Two Promising Projects

By Rick Dantzler, CRDF chief operating officer

As one who is not a scientist, it has been fascinating to see how the scientific process works. One discovery leads to another, which leads to another, and so on, until hopefully a helpful outcome is achieved. It is symmetrical and logical. Occasionally, though, an idea comes along that turns this model on its head.

One such idea is a field experiment conducted by Randy Niedz and Michelle Heck, U.S. Department of Agriculture-Agricultural Research Service (USDA-ARS), in Ft. Pierce, Florida, and Ithaca, New York. Their team is taking molecules or compounds identified by Brian Scully, retired USDA-ARS scientist, as possibly having antibacterial properties and injecting them into trees of fruit-bearing age to see how they compare with trees injected with oxytetracycline (OTC). The traditional scientific model would dictate that the molecules first be tested in an assay of sorts. Then, if sufficient antimicrobial qualities of *C*Las (the HLB pathogen) are demonstrated, the molecule would be tested in a greenhouse before going to the field.

It's all very logical. One discovery leads to another, and so on. However, this takes time, which is not on the side of growers. So Niedz and Heck bypassed all of this and went straight to the field. "How it performs in the field is the only assay that really matters," says Niedz.

So far, they have injected 88 molecules, 13 of which appear to be equal to or outperforming the OTC control trees. Scully has found another 50 or so that need testing. This is important for several reasons, not the least of which is the need to have a backup ready if *C*Las develops resistance to OTC.

On the day this field screening trial visit occurred, I heard a second presentation on another exciting project. The USDA-ARS team is working on a way to deliver antimicrobial peptides to citrus trees. Antimicrobial peptides are small proteins that can have the same effect as OTC, but which are typically much more expensive to produce. This approach is called symbiont technology.

Symbiont technology operates by modifying agrobacterium's T-DNA, causing it to produce specific plant growth regulators and antimicrobial peptides. This results in a cluster of plant cells, referred to as symbionts, which grow on a fixed site of the trunk of the citrus tree to connect to the tree's vascular system. The symbionts continuously generate these antimicrobial peptides, which then flow into and distribute throughout the tree.

The team developed symbionts for over 40 antimicrobial peptides and found four to be effective against HLB in initial greenhouse tests. "Symbionts are to citrus trees what insulin pumps are for diabetic patients," says Heck.

The researchers secured 10 acres in the Indian River Citrus District and met Environmental Protection Agency and Animal and Plant Health Inspection Service criteria for field testing symbionts. If successful, this approach should be affordable to growers as the antimicrobial peptides are produced continuously throughout the symbiont's life.

Exciting projects are underway. OTC has given us time. Let's take advantage of it and develop more durable solutions.

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