



Figure 1. Symptoms of citrus leprosis virus include localized chlorotic lesions on the leaves, fruits and twigs (left upper, middle and lower panels, respectively). Note the increasing severity of the symptoms from left to right on the panels depicting early and late infection stages on growing tissues. Citrus leprosis is transmitted by several *Brevipalpus* (flat) mite species (right upper and lower panels).

Diseases without borders: Leprosis and yellow vein clearing viruses

By Ozgur Batuman

Plant virus diseases are unusually difficult to manage if introduced into new production sites. Citrus-infecting viruses, particularly those spread by insect vectors, are no exception to this. Florida is regularly challenged by a barrage of invasive pests and pathogen species that could devastate the citrus industry.

Viruses causing citrus leprosis and citrus yellow vein clearing diseases are expanding into production regions in South America, Central America and Asia. Recently, these viruses have passed continental borders and have been found in the United States, specifically Hawaii and California. The citrus industry must stay vigilant to prevent these viruses from entering Florida.

LEPROSIS

Citrus leprosis virus is transmitted by several *Brevipalpus* species, also known as flat mites, including

those found in Florida. Leprosis disease symptoms on citrus tissue only occur where the flat mite feeds and do not move systemically throughout the tree. Symptoms are distinguished by localized chlorotic and necrotic lesions on fruits, leaves and young twigs (Figure 1). These symptoms can be confused with damage from insect feeding or bacterial and fungal diseases, such as citrus canker or *Alternaria*.

Despite being an important disease in citrus until the late 60s, leprosis is fortunately not present in Florida. It has been expanding into Mexican and Brazilian production regions over the last couple of years. This has exacerbated fruit drop and economic losses in all citrus types. If it continues to expand and is introduced into Florida again, it can seriously threaten the citrus industry.

Leprosis is being managed in other countries by keeping flat mite populations at low levels with effective acaricide applications. This is similar to

how mites are managed in Florida. Growers in Florida should look for both flat mites and leprosis symptoms when scouting their groves.

See edis.ifas.ufl.edu/publication/PP148 for more comprehensive information on the leprosis virus.

CYVCV

Citrus yellow vein clearing virus (CYVCV) was found in California in 2022 but is currently absent in Florida. This virus differs from leprosis in many ways. First, it can systemically infect all parts of the citrus tree. Second, it can be transmitted by several insect vectors. It can also spread through grafting, the movement of infected propagative materials or via contaminated tools and equipment.

Leaf water-soaking and yellow clearing vein symptoms of CYVCV also differ with leprosis (Figure 2, page 14). Depending on the time of the year and environmental conditions (i.e., temperature), some of these symptoms may disappear in the summer. The leaves may also appear chlorotic, with noticeable crinkling and warping. Infection of CYVCV in some citrus cultivars can also be asymptomatic.

CYVCV can infect most citrus, but lemon, satsuma and sour orange trees are usually more susceptible. It has also been reported in grapes and herbaceous plant hosts, including beans, cowpeas and quinoa. CYVCV has been reported in several weeds, such as common mallow, black nightshade, wild mustard and field buttercup.

Several insect vectors that can transmit CYVCV are present in Florida, including citrus whitefly, green citrus aphid, melon or cotton aphid, and cowpea aphid. Because of the easy and numerous modes of transmission, this virus would spread rapidly and easily move from tree to tree if introduced into Florida. Insect transmission is the predominant mode of transmission.

The rapid reproduction and dispersal of insect vectors (for example, aphids and whiteflies) are why CYVCV can spread so quickly in different areas and countries. Therefore, keeping an eye out and managing disease-transmitting insects in Florida citrus groves, especially in problematic areas with other hosts present, continues to be very important for the industry's sustainability.



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LAB DIAGNOSIS NECESSARY

The symptoms of these (and other) viruses on citrus trees can be masked by other widespread diseases (e.g., canker and HLB), making them

difficult to notice. Relying only on visual symptoms often results in painful (and costly) misdiagnosis of these exotic diseases in the grove. Additional and confirmatory diagnostic tests with

molecular tools are established in University of Florida (UF) diagnostic labs. Suspected samples should be submitted for proper diagnostic testing.

One of the objectives of this article is to raise grower awareness, offer help with diagnoses and management options, and ultimately prevent accidental introduction and establishment of these viruses in Florida.

If growers see unusual symptoms or suspect they may have a new virus-like disease, they should immediately act. Contact a local Extension office for assistance, submit samples to a local UF Institute of Food and Agricultural Sciences (IFAS) plant diagnostic lab or contact the Florida Department of Agriculture and Consumer Services Division of Plant Industry helpline at 352-395-4600. If assistance is needed with testing for these exotic viruses, contact your county Extension agent or obatuman@ufl.edu.

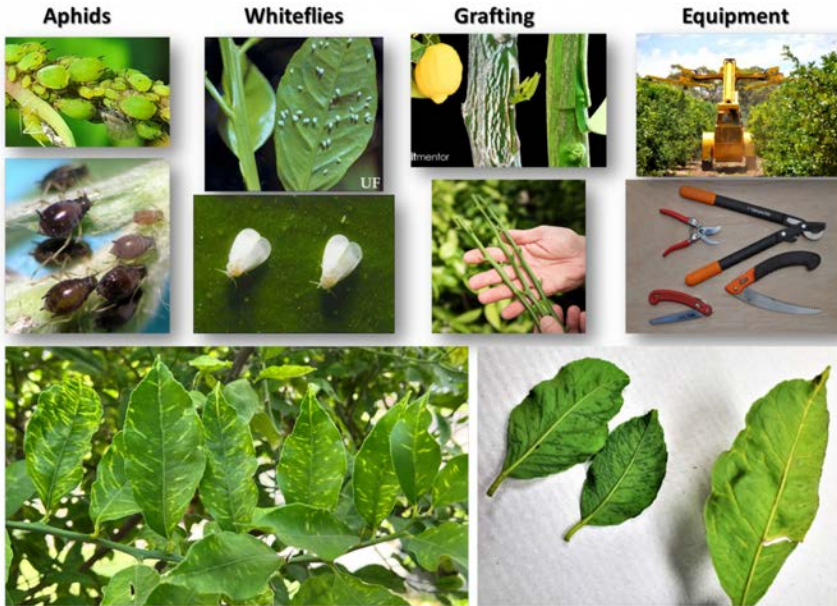


Figure 2. Citrus yellow vein clearing virus (CYVCV) is transmitted through insect vectors, grafting and grove equipment (upper and middle panels). Leaf symptoms of CYVCV include yellow veins and a water-soaked appearance (lower panel).

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