Big boost in young tree growth and yield from insecticides and metalized mulch

By Phil Stansly, Scott Croxton and Joby Sherrod

Figure 1. Laying plastic at A. Duda & Sons in LaBelle.

With yields dropping in Florida and Brazil, the decision to replant is not an easy one. Still, prospects for eventual success of new plantings are better now than ever in the last 10 years. Think about it: 1) Asian citrus psyllid (ACP) populations are lower now, thanks to citrus health management areas and aggressive control programs, 2) we know a lot more about growing trees in the face of HLB and 3) we have some new techniques for growing off young trees in a hurry. One of these techniques that is still new to many citrus growers is the use of metalized (UV-reflecting) polyethylene film as a ground cover for new trees.

"Plasticulture" is a standard practice for vegetable growers in Florida, but citrus has always been planted into bare ground; so why change now? The strip of metalized plastic film into which the trees are planted offers many advantages, including:

- ACP repellence
- More efficient use of water, fertilizer, herbicides and systemic pesticides
- Higher soil and canopy temperatures and more light

The disadvantages are the need for a dual irrigation system (drip plus micro-sprinkler for freeze control) and dependence on liquid fertilizer during the 3-year duration of the mulch. However, our experience in a 3.5-year, large-scale field trial would suggest that the advantages may outweigh the disadvantages.

STUDY SETUP

The experiment was conducted on 10 acres of commercial citrus land in northwestern Hendry County. Hamlin orange trees on Carrizo rootstock were planted July 4–5, 2012, at a density of 23 feet by 9 feet (207 trees per acre) on two row beds separated by shallow swales with drain tile underneath. Irrigation was provided via two drip emitters per tree and fertilized initially with 1 pound per tree slow-release at planting followed by liquid fertilizer injected in the first of three daily irrigation cycles.

The block was divided into 16 main plots, each being five rows wide and 490 feet long in a two-way factorial, randomized, complete block design with four replicates. Main plot factors were 1) with and without systemic, soil-applied insecticides and eventually sprays and 2) with and without enhanced foliar nutrition, making four treatments: foliar nutrition only, insecticides only, foliar nutrition plus insecticides and neither foliar nutrition nor insecticides (control). Treatments were continued for three years after which the grower took over all management of the block.

Figure 2. Planting trees into plastic mulch, July 4, 2012.

Each plot was split with half being planted in a 56-inch-wide strip of 3.5-mil thick, three-layer, low-density,

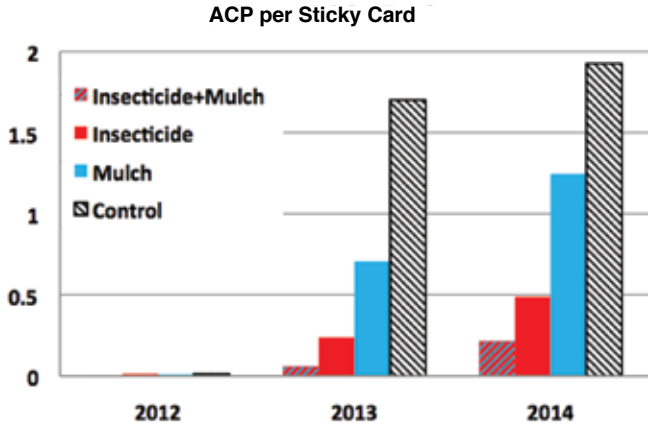

Figure 3. Average number of ACP per yellow sticky card by treatment and year.

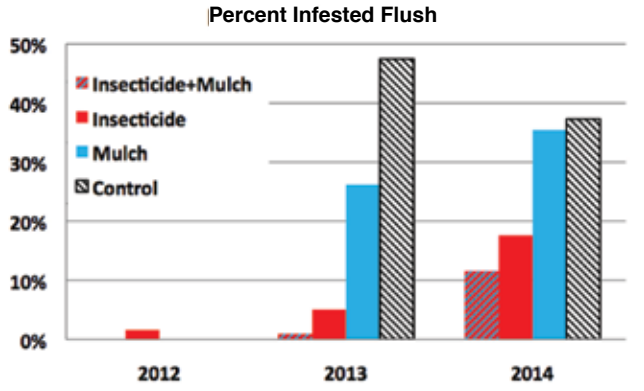

Figure 4. Percentage of flush shoots infested with ACP by treatment and year.

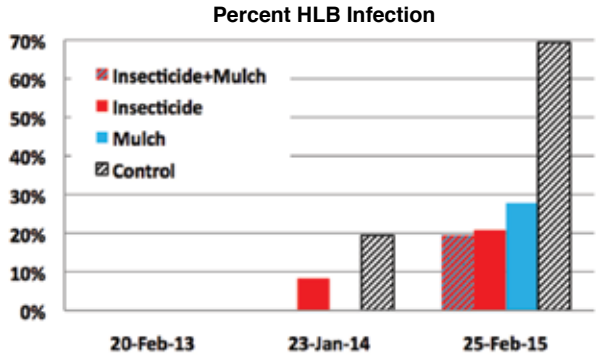

Figure 5. Percentage of tested trees positive for HLB by treatment and year.

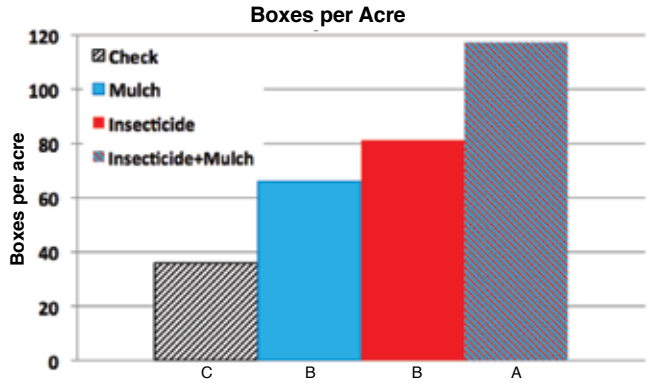

Figure 6. Average boxes per acre by treatment harvested on January 4, 2016.

black polyethylene metalized on top and covered with a clear polyethylene coat to protect from foliar sprays and UV breakdown (ImaFlex, Montreal, Canada). The 72-inch plastic film was installed flat on the ground using a Kennco plastic layer (Figure 1, page 20). Beds were strawed as usual with tree holes cut and dug using a post hole digger finished by mudding in the trees (Figure 2, page 20).

Tree growth and monitoring of ACP/HLB using quantitative polymerase chain reaction were largely confined to the 15 central trees in each subplot (five trees in each of the central three rows). However, fruit from all trees was harvested on January 5, 2016, three and a half years to the day after planting.

RESEARCH RESULTS

Fewest ACP adults and least infestation of flush was seen on trees planted in reflective mulch and treated with insecticides, followed by insecticides alone, mulch alone and finally the untreated check (Figures 3 and 4). Likewise, incidence of HLB was greatest in check plots with no notable differences among other treatments (Figure 5).

These results mirrored an earlier trial (see *Citrus Industry* April 2013) that demonstrated that whiteface mulch, which does not reflect ultraviolet (UV) light, also does not repel ACP. The psyllid is typical of other insects in being able to perceive light in the near UV and use these wavelengths to orient themselves in flight. Reflection of UV by the mulch probably interrupts flight by creating confusion between up and down.

These effects were accentuated at harvest, with mulch alone increasing yield compared to the check by 84 percent (Figure 6), insecticides by 226 percent and the combination of the two by a whopping 377 percent! The addition of mulch to the standard insecticide regime resulted in a 44 percent increase in yield (36 boxes), which would more than cover the cost of the mulch.

No effects of foliar nutrition were observed, probably because root systems of the young trees were not yet sufficiently compromised by HLB. It will be interesting to see how long these effects persist into future harvests, which will better enable us to evaluate the economic benefits of using metalized, UV-reflective mulch at planting.

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