

Groundbreaking Potential HLB Solution



By Rick Dantzler, CRDF chief operating officer

Every now and then a research proposal comes along that is so unique it grabs the immediate attention of the Citrus Research and Development Foundation's (CRDF) scientific reviewers. This was the case with a proposal in 2022 from Bob Turgeon of Cornell University. Turgeon is one of the world's leading scientists on phloem physiology, so when he said he thought he could induce the phloem of a citrus tree infected with HLB to eliminate CLAs at the point of infection using the tree's natural defenses, we took notice. The CRDF board funded the project.

Now, three years later, the results seem nearly too good to be true. Turgeon believes he and his colleagues have killed 100% of the CLAs in the tree. If this is the case, it is a groundbreaking potential solution to HLB.

Turgeon's lab team genetically transformed Carrizo trees in New York so that the bacteria are killed at the point of infection by the trees' natural defense mechanisms — before they are able to move out of the infection zone. No harmful chemicals are involved. The details will be disclosed once the concept has been patented.

The transformed trees and controls were shipped to Amit Levy at the Citrus Research and Education Center in Florida, where they were exposed to psyllids carrying CLAs. After the bacteria were given sufficient time to migrate to the roots, a highly sensitive system was used to quantitatively measure CLAs. Almost no signal was detected, in stark contrast to controls. Even better, it is possible that the faint signal detected in the roots was due not to living bacteria, but to fragments of dead cells carried downstream in the phloem.

Compared to controls, the number of bacteria in the roots of the transgenic trees was extremely small: 0.0031% in comparison to controls in one case and 0.00076% in comparison to controls in the other case. What's more, it is highly unlikely that the first constructs tested are the best, so even better constructs are likely still to come. Also, it is important to realize that the tests were performed on relatively small plants. As the trees grow, the number of protected phloem cells which the bacteria must pass through increases, making it much less likely that the bacteria can do any damage before they are eliminated.

True, the technology makes the tree transgenic by definition, which will have to be navigated, and the transformations were with Carrizo rootstock, which has its issues. However, the results are statistically consistent and compelling, and there is no reason to suspect that this methodology won't work on all citrus germplasm.

More plants of different varieties are growing in Florida and will soon be ready for testing. Also, more plants in New York will soon be sent to Florida. I believe the concept has been proven, and the system works. Furthermore, it is reasonable to predict that protection by this technology will be permanent and effective with any citrus variety.



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