Gumbo-Limbo Trees Struggle With Three New Dieback Plagues: Puzzling Witches’-broom Symptoms, Croton Scale, and Rugose Spiraling Whitefly

DOUGLAS L. CALDWELL1* AND AARON J. PALMATEER2

1University of Florida, IFAS, Collier County Extension Service, 14700 Immokalee Road, Naples, FL 34120
2University of Florida, IFAS, Tropical Research & Education Center, 18905 SW 280 St., Florida Extension Plant Diagnostic Clinic, Homestead, FL 33031

ADDITIONAL INDEX WORDS. Aleurodicus rugioperculatus, Bursera simaruba, native plants, Phalacrocorax howertonii, phytoplasma

In 2013, gumbo limbo trees, Bursera simaruba (L.) Sarg., in south Florida were under siege with three dieback plagues: a witches’-broom symptom or rosette-type symptom of the terminal buds and two new, aggressive insect pests, the croton scale (Phalacrocorax howertonii Hodges & Hodgson) and the rugose spiraling whitefly (Aleurodicus rugioperculatus Martin). Samples from 16 trees exhibiting witches’-broom were tested for phytoplasma infection. A phytoplasma infection matching a ‘Candidatus phytoplasma asteris’-related stain, previously classified as a subgroup 16SrI-B member, was reliably detected in only one tree thus ruling out phytoplasmas as the primary cause of this symptom. Other fungal pathogens are discussed.

Because of its beautiful coppery bark and statuesque appearance (Fig.1), the gumbo-limbo tree, Bursera simaruba (L.) Sarg., is a beloved, native shade tree in south Florida. In the past, it occasionally was attacked by aphids and was for the most part, pest-free, but now it is under siege by three new pests.

The witches’-broom symptom (Fig. 2) was noticed in the Naples area in July 2011, but was attributed to collateral herbicide damage. More examples appeared and an e-mail inquiry was sent to extension agents, University of Florida (UF) researchers, natural areas and parks managers, rangers, and other contacts in south Florida. The symptom has been confirmed in natural areas from Key West to Everglades National Park to Ft. Lauderdale as well as a golf course in Naples. The diagnostic conundrum was to sort out what was causing the problem. Typical culprits for such symptoms are: herbicide injury, eriophyid mites, various fungal, bacterial or viral-like pathogens, and nutritional deficiencies. The investigation was launched. Since many of the symptomatic trees were found in natural areas where herbicides could not have been used, herbicides were ruled out. Eriophyid mites were never found.

There are several potential causes for witches’-brooms from the plant pathology realm, and one of the most common among fungi is Sphaeropsis tumefaciens, which has a very broad host range, but has not been reported on gumbo-limbo in Florida. Several bacteria (i.e. Agrobacterium tumefaciens, Pseudomonas savastanoi, Rhodococcus fascians) including phytoplasmas, can produce tissue proliferation and galling.

In Jan. 2013, twig samples from Naples were sent to plant pathologist Tim Schubert at the Florida Department of Agriculture and Consumer Services, Division of Plant Industry. Results from his laboratory work indicated “a band consistent with a phytoplasma was obtained using a general primer (developed by A. Jeyaprakash).” This was a phytoplasma host record.

In Jan. 2013, Aaron Palmateer at the University of Florida’s Institute of Food and Agricultural Sciences (UF–IFAS) reported that several isolates of Botryosphaeria spp. and an anamorph, Dothiorella spp. were collected from symptomatic trees throughout south Miami Dade and Monroe counties. These fungi are known to cause witches’-broom-like symptoms on other woody trees and shrubs. Based on their association with the symptoms on gumbo-limbo the next step is to conduct Koch’s Postulates.

In June 2013, galled twigs with foliage were sent to Nigel Harrison (UF–IFAS). DNA extracts from foliage or phloem scrapings from the interior bark of twigs were harvested from 16 symptomatic trees at three south Florida locations. These were analyzed for the presence of phytoplasma DNA by a nested PCR (polymerase chain reaction) assay employing phytoplasma universal primers. A PCR product was readily obtained from just one Homestead tree, thus ruling out phytoplasmas as the primary causal agent for this symptom. The product was sequenced directly using automated equipment at the University of Florida’s Core Genomics Laboratory. Comparison of the resulting sequence with the GenBank nucleotide database by blast analysis determined the sequence to share 100% identity with the aster yellow subgroup phytoplasma subgroup 16S1-B strains rDNA sequences archived in the database. However, in 2014, normal foliage and twig development was found on many of the witches’-broom affected plants in the Naples area.

Besides the witches’-broom problems, two newly-arrived sucking insects were thriving on the gumbo-limbos. The croton scale (Fig. 3) is a previously undescribed soft scale species and arrived in Collier County around 2008. It will feed on at least 72 host plants from 34 plant families (Hodges and Hodgson, 2010). It is often found under layers of sooty mold as it produces a fair
amount of honeydew waste, which the black mold colonizes. This scale species has high pest potential characteristics. It has many overlapping generations and averages about one generation per month and each female may produce about 400 eggs (Hodges and Hodgson, 2010). As with many new insect pests, the populations were found initially in large numbers, especially on crotons. However, due to several lady beetle species and even a predacious caterpillar, Laelilla coccidivorathe, scale populations are not as common on the gumbo-limbos. They still remain a significant pest of crotons. See video: <http://tinyurl.com/kftv2av>.

The rugose spiraling whitefly (previously called the gumbo-limbo whitefly) (Fig. 4) arrived in Miami–Dade Co. in March 2009. It spread to Collier County by Oct. 2011. The Florida Division of Plant Industries reports it has over 90 host plants with preference for coconut palms, gumbo-limbos and white bird of paradise (Ian Stocks, email communication). Populations thickly coated fronds of coconut palms. The fronds were dripping with honeydew and the white waxy material this large (3 mm from head to wing-tip) whitefly produces coated the undersides of the fronds, while the black sooty mold coated the tops of the fronds. See video: <http://tinyurl.com/kvazqt4>.

Residents were so fed up with the messy honeydew and sooty mold on their docks and boats, decks, or cars that trees were butchered or removed to stop the mess, even though this pest is readily controlled with trunk injections, trunk sprays or soil drenches of systemic neonicotinoid insecticides (Mannion, 2010).

In 2014, the rugose spiraling whitefly appears to have vanished in Collier County. “Of course, we have seen the reduction in Monroe, Miami–Dade, and Broward counties for quite a while now. And we are seeing it in Palm Beach and over in your neck of the woods too. I think it is for the most part due to the parasitoid, Enearisa noyesi.” (Mannion, July 2014, email communication).

One often hears that native plants have fewer pests than non-native plants, but in south Florida, we are finding new foreign pests can thrive and damage our native plants, the gumbo-limbo being one example. Only time will tell how these pest dynamics will interact and impact gumbo-limbo tree health.

Literature Cited
