Citrus blight

By Ron Brlansky

Citrus blight, young tree decline, sand hill decline, road side decline and declinio (in Brazil) — by any name, this citrus disease is still a problem in citrus groves in Florida.

It appears that the disease was first discovered in Florida in 1894 on sour orange rootstock, which was the most prevalent rootstock at that time. In the 1970s with the increased use of rough lemon as a rootstock, the disease became a serious problem. Thousands of trees each year became unproductive and were removed, with losses estimated at $60 million per year.

Symptoms of citrus blight usually begin with symptoms of zinc deficiency on some of the newer flushes of the tree. Next, the tree shows a permanent wilt with leaves having a gray color rather than a bright green (see Fig. 1). Some growers have even said that car headlights shined on early blight trees at night show a difference in the brightness of the leaves. Leaf size is then reduced in size, and leaf drop begins to occur. Twig death is pronounced, and fruit size is reduced. All of this is due to the reduced water uptake from the roots of blight-affected trees through the water conducting system (the xylem or wood) of the tree. This is due to the production of plugging in the xylem, which is irreversible.

Early work on citrus blight used water uptake tests with water bottles for diagnosis and showed that xylem plugging reduced the water uptake and flow in the tree. In 1984, a syringe injection test (Fig. 2) was developed to test for reduced water uptake in the xylem, and this test is still used for the diagnosis of citrus blight.

Pathogenesis related proteins were found in blight-affected trees in 1991, and one of these (12 kD) has been used for blight diagnosis using an antibody-based test.

Blight-affected trees occur in a random fashion; however, after a tree is affected, the next tree to become affected most often occurs next to it. Trees seldom die with blight; however they become unproductive.

With the occurrence of HLB, reports of dual infection have been seen.

Rootstocks have changed due to citrus blight; however it still occurs on both Carrizo and Swingle rootstock. Rough lemon and Rangpur lime are still the most susceptible rootstocks followed by Carrizo, Swingle and Cleopatra mandarin, with sour orange and sweet orange being tolerant to the disease (they develop the disease at an older age than other rootstocks).

Fig. 1 (left). *A blight-affected tree (center) showing the gray-green leaf color characteristic of the disease. A healthy tree is on the right.*
Fig. 2 (below). *Syringe injection technique. The hole in the tree was drilled using a portable battery-powered drill with a 9/64-inch drill bit and injection of water was attempted with a 30-ml syringe without a needle.*

The main question on citrus blight continues to be, what is the cause? Various things have been proposed and studied. These include mineral deficiency or toxicity, soil type, soil bacteria such as Pseudomonads and *Xylella fastidiosa* — the cause of Pierce's disease of grapes. None of these have proved to be the cause, and in fact, some like *X. fastidiosa* have been disproven as the cause. The causal agent has been proven to be transmitted by root grafting, which further suggests that the disease is caused by some graft transmissible agent. Viruses have been looked for in the past using purification and microscopy methods; however, none have been proven to be the causal agent. With the advent of new generation or deep-sequencing technology, identification of potential pathogen sequences in blight-affected trees is now possible. If such sequences are identified, then pathogenicity assays will still be needed to prove a certain organism is the causal agent. Once a causal agent is identified, it will then be possible to determine the source of the inoculum and how it is being transmitted into citrus. This will lead to the management of this important citrus disease.

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