Leaf infected with rust. (Photo: Alex Keller)

Central American Coffee Rust Crisis: No Easy Answers

Photos by Flor de Maria Aleman of El Salvador Coffee Council

A simple lack of knowledge and experience with managing the fungus exacerbated the problem

By Jenny Neill

Finca Santa Isabel, often held up as a shining example of success with organic agriculture in coffee, may not make it. The culprit? A fungus known there as *roya* that often goes unnoticed until bright-orange pustules start appearing on the underside of leaves. This parasite interrupts the tree's ability to nourish itself by redirecting nutrients to those colorful lesions. Eventually, the infected leaves shrivel up and fall off.

By the time this leaf rust epidemic was detected, it was too late for fumigation to be an effective control.

The Keller family owns Finca Santa Isabel, located in Santa Rosa, about an hour southeast of Guatemala City. It became the second estate to be Rainforest Alliance-certified in 1997, and the Kellers were named Sustainable Standard-Setter by the nonprofit in 2003. In a 2009 profile, the family was lauded for its successes with sustainable practices: caring for the land, being a profitable business, and having enough left over to help build needed infrastructure for their community. They grow arabica at an elevation of 3,500 to 4,500 feet above sea level in a zone most growers thought roya could not thrive.

But the rust outbreak is happening almost everywhere. By most accounts, large and low-lying estates accustomed to spraying to protect their trees will survive. Rainy and windy weather carry the spores, which transmit the infection from tree to tree. Growers in areas prone to the rust use fungicide prophylactically twice a year. Spraying, which typically occurs in July and September in Central America, is timed to happen just before and just after periods of heavier precipitation.

Farmers caught unprepared, like Keller, have to decide whether and how to fight this blight. Renovation, a lengthy and expensive process that entails removing infected plants and replanting young trees, is an easier choice for a few. For those without financing options and technical assistance, the way forward is less clear.

This familiar foe for plantations in lower-lying areas has devastated this medium-sized

estate. Alex Keller, financial manager at Finca Santa Isabel, broke with his upbeat tone from 2009 by recently declaring: "I'm the fourth generation working in this business. This crisis is going to reshape the way we do things. Our sector is going to have to reinvent itself. I don't know if everybody's going to be able to make it."

The fungus is causing huge shortfalls in coffee cherries at higher elevations and in shaded areas of Central America, in places where growers used to feel relatively immune. Keller was one of them and he relayed a stunning loss: "Last year, we had about a 70% drop in production and so did many other farms that work conventionally around us. The main reason is that nobody thought that it was going to be so bad."

Jean Ristaino, William Neal Reynolds Distinguished Professor at North Carolina State University, agreed:

"As a plant pathologist, I've seen coffee rust in the past, but this year it's the worst outbreak that has really ever occurred in the region. It's more severe because the pathogen basically expanded its geographic range and moved into areas where it normally wouldn't occur in the past."

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"Double whammy" for smaller estates and workers

While production overall is down less than 20% for the 2012-13 harvest, according to PROMECAFE, individual farms are seeing losses on a scale similar to what has happened at Finca Santa Isabel. Coffee is more susceptible to rust when fruit load is high, but that is only one part of the problem. Jacques Avelino, plant pathologist from Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) posted at (CATIE) and (PROMECAFE), explained: "The year after a strong attack, production declines and plants become less susceptible to rust through this mechanism."

The grower's main tactic, once rust strikes, is to stump the trees and wait for them to regrow. If the shrubs survive, at least two years must pass before the fruit returns. Alternatively, he can remove infected plantings and replant. Both options are economically challenging because few Central American farmers who rely on coffee have food or other cash crops already growing on their estates. For this reason, production will continue to decline and remain low for at least two more years—and perhaps longer for those who choose to renovate.

Worse news for growers and workers alike is that already-low coffee prices are continuing to decline worldwide. With green Arabica fetching less on the market, most estate owners face difficult choices—and so do the seasonal workers who can no longer count on having jobs when harvest time comes. For the 2012-13 harvest season, Keller said that layoffs were necessary: "We had to reduce about half the people. For this coming year, we're probably going to have to reduce a little bit more."

Many agencies and analysts predict that demand for seasonal hired hands will be at about 60% of the level it was before this latest roya epidemic. If that bears out, the decrease in demand will be twice what it was this year. Against such dire predictions, the Famine Early Warning System has issued alerts that hunger will rise above current levels during lean seasons. National emergencies have been declared in Guatemala, Honduras, and Costa Rica.

Severity begs news questions

Central America has seen coffee rust epidemics in the past. A 1989-90 outbreak in Costa Rica and one that spread through the Nicaraguan highlands in 1995-96 were later attributed to some of the same factors thought to be behind the latest disaster. Heavy rains and inadequate fungicide applications contributed to the loss.

"The epidemics of 1989 and 1995 were episodic. The year after the outbreak, the situation came back to normal," Avelino declared. The 2012-13 situation may be a result of similar precursor; however, many fear that the scale and intensity is a harbinger of a larger change.

Avelino and Ristaino both talked of climate change shifting local weather patterns as a possible explanation for the severity of the roya outbreak. The warmer weather, combined with unusually dry and windy periods, likely dispersed the spores over larger

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distances than they would normally have traveled.

All interviewed for this article agreed that the disease reached new areas unexpectedly. Guatemalan workers on coastal farms in lower altitudes that face the Pacific sprayed ahead of time. Farmers in these regions have also planted rust-resistant varieties as part of recovering from earlier outbreaks. Those growing coffee in hillier areas at higher altitudes did not. Nor do they use fungicide routinely.

A simple lack of knowledge and experience with managing the fungus exacerbated the problem. Avelino explained: "In high-altitude zones, producers do not generally apply preventive chemical treatments against leaf rust. Treatments were thus launched relatively late in 2012, often not until the damage was already irreversible."

Some have also speculated that the underlying organism may be changing. Sessions at the Coffee Rust Summit, an emergency meeting held April 17-20 in Guatemala City, proposed the idea that the roya species may be reproducing sexually. If so, present methods for control may in fact be less effective as mutation occurs. This hypothesis is one of many for which research could find an answer, eventually.

Ristaino admitted, "We don't know the answers. We need to find out whether there is a new strain or whether there's a strain that's more tolerant to higher temperatures. The pathogen itself could be adapting to temperature variation or it could be a combination of the weather events with growers not using fungicides making disease more severe."

Determining whether this outbreak will turn out to be a single episode like some earlier ones will take time. Already, weather conditions are different than last year's. To understand what combined to catalyze this epidemic means extensive study into climate, farm management, and pathogen evolution. Avelino explained: "If we have another severe outbreak this year that means that other things have probably occurred last year—maybe a change in the aggressiveness of the pathogen or an adaptation to different environmental conditions."

Sorting out whether roya itself is changing involves inoculating coffee leaves with rust samples taken from places where the outbreak was severe—and from where it was not a problem. Observing the development of disease under controlled conditions will help determine whether the time to sporulation or the intensity of sporulation differs between cultures. Studies like this are part of the medium-to-long-term actions proposed at the Coffee Rust Summit.

Farmer's future?

Before roya struck, having more than 95% of the estate planted to Caturra and Catuai made sound business sense. Now that choice seems less obvious. Finca Santa Isabel has a dilemma: Keep or replant to the cultivars that win them accolades and corresponding premium prices at auction, or start working with rust-resistant varieties.

"It's a big hit. It's a very big hit. Emotional-wise and economically-wise, because it took many years to plant this plantation. A lot of this work has been lost," reflected Keller. "What we feel we're going to have to do is replant a large area because many of the plants look too weak, and we fear that by just pruning them, it's not going to be enough."

Rust propagules detached from the leaves. (Photo: Jacques Avelino)

Others have no such choices to consider. Ristaino cautioned, "Many that are losing jobs are not actually growers. They're workers. They're laborers that work on the larger plantations so they've had to change what they're doing. People migrate and have to leave the country because they can't make a livelihood."

Government and aid organizations met with growers, scientists, and other industry players (buyers, packers, and roasters) at the Coffee Rust Summit to brainstorm how to speed the recovery process along. Proposals ranged from implementing an early warning system to establishing a Rust Response Coordinator. (At press time, the interview process for hiring a contractor to work in this role at PROMECAFE was underway. An announcement on a hire is expected in July.)

Many challenges remain. Tim Schilling, executive director of World Coffee Research, spoke about the importance of such ef-

forts: "It's fully likely that the same kind of thing will occur in another area of the world. If it's not rust, it will be another one of the pests or diseases that attack coffee, because with the climate acting up the way it is, things getting just generally warmer we will be seeing more of this kind of thing. We need to be much more keenly prepared for events like this, around the world, in the future."

Keller could not say how things will change at Finca Santa Isabel going forward. The only conclusion he would arrive at about his estate and those around it was this: "The ones that are left, they're definitely going to be better and stronger producers than a couple of years ago."

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Coffee shrubs at Finca Santa Isabel, Guatemala before the roya epidemic. (Photo: Alex Keller)