

Greater growth, less psyllids

Grapefruit grown in trials with metallized reflective mulch show impressive results.

By **Tacy Callies**

In the nearly 30 years that Bob Adair has been researching citrus, he has never seen a treatment produce such dramatic results on tree growth as metallized reflective mulch (MRM). Adair, executive director of the Florida Research Center for Agricultural Sustainability (FlaRes), says his project with MRM “represents the most significant citrus tree growth study that I have been a part of since I began citrus research in 1986.”

The study, funded by the Citrus Research and Development Foundation (CRDF), began in July 2013 at the FlaRes in Vero Beach. The main objective of the project was to determine if MRM reduced psyllid populations in newly planted trees. The study builds on research originally conducted in 2013 by University of Florida professor Phil Stansly and his doctoral student, Scott Croxton.

THREE TREATMENTS

Adair’s study included three treatments on Ray Red grapefruit trees grown on sour orange rootstock:

- 1) Trees planted in bare ground (untreated control or grower standard)



Bob Adair stands next to 20-month-old Ray Red grapefruit trees. Top: bare ground; center: compost; bottom: metallized reflective mulch.

- 2) Trees planted with 9 cubic yards per acre of urban plant debris (UPD), also known as compost
- 3) Trees planted with MRM. The MRM used was Shine N' Ripe XL, a 6-foot-wide, heavy-duty, 3 mil film made by Imaflex.

Each treatment, consisting of five replications of 100 trees, received all of the recommended horticultural practices and products currently prescribed by the University of Florida for the citrus industry.

INSTALLATION AND IRRIGATION

MRM installation is achieved by a tractor attachment that unrolls the product, cuts a furrow and pushes the MRM into the furrow on each edge. The material is tucked in, and the edges are covered in dirt to keep it in place.

Adair stresses the importance of properly preparing the ground prior to MRM installation. He says a weed-free area of roughly 8 feet wide is required. The next step is to disc the ground two to three times before rotivating it. The last step before laying down the MRM is rolling the ground to pack and level the soil.

Once the MRM is installed, tree placement can be laid out with plastic straws in a conventional fashion. Then, access for planting holes is cut in the MRM with a box cutter in the shape of a plus sign (1 foot by 1 foot), which allow for holes to be dug without tearing the plastic. Trees are planted in the holes and the dirt is packed back in.

One-inch poly tubing is installed on top of the MRM. Adair advises growers to let the tubing sit for a few days before installing two drippers — one on the north side of the tree and one on the south side. In his study, Bowsmith NonStop® drippers were used for irrigation.

"I was biased against using drippers, but we have been delighted with them," says Adair. "They have been maintenance-free to date (20 months into the project) with no plugging, and irrigation can be run during windy conditions without

concerns for evaporation or drift. In terms of conservation and salinity management, they have been exceptional." And because the water drips underneath the MRM, there is less evaporation and greater efficiency.

PRODUCTS APPLIED

Trees received continuous fertigation throughout the duration of the study. The fertilizer used was a

liquid 6-0-8 (calcium nitrate, potassium nitrate, 0.05 percent magnesium with nitrate minors) from The Andersons. "The IFAS recommended rate is 0.6 pounds of nitrogen per tree, but we have only put out 0.43 pounds per tree per year to date (as of November 16, 2015) while achieving exceptional growth," says Adair.

Herbicide was applied to the outer boundaries and the tree-hole openings

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Rolling the soil flat prior to installation of the metallized reflective mulch (MRM) is important to avoid puddles on the MRM.



Left to right, Matthew Adair, Pat Hall and Scott Croxton install metallized reflective mulch at the Florida Research Center for Agricultural Sustainability in Vero Beach.

of the MRM to control encroaching weeds. Adair warns that nutsedge can bore through the mulch, but can be spot-treated.

Foliar insecticides were applied only for pests not controlled by neonicotinoids or in the rare occasion when they began to breakdown.

MRM AND COMPOST COSTS

Labor and material costs for installing the MRM were approximately \$300 per acre, according to Croxton's figures. "It has lasted us 20 months so far," reports Adair. "The manufacturer says it should last three years."

According to Adair, the cost of the compost used in his study was less than \$120 per acre per year. He said the compost, which is holding up very well, was applied on both sides of the tree for a total width of 6 feet. A Knight spreader — a side-delivery type of spreader with augers and a hammer mill — was used to apply the compost.

RESEARCH RESULTS

Tree growth data was collected in October 2015 for trunk caliper, canopy diameter and tree height (see table) that occurred from May 2014. When compared to the bare ground treatment, trunk caliper increased 50.2 percent for the MRM treatment and 30.2 percent for the compost treatment. Canopy diameter increases were 45.6 percent for MRM and 27.8 percent for compost. Tree height increased 29.2 percent with MRM and

Tree Growth over 17.4 Months

Measurement Dates: 5/08/14 and 10/20/15	Bare Ground	Compost	Metallized Reflective Mulch
Increase in Caliper (centimeters)	3.44	4.23	4.79
Increase in Canopy Diameter (meters)	1.46	1.86	2.12
Increase in Tree Height (meters)	1.49	1.73	1.92
Measurement Dates: 5/08/14 and 10/20/15	Compost	Metallized Reflective Mulch	
Percent Increase in Caliper vs. Bare Ground	30.2%	50.2%	
Percent Increase in Canopy Diameter vs. Bare Ground	27.8%	45.6%	
Percent Increase in Tree Height vs. Bare Ground	16.5%	29.2%	



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16.5 percent with compost.

“There is every indication that the use of MRM in new citrus plantings will be able to bring trees into crop production 50 percent faster than conventional plantings,” says Adair. He speculates that the enhanced growth with MRM could be due to the following factors: increased photosynthesis from the reflected light, greater moisture holding, more moderate soil temperatures contributing to root health and a lower salt content from high-salinity irrigation water due to less evaporation.

“Trees growing vigorously have more flush and should be more attractive to pests,” said Adair. But this was not the case when it came to Asian citrus psyllids (ACP) in the MRM treatments. ACP nymphs and adults were reduced by 66 percent in MRM when compared to the bare ground treatment. Average number of insects per tree per week for each treatment was determined by visual inspection for ACP, Diaprepes root weevil, orange dog, citrus leafminer, aphids, Sri Lankan weevil and spider mites. The MRM was found to significantly deter not only ACP, but also adult Diaprepes and orange dog larva.

WHAT'S NEXT

If Adair receives CRDF funding to continue the study for a third year, he plans to measure yield data. “Anecdotal evidence indicates there is a greater incidence of fruit on the MRM trees. I think we will not only see enhanced yield, but at a younger tree age,” he says, adding that fruit from the 19-month-old trees tastes delicious.

One thing Adair would like to do differently in subsequent studies is switch to an 8-foot-wide or 10-foot-wide MRM, which would better accommodate the larger trees due to accelerated growth and provide greater insect repellency over a longer period of time. Adair also is considering the possibility of future studies on the use of MRM with other types of trees, such as avocados or energy crops like pongamia. 🍊

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