

Kaolin particle film can reduce psyllid infestation and increase tree growth.

# Incorporating newer tools in resets

aintaining a productive citrus grove in Florida takes a lot of effort and innovation these days. So much so that growers' needs can outpace the timeline of the researchers who support this industry. As such, growers often move forward with promising ideas or tools before researchers can provide useful recommendations toward successfully incorporating these tools. The following is a discussion of the challenges and benefits of these tools based on conversations with growers and observations during research trials.

#### **REFLECTIVE MULCH**

Based on research from Phil Stansly and his collaborators, thousands of acres now have reflective mulch. This is a metallic material with a polyurethane coating installed before resets are

#### By Lauren M. Diepenbrock

planted. Early research trials showed an increase in the aboveground growth of trees, fewer incidences of Asian citrus psyllid (ACP) infestation and a reduced likelihood of trees developing

HLB. This research also revealed that the tree canopy can grow so rapidly that it shades the reflective mulch, which reduces the tool's ability to deter ACP.

Reflective mulch is not a silver bullet for establishing healthy resets, and additional challenges have been identified beyond the

problem of shading. First, to counter the concern of shading reducing efficacy, 8-foot-wide reflective mulch can be installed with the edges buried underground. Depending on where a grower is located within the state, finding someone to install this size plastic ground cover can be a challenge. Most installation equipment

Oil-based sprays cannot be used on reflective mulch. is for 6-foot-wide materials. Increased aboveground production also means frequent flush. Both growers and researchers have experienced heavy infestation by citrus leafminers and the subsequent inoculation with canker, which will impact plant health. An additional

point to consider is that oil-based sprays cannot be used on this ground cover. Oils will degrade the polyurethane coating. For research trials, non-ionic surfactants have been substituted for spray oils, which slightly increase the cost of chemical applications.

Irrigation and fertigation must be done through drip irrigation. While it makes sense to lay irrigation lines under the reflective mulch, there are unexpected challenges to this design. Accessing lines for maintenance like clearing clogs or finding leaks is not possible if the lines are under the plastic. Growers have mentioned that cranes attack irrigation lines through the plastic, causing tears to the reflective mulch and damage to the lines.

In University of Florida Institute of Food and Agricultural Sciences (UF/ IFAS) Citrus Research and Education Center (CREC) plantings, fire ants were attracted to the emitter during drier parts of the year. Over time, they chewed holes into the irrigation tubing, requiring the irrigation to be reinstalled during the experiments.



### IPCs

Individual protective covers (IPCs) are popular in Florida. IPCs take advantage of insect exclusion to prevent ACP from accessing the flush of young trees and transmitting the bacterium that causes HLB. This is crucial for young trees because it enables them to establish HLBfree and develop healthy roots and foliage, potentially allowing them to come into production sooner (see citrusindustry.net/2021/04/26/ MEET THE SOAR® FAMILY OF ADVANCED MICRONUTRIENTS IDEAL FOR EVERY STAGE OF CITRUS GROWTH.

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The main drawback of IPCs is the cost, which is around \$10 per bag, including PVC and labor for installation. Most IPCs are intended to be used for several years, and the highest return on investment comes only if IPCs can be used twice (see citrusindustry.net/2020/04/28/ the-economics-of-mesh-bags-forprotecting-young-citrus-trees). But the production environment often leads to many bags being unusable a second time. It is possible that the return on investment comes several years after use as trees remain productive longer than they would have without IPCs, or when there are additional tools to better mitigate HLB available for these trees.

Additional challenges of using IPCs come in the form of pest management. The exclusion netting used to make IPCs is sufficient for keeping out adult psyllids, which is the primary goal, but it does not prevent other pests from entering. A major concern in IPCs is the lebbeck mealybug. This pest can develop high populations in IPCs that can kill young trees if not found and managed early on. Spider mites can also build to damaging levels during dry periods, causing visible leaf damage and leaf drop if not brought under control.

Like reflective mulch, aboveground tree growth is increased relative to



Two-year-old sweet orange trees grown A) on metalized reflective mulch, B) in an individual protective cover, C) with red-dyed kaolin and new growth and D) with monthly insecticide applications

trees not under IPCs. However, unlike reflective mulch, citrus leafminer and subsequent canker inoculation are generally not a problem (see academic.oup.com/amt/article/46/1/ tsab114/6304278?searchresult=1). Other pests, including various scales, caterpillars and occasionally aphids, have also been found inside IPCs. Greasy spot is a common pathogen concern inside of IPCs, though the internal environment of bags is likely to be an ideal habitat for several pathogens.

#### KAOLIN

Research from Christopher Vincent at CREC has shown that kaolin particle film can be an effective tool for reducing psyllid infestation and increasing tree growth compared to untreated and insecticide-based controls (see citrusindustry. net/2019/10/02/a-growth-enhancingpest-management-option).

Psyllids are highly attracted to developing flush. Both kaolin alone and kaolin mixed with a red dye interrupt the ability of the pests to find flush. The red dye also appears to increase longevity of kaolin on trees while standard kaolin washes off with heavy rains.

The primary challenge of incorporating kaolin into a management



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program is the need to reapply, which drives up the cost. Like reflective mulch and IPCs, treatment with kaolin increases aboveground plant development relative to untreated trees. For kaolin-treated trees, new growth outside of application periods will not be covered in the particle film and therefore is accessible to ACP and other pests.

Like reflective mulch and IPCs, treatment with kaolin increases aboveground plant development relative to untreated trees.

#### MONTHLY INSECTICIDE SPRAYS

Monthly sprays are a common way to protect resets without any of the tools discussed thus far, but even this is insufficient in the face of constant pressure from ACP, HLB and other pests. In an ongoing trial, the aboveground biomass of plants receiving monthly insecticide treatments is less than that of the trees in the reflective mulch, IPC or kaolin treatments. Monthly insecticide applications have been effective at keeping ACP infestation low to non-existent, which is the goal of regular management.

Growers have been expressing concerns about increasing pressure from citrus leafminers and other pests in a growing environment where regular ACP sprays are needed to protect young trees. Their concern is mirrored in an ongoing trial where UF/IFAS researchers see similar infestation by leafminers in trees with monthly insecticide application, reflective mulch and kaolin applications.

These tools are currently being compared in a UF/IFAS trial funded by the HLB Multi-Agency Coordination program. Findings from this trial will be highlighted in the March 2022 Citrus Industry issue.

Lauren Diepenbrock is an assistant professor at the UF/IFAS CREC in Lake Alfred.

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