

No magic bullet for coffee rust eradication

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Spraying fungicide to kill coffee rust disease, which has ravaged Latin American plantations since late 2012, is an approach that is "doomed to failure," according to University of Michigan ecologists.

Instead, management practices focused on maintaining the complex web of ecological interactions among coffee plantation organisms—including insects, fungi, plants, birds and bats—are much more likely to succeed in the long run, according to the U-M researchers, who provide an overview of the recent Latin American coffee rust epidemic in a paper published online Jan. 22 in the journal *BioScience*.

Coffee rust is a fungus, but spraying fungicides to kill it may inadvertently destroy natural fungal enemies of coffee rust that help to keep it in check.

And the ongoing abandonment of traditional shade-growing techniques, in which coffee is grown beneath a canopy of trees, likely reduces the diversity and abundance of beneficial insects and opens the plantations to winds that help disperse coffee rust spores, according to U-M ecologist John Vandermeer and his co-authors, Ivette Perfecto and Doug Jackson.

"Small, seemingly trivial changes in environmental conditions can generate dramatic shifts in the underlying dynamics of the disease," the researchers wrote. "The techniques of so-called modernization (e.g., cutting shade, applying fungicides) may gradually eliminate what has been effectively autonomous biological control" of coffee rust.

"A movement back toward more shaded systems, with minimal application of agrochemicals, might be an appropriate recommendation for coffee farmers in the region."

Vandermeer is a professor in the Department of Ecology and Evolutionary Biology and at the School of Natural Resources and Environment. Perfecto is a professor at SNRE. Jackson was a U-M graduate student when much of the research was done and now works at the U.S. National Oceanic and Atmospheric Administration.

Vandermeer and Perfecto have operated research plots at an organic coffee plantation in southern Chiapas, Mexico, for about 16 years. Last year, more than 60 percent of the coffee plants there experienced more than 80 percent defoliation due to coffee rust fungus, and nearly 9 percent of the plants died.

The recent coffee rust epidemic damaged plantations from Mexico to Peru, and applying fungicide is one of the main control methods promoted in the affected countries. But generalized fungicides can also kill the white halo fungus, which is known to attack coffee rust.

If conventional disease control methods alone are used to address the coffee rust problem, the disease may prove to be intractable in Latin America, according to the authors. It's even possible that coffee rust will maintain its epidemic status indefinitely in the region, though additional research would be required to determine if that is likely to happen.

Coffee rust "threatens the livelihoods of millions of farmers and will potentially distort the economies of many of the world's most vulnerable nations," according to Vandermeer and his colleagues. "It is reasonable to suggest that the situation calls for a revitalization of what pest control specialists have come to call 'autonomous pest control.'"

Provided by University of Michigan

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