

Just add water: New discovery in plantdisease mechanism

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Credit: Michigan State University

We all know that when it rains, plants grow. When it doesn't, they don't.

However, new research led by plant scientists at Michigan State University has found that too much rain, coupled with prolonged high levels of humidity, can result in more plant disease.



The research, detailed in the publication *Nature*, sheds new light on how climate conditions can influence <u>disease outbreaks</u> in all <u>plants</u>, including field crops, something of concern as we confront climate change.

The scientists discovered that certain virulent <u>bacteria</u> are able to directly inject a protein into a plant's cells that increases the levels of water content in a part of the plant known as the apoplast, where bacteria live.

This, in turn, results in an increase in the prevalence of disease.

"We discovered a new mechanism that allows bacteria to infect plants," said Sheng-Yang He, a University Distinguished Professor of <u>plant</u> <u>biology</u>, an investigator at the Howard Hughes Medical Institute-Gordon and Betty Moore Foundation, and a member of the research team. "What we discovered, in addition to their ability to suppress the plant's immune system, is that bacteria also create a watery environment inside the plant so that they can cause disease."

Add to that conditions of high humidity, He said, and you have a recipe for plant-disease disaster.

It's been a long-standing concept among plant scientists that for disease to occur, the plant needs to be susceptible and the pathogen that attacks it must be very virulent.

However, said Xiu-Fang Xin, MSU research associate and lead author of the paper, it turns out that's not enough.

"What we discovered in this study is that humidity is required for bacteria inside the leaf to accumulate water," she said. "Conditions need to be right. That's why we don't see widespread plant diseases every year."



It's easy to look through past historical weather records to see when a period of high humidity correlated with a disease outbreak. One example: A devastating outbreak of apple fire blight about 10 years ago that wiped out much of west Michigan's apple crop.

"The apples are always there and the pathogens that live in them are always there," He said. "That year, there were rains and long periods of high humidity during apple blossom season that created a perfect storm for disease."

The researchers are hopeful that this discovery will guide efforts to prevent future outbreaks.

"For example, if we were able to accurately forecast the weather we could take some precautionary measures to prevent this from happening," Xin said.

More information: Xiu-Fang Xin et al, Bacteria establish an aqueous living space in plants crucial for virulence, *Nature* (2016). DOI: 10.1038/nature20166

Provided by Michigan State University

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