at lower levels later in the year. While a single female psyllid can lay as many as 800 eggs, studies in Florida and Puerto Rico have shown that more than 90 percent of psyllids that hatch in the field do not survive to become adults. Many meet their demise as meals for predaceous insects such as ladybeetles. The parasitic wasp *Tamarixia radiata* has been released in Florida and also contributes considerable mortality in some locations. Additionally, there are many potential pests such as scales, mealybugs, whiteflies etc. that are generally innocuous in Florida citrus thanks to biological control. Excessive sprays could easily result in resurgence of psyllids and other pests.

OTHER CONSIDERATIONS

In groves where greening has been confirmed, trees that show signs of greening infection should be removed quickly. An effective foliar insecticide such as Danitol (fenpropathrin) should be sprayed on the infected trees prior to removal to prevent further spread of the disease by psyllids. Otherwise, the greening infected psyllids will disperse from the tree being removed and infest surrounding healthy trees. Be sure to follow re-entry interval (REI) directions on the pesticide label. Trees in the immediate vicinity of infected trees should be considered higher risk due to increased likelihood of infection and receive extra scouting and treatment if necessary.

Management practices used within a grove can also affect psyllid populations, especially those practices that promote new flush such as hedging and topping and fertilization. Management strategies that reduce or limit the duration of flush may help to keep psyllid populations at low levels and reduce the need for additional pesticide applications.

Managing psyllid populations in the face of greening presents a new and threatening challenge to the citrus industry in Florida, but one that we can meet successfully with sufficient care and vigilance. More information on citrus greening and psyllid management can be found in the 2006 Florida Citrus Pest Management Guide.

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