

Vine removal technique foils devastating grape disease

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Removing not only a diseased grapevine but the two vines on either side of it can reduce the incidence of leafroll disease, a long-standing bane of vineyards around the world, Cornell researchers have found.

Leafroll disease, a virus spread by mealybugs, damages grapevines, reduces yield and alters grape quality—all of which can detrimentally affect wine quality and cost growers tens of thousands of dollars per hectare. There's no cure for leafroll disease, so growers have traditionally attacked it by tearing out infected [vines](#)—that is, roguing, or removing "rogue" plants—and replacing them with healthy ones.

In the first study of its kind, scientists at Cornell AgriTech have documented that the new technique, called spatial roguing, can reduce the incidence of leafroll disease in commercial vineyards. Removing the extra vines eliminates the mealybugs' means of transporting the leafroll virus, creating a moat-like space. The study was published in the April issue of the *American Journal of Enology and Viticulture*.

For the study, Marc Fuchs, professor in the Plant Pathology and Plant-Microbe Biology Section in the School of Integrative Plant Science at Cornell AgriTech, and his team set up a cabernet franc plot at Sheldrake Point Winery in Ovid, New York, where they documented the presence of leafroll disease and mealybugs, and then tested the effectiveness of spatial roguing and mealybug insecticide management, both alone and in combination.

Over a five-year period, they found that spatial roguing was effective in quickly reducing the incidence of leafroll virus—from 4% in 2016 to almost zero in 2020-21—while the unrogued vines' viral incidence increased from 5% to 16%. Insecticides reduced mealybug population to almost zero over the same period; in untreated vines, it grew 57 to 257 times greater. But insecticides were not shown to limit the number of newly infected vines.

"Managing leafroll used to seem a bit like a 'whack-a-mole' game because it would keep popping up," said Dave Wiemann, vineyard manager at Sheldrake Point Vineyard. "By acting quickly and utilizing

Fuchs' strategy, we now know that we will avoid having to remove large sections of vineyards in the future. That will translate into more consistent yields and quality, which are both critical to our winery's success."

Fuchs has been researching grape viruses for decades and had been intrigued by the possibilities of spatial roguing. But it wasn't until 2015, when he collaborated with Miguel I. Gómez, the Robert G. Tobin Food Marketing Professor in the Charles H. Dyson School of Applied Economics and Management, and Shadi Atallah, Ph.D., his graduate student at the time, that he was able to gather some numbers to bolster his case.

"They modeled what they are referring to as the bio-economic spread of the disease, where one takes into account how the disease is spreading in the vineyard and what the economics have been for the grower," Fuchs said. "Meaning, do you remove just one vine or also the two adjacent vines, and how much money do you make or lose? When is it economical to do one thing versus the other?"

There is a cost to spatial roguing, Fuchs said, in terms of the labor needed to removing disease vines and replanting with healthy vines, in addition to the loss of full production for the five years it takes a new vine to begin producing.

"Growers are used to making business decisions on how to best manage their vineyards based on immediate profits," he said. "But we are convinced that it's worth losing a little bit of money upfront, or investing money upfront, because dividends would be incurred much faster down the road."

Sometimes, leafroll infestation can be so high—a virus incidence of 25% or more—that it's not economical to employ spatial roguing. In those

cases some growers will choose to do nothing and live with the reduced quality of their grapes, while others will determine that total [vineyard replanting](#) is the better strategy.

The concept of spatial roguing may puzzle some growers and winemakers, Fuchs said.

"Growers like to grow things, not tear them out," he said. But as more of them adopt the tactic, he believes the results will speak for themselves. "My strategy is to identify some [early adopters](#) and let them spread the word and convince their peers of the efficacy of the new methodology."

More information: Stephen Hesler et al, Spatial Roguing Reduces the Incidence of Leafroll Disease and Curtails its Spread in a Finger Lakes 'Cabernet Franc' Vineyard, *American Journal of Enology and Viticulture* (2022). [DOI: 10.5344/ajev.2022.22004](https://doi.org/10.5344/ajev.2022.22004)

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