Using pathogen-specific viruses to control pathogen outbreaks

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Greenhouse full of tomatoes destroyed by Ralstonia. To date no control method is available. Credit: Zhong Wei

Researchers from the Utrecht University, in collaboration with colleagues at the University of York (UK) and the Nanjing Agricultural University (China) have developed a new technology to selectively destroy the pathogen that causes the devastating bacterial wilt disease without side effects on other beneficial microorganisms.

Bacterial wilt disease caused by Ralstonia solanacearum infects several plants including tomatoes, potatoes, banana and roses. It causes huge economic losses around the world, and to date, no control method is available.

"Current management of plant diseases rely on aggressive chemicals. These treatments are, however, extremely damaging to beneficial microorganisms that naturally protect plants. As a result, fumigation only provides a brief respite, but pathogens outbreaks become progressively worse after every treatment," plant biologist Alexandre Jousset from the Institute of Environmental Biology at Utrecht University explains.

Precision medicine

"Here, we developed a novel approach using bacteriophages: special viruses that only attack pathogenic bacteria. This precision medicine is fully natural and highly efficient," Jousset says. This new technology provides a long-lasting protection by destroying the pathogen while allowing soil life to recover. Even if pathogens survive the treatments, they are so weakened that they can no longer compete with natural microbes and are thus eradicated. The researchers have published their results in *Nature Biotechnology*.

Bacterial plant diseases such as Ralstonia, Clavibacter, Xyllela, Xanthomonas and Erwinia are major issues for the Dutch agrifood and horticulture sectors. By providing the first solution to these scourges, the study forms the basis of highly efficient and sustainable plant protection

methods that make pesticides redundant.

More information: Xiaofang Wang et al. Phage combination therapies for bacterial wilt disease in tomato, *Nature Biotechnology* (2019). DOI: 10.1038/s41587-019-0328-3

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