



Using particle films to manage ACP



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What are particle films?

Particle films are fine particles that are applied to plants to form a thin residue, or “film,” over the leaf surface. These films reflect light, giving the plant a bright or white appearance. Usually they are sprayed in a water suspension through a standard sprayer. The most common type of particle film is made from natural kaolin clay, a soft, white aluminum silicate, that is mined and filtered for a small particle size. Another type of film consists of diatomaceous earth. The particles are applied to crops to manage environmental challenges, like high heat or sunburn, or manage pests, such as aphids. Particle films enhance plant growth under most conditions by helping the plants achieve a more optimal light distribution. The particles reflect light away from the outer leaves which keeps them from experiencing high light stress which, in turn, helps to reduce water loss and keep leaf temperatures within an optimal range. Some of the light reflected by the particle film appears to be redistributed deeper into the canopy which would assist more of the tree’s leaves to have access to light. Particle films reduce infestations by some pests because the particle films hide the natural plant colors that help some insects find their plant host. Recently we began field-testing mixes that use a particle film (Surround WP), made from kaolin that has an added red dye to improve the effect on pest management. Red enhances the pest management effect by reducing reflectance of yellow, blue, and ultraviolet light, which attract Asian citrus psyllid (ACP), the vector of HLB.



2-year old ‘Hamlin’ sweet orange in Florida with red or white particle films.

How are particle films used to manage HLB?

Particle films can dramatically reduce arrival of ACP. In our experimental plots in Florida, under high disease and ACP pressure, both natural white and red-dyed kaolin reduced ACP populations by more than 80% as compared to monthly insecticide treatments. Red kaolin produces a small reduction (4-5%) in ACP populations, relative to the white. Both treatments delayed HLB infection; the first detected infection in the red treatment was nearly 1 year after the first detected infections in the untreated trees. Both treatments have had positive effects on young tree growth, with kaolin-treated tree trunks having a nearly doubled girth versus untreated trees and much larger and denser canopies. Several growers are using kaolin regularly and report positive results in terms of tree health and growth.

Who is working on this project?

This project is being conducted by several people in the Tree Ecophysiology Laboratory at the University of Florida Citrus Research and Education Center, with help from Ed Etxeberrria and Pedro Gonzalez at the same center. Additionally, a number of growers are experimenting with ways to apply kaolin more effectively.

What are the challenges and opportunities?

The major challenge in Florida is the ability to withstand rainfall. Frequent rains tend to wash off particle films, which are only effective as long as they cover the entire leaf. To maintain constant coverage in Florida we have had to apply every two weeks on average, and growers have noted similar frequencies, which drives the cost up. In California, growers use this product for sunburn protection and have commented that in desert conditions, they have difficulty adhering the product to new foliage. For these reasons, research is needed to develop formulations that adhere to the leaves better. Additionally, these films have disrupted natural enemies and led to California red scale outbreaks. To minimize this problem, we intend to test the efficacy of border treatments where the psyllids are most commonly found. Major opportunities are that particle films are appropriate for both organic or conventional use, and that they can effectively decrease ACP and delay HLB infection, while simultaneously enhancing growth.

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