



DETECTIVE DENDRO THE DIAGNOSTIC SLEUTH

By Cláudia Coleoni

The Case of the Defiant *Ficus*

As I slowly savored my piece of Brazilian cheese-bread (also known as *pão-de-queijo*), I wondered if Codit and I could stay a bit longer in Belo Horizonte, the capital of Minas Gerais. Don't get me wrong—I am always keen to solving our arboriculture cases as thoroughly and rapidly as possible. But the combination of amazing local food and tasty coffee (or should I say *cafezinho* from now on?) has somehow made this case that much more interesting.

“C'mon, Dendro! We've still got a whole block to go!” Codit said, slightly more uptight than usual, wisely reminding me of the task at hand: addressing the problem of leaf dropping, shedding, and defoliation of several *Ficus microcarpa* individuals, some of them even as old as 100 years!

“Right-o, Codit! Make sure you grab some extra bottles of water to handle the heat outside!” I answered, smiling at the fact that our fieldwork was all set in a tropical weather this time.

“Olá, Dendro and Codit!” a voice called from behind me. “Are you guys ready to see the last row of affected *Ficus* trees in the south-central region?”

It was Mr. Mendes, a utility arborist in Belo Horizonte, who had been explaining the whole *Ficus* situation during our fieldwork.

“Absolutely, sir,” Codit said. “I've been researching about the *Ficus* myself, and I find it really intriguing that you can see yellowish or greenish leaves in the same tree. And some of the leaves have already fallen! Those trees are really going through a lot of stress.”

Mr. Mendes and I looked at each other with amusement at the details Codit had seen so far.

“It seems to me you've observed quite a lot in the past few hours, Codit!” I said, quickly turning my eyes to the challenge ahead of us: some *Ficus* trees had dying branches, imposing serious impairment of tree health and stability. More importantly, *Ficus microcarpa*, which is an exotic species (native to the Asia-Pacific region), is commonly used for tree planting in many Brazilian cities. This inevitably leads to a greater concern about the urban forest health and sustainability in the long-run, which was the main reason why I felt Codit and I should personally take a closer look at this case in Belo Horizonte.

“This is definitely not the kind of streetscape I'd like to show you guys”, Mr. Mendes said, as our walk of the area began. He pointed out to some dead branches on live trees, and even some dead *Ficus* trees in the area. “We have been removing dead branches that represent high risks, especially in areas of pedestrian traffic and at the intersection of busy streets. It's hard to believe those trees were once so leafy!”

“That seems about right,” I observed. “In assessing and managing trees, city arborists need to balance out the risk that a tree poses, and the benefits people and communities derive from those trees. Back to the tree inspection and assessment principle: failure occurs when stress exceeds strength.”

“Oh!” Codit said, jumping in. “I couldn't help but notice another curious thing, Mr. Mendes. “This tree over here, it says *Fica Ficus* . . . what does that mean, exactly?”



Intense defoliation in *Ficus microcarpa* in the city of Belo Horizonte, Brazil.

“Oh, sorry I didn’t mention that earlier,” Mr. Mendes replied. “It stands for *Stay Ficus*, which is a community movement here in the city. People joined the movement to advocate for the maintenance of *Ficus* trees, so that the individuals wouldn’t be removed.”

“Wow, so you’ve got a pretty active community here, eh?” Cudit asked, clearly impressed that the citizen movement had a great concern about the health of the urban forest.

“No doubt about it . . . which is good, because people started valuing the importance of a standing healthy tree. But it also pushes us to further deliver a sound answer to this challenging *Ficus* problem.” Mr. Mendes looked to me, awaiting my advice.

Before voicing my opinion to Mr. Mendes, my attention drifted across the street to another row of *Ficus* trees. It was evident the city had relied heavily on this species for landscaping, which does not prove to be ideal to this particular setting—*Ficus* genus are well-known for their wide-ranging roots, and concreted sidewalks can only take so much. Despite the limited space for *Ficus* roots under the pavement, the problem did not appear to be related to the soil type and volume for the tree’s growth and longevity—there were some *Ficus* that still looked healthy, with many greenish leaves. These facts reminded me of a similar case I had with Cudit in Florida, U.S., a few years ago, when I spotted dying branches and leaf dropping in *Ficus benjamina* individuals.

It had to be an external agent.

“Mr. Mendes,” I began, “after taking a careful look around, I see that some of the *Ficus* trees are still healthy and the soil conditions appear to be just fine. And just like Cudit realized earlier, even in the same tree you can spot some yellowish leaves. I want to take a closer look at them. Would happen to have some leaf samples I can examine?”

“Absolutely, Dendro. I will have some samples ready for you,” Mr. Mendes answered, indicating his climbing gear was nearby. “If needed, we can run a lab analysis on these samples, too.”

“I really appreciate that,” I replied, taking a sip of my still-warm *cafezinho*. “I think we’ll be lucky enough to spot the answer right here with our samples.”

What’s the Solution? Turn to page 52 to find out.

WHAT'S THE SOLUTION?

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Of course, Codit also put on his climbing gear, so he could to help Mr. Mendes collect the samples. And from the top of the *Ficus*, I could hear Codit shouting: “Dendro, you were right! I guess the answer is right here in these leaves!”

“Great to hear that, Codit! Can you tell me which external agent it is?” I questioned, testing Codit’s memory of our previous field work.

“Eh . . . not really! But Mr. Mendes and I are coming down in a minute, and you can have a look at these . . . flies. Or bugs. Why do I always have to end up finding bugs?” Codit, if anything, is not fond of insects.

“Here, Dendro,” Mr. Mendes said, already on the ground. “Have a look at these samples.”

I took a closer look with my magnifying glass. “Oh, there they are—*Singhiella simplex*, popularly known as fig whitefly! Codit, do you remember them from our fieldwork in Florida a few years ago?”



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The size of an adult fig whitefly (*Singhiella simplex*) varies from 0.8 mm to 1.2 mm (top).

Symptoms of *Singhiella simplex* in a leaf of *Ficus* sp. (bottom).

“Oh gosh,” echoed my assistant, repelling to the ground. “I should have recognized them! This pest feeds on *Ficus* shrubs and trees, defoliating them. I wouldn’t imagine we would see a similar case years later and in another country!”

“So now I understand why some of the leaves were yellow rather than green,” Mr. Mendes pondered. “The fig whiteflies extract important nutrients from the trees, turning the leaves yellow and causing the continuous defoliation, which may even lead to tree death.”

“Precisely,” I said. “The fig whitefly stays in the back of the leaf, sucking the plant’s sap, which may lead to wilting, yellowing, and leaf drop. In warmer climates, the life cycle of the fig whitefly may last up to 28 days, and the adult’s size varies from 0.8 mm to 1.2 mm.”

Codit scratched his chin. “Dendro, I just recalled another fact from pest infestations in *Ficus* trees. Even in natural environmental conditions, *F. microcarpa* can be attacked by other several pests and diseases, such as cochineals, mites, nematodes, and fungi.”

“Exactly, which makes me jump to another conclusion—we should always strive to strike a balance of diverse trees in the urban forest, so that we may have more resilient trees when faced with pests and infestations.”

“Agreed,” Mr. Mendes said, nodding. “Not to mention that some of these *F. microcarpa* individuals are clones, which reduces the genetic variability and increases the species susceptibility to the attack of the fig whitefly. But Dendro. . .” Mr. Mendes paused. “I’m still unsure about what solution I should give to the city of Belo Horizonte and to the *Stay Ficus* movement. . .”

I walked calmly toward the nearest *Ficus*, just imagining how challenging it would be to reverse this situation. “Mr. Mendes, to be quite honest, there is no one-size-fits-all solution. You and your urban forest team have been doing a good job of removing the dying branches and leaves, especially when there is some kind risk involved. But you should also pay a careful attention to the fallen leaves, because that’s where the immature fig whiteflies will be hosted. In addition, there are the silicate fertilizations, which can promote resistance to the attack of insects and diseases in the affected *Ficus* individuals.”

“You could also consider the natural predators of *Ficus* trees for a long-term control,” Codit suggested. “I once read a scientific article that pointed out some natural enemies, such as ladybird beetle predators and lacewings. Ironically, as a not-fond-of-insects guy, I have read some pretty good books on insects and biological control.”

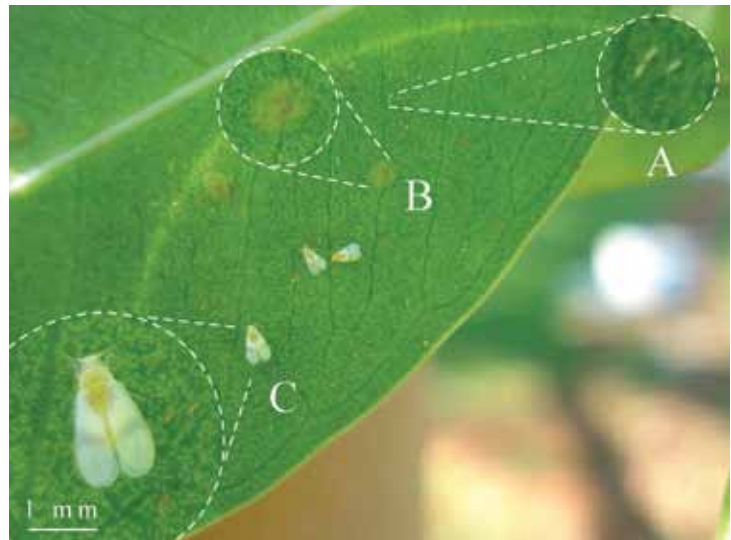
Mr. Mendes wiped his brow. “That’s great advice, guys! I should also get in touch with other states in Brazil, because *Ficus* trees are so widely used in urban landscapes. I will also carry on some research on the biology and behavior of *Singhiella simplex* to promote better control in urban areas. And oh, by the way, we have scheduled a meeting with the *Stay Ficus* movement early this evening. Would you guys like to join me on this last task? *Pão-de-queijo* and *cafezinho* guaranteed!”

“Sounds like a plan, Mr. Mendes,” I said, smiling. “I wouldn’t mind staying a bit longer at all!”

Additional Reading

- Amaral, D.S.S.L., C.L. do Couto, M.R. de Medeiros, M. Vichiato, P.W. da Silva, and L.S. Pereira. 2013. Relatório técnico: Infestação e manejo da mosca-branca-dos-ficus em logradouros públicos e áreas verdes do Município de Belo Horizonte – MG. Prefeitura de Belo Horizonte: Secretaria Municipal de Meio Ambiente Coordenadoria Municipal de Defesa Civil. 36 pp.
- Avery, P.B., C.M. Mannion, C.A. Powell, C.L. McKenzie, and L.S. Osborne. 2011. Natural enemies managing the invasion of the fig whitefly, *Singhiella simplex* (Hemiptera: Aleyrodidae), infesting a *Ficus microcarpa* hedge. *The Florida Entomologist* 94(3):696–698.
- Legaspi, J.C., C.M. Mannion, D. Amalin, and B.C. Legaspi, Jr. 2011. Life table analysis and development of *Singhiella simplex* (Hemiptera: Aleyrodidae) under different constant temperatures. *Annals of the Entomological Society of America* 104(3):451–458.
- Velasco, G.D.N., R.G. Moura, E.B. Filho, and H.T.Z. do Couto. 2011. Evaluation of the infestation of *Singhiella simplex* (Hemiptera: Aleyrodidae) on *Ficus microcarpa* in São Paulo city, Brazil. *Revista de Agricultura* 86(2):134–141.

spent one year at Indiana University–Bloomington. She is currently working with water resources management at the Foundation School of Sociology and Policy of São Paulo.



Detail of the eggs (A), nymph (B), and adult (C) of *Singhiella simplex* in the inferior part of the *Ficus* sp. leaf sample.

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The Case of the Defiant Ficus Quiz

1. The *Ficus* genus Dendro and Codit were inspecting are actually ill suited to urban landscapes because
 - a. they require large amounts of water, making them expensive to maintain
 - b. they require full sun to thrive, building shadows can cause diminished growth
 - c. they are well known for their wide ranging roots, and concrete infrastructure can get in the way
 - d. All of the above
2. The *Ficus microcarpa* species commonly used for tree planting in Brazilian cities is actually native to
 - a. the Asia-Pacific region
 - b. the tropical central American region
 - c. the Central European region
 - d. the desert Southwest of North America
3. The *Ficus* trees had successfully survived their urban environment for several decades, with some trees as old as
 - a. 70 years
 - b. 80 years
 - c. 90 years
 - d. 100 years
4. Dendro was able to diagnose the problem by examining
 - a. soil samples
 - b. cambium samples from an incremental borer
 - c. leaf samples
 - d. conch samples
5. *Sighiella simplex*, popularly known as _____, were identified as the external factor stressing the trees
 - a. lacewings
 - b. ladybird beetles
 - c. fig whitefly
 - d. sap worms
6. *Signhiella simplex* attacks a tree by
 - a. burrowing into the cambium
 - b. sucking nutrients from the sap in the back of the leaves
 - c. covering the stomata of a leaf and suffocating it
 - d. chewing terminal buds

7. In warmer climates *Sigheilla simplex* may have a life cycle that lasts up to
 - a. ten days
 - b. two weeks
 - c. two months
 - d. 28 days
8. Symptoms *figus* trees show when suffering a *Sigheilla simplex* infestation is
 - a. yellowing of the leaves
 - b. leaf drop
 - c. dead branches
 - d. all of the above
9. Dendro suggested paying careful attention to fallen leaves because
 - a. immature fig whiteflies can be hosted there
 - b. It's a natural breeding ground for fungi
 - c. the extra moisture held against the soil can cause root rot
 - d. they can be a vector to transfer the problem to other trees
10. Codit suggested attacking the *Sigheilla simplex* by
 - a. using injected fungicides
 - b. using foliar sprays
 - c. using natural predators
 - d. replacing the trees with a species not susceptible to the stressor