

# Rainfall suspected culprit in leaf disease transmission

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Rainfalls are suspected to trigger the spread of a multitude of foliar (leaf) diseases, which could be devastating for agriculture and forestry. Instead of focusing on the large-scale, ecological impact of this problem, researchers from the Massachusetts Institute of Technology (MIT) in Cambridge and the University of Liege in Belgium are studying the phenomenon from a novel perspective: that of a single rain droplet.

"One may easily picture that a raindrop impacting a contaminated leaf grabs some of the pathogens there before being ejected and flying towards some healthy plant in the neighborhood," says University of Liege assistant professor of engineering Tristan Gilet, who will present the team's research at the upcoming meeting of the American Physical Society (APS) Division of [Fluid Dynamics](#) (DFD) in Baltimore, Md., along with MIT colleagues Lydia Bourouiba, a postdoctoral associate, and John Bush, professor of applied mathematics. But a more plausible scenario, Gilet continues, is that bacteria, viruses, and fungi dissolve into rainwater sitting on the surface of a leaf, and that this disease-carrying rainwater is then pushed off the leaf by other raindrops.

Using a high-speed camera to film artificial rainfall on a series of plants, the team identified two patterns of droplet ejection. The first is direct: a raindrop hits pathogen-infested water on a leaf and splashes some of it off.

The second is indirect: a [raindrop](#) hits the [leaf](#), whose violent movement ejects some of the disease-carrying water that had been sitting on it.

From their modeling and experiments, the team concludes that the direct splashing method is a more efficient disease spreader for relatively large and rigid leaves, while smaller and more pliant leaves are more likely to be affected by the indirect method.

The cost of [plant diseases](#) is estimated at three billion dollars a year in the United States alone, the researchers write. They say they hope their work will provide some guidance for farmers, by providing suggestions for the optimal spacing between plants, for example.

**More information:** The talk, "Foliar disease transmission: insights from fluid dynamics," is on Monday, Nov. 21. Abstract: [meeting.aps.org/Meeting/DFD11/Event/155026](https://meeting.aps.org/Meeting/DFD11/Event/155026)

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