A plant defense metabolite specifically suppresses virulence of pathogenic bacteria

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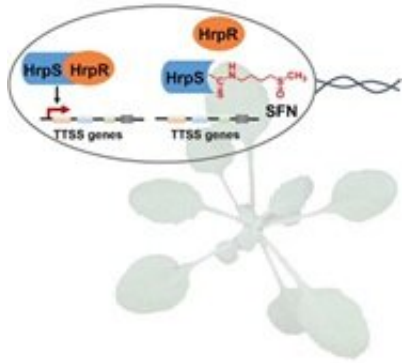

Figure1. Model for the SFN-mediated repression of virulence gene expression in the bacterial pathogen. Credit: IGDB

When attacked by pathogenic microbes, plants protect themselves by deploying numerous secondary metabolites inhibitory to the pathogen. These metabolites are thought to nonspecifically inhibit both pathogenic and beneficial microbes, which is not desirable for plants.

A research team led by Prof. ZHOU Jianmin from the Institute of Genetics and Development Biology of the Chinese Academy of Sciences and LEI Xiaoguang at Peking University discovered a new mechanism by which a plant defense compound targets pathogenic bacteria without having a deleterious effect on commensal bacteria.

Many Gram-negative pathogenic bacteria, such as Pseudomonas syringae, secrete virulence proteins into plant cells through a specialized protein secretion system, a process essential for pathogenicity.

In this study, the researchers identified sulforaphane, a natural product produced by cruciferous plants, covalently attaches to a specific residue of a bacterial protein that is needed to express genes encoding the secretion system. As such the metabolite specifically decreases virulence of the pathogenic bacteria and protects plants. This metabolite does not affect commensal bacteria, as the target protein only exists in the pathogen.

This study demonstrated that plants do possess "smart" chemical that attacks enemy without harming friends, which has not been discovered before.

The work has been published online in *Cell Host & Microbe* on April 8, 2020.

More information: Wei Wang et al. An Arabidopsis Secondary Metabolite Directly Targets Expression of the Bacterial Type III Secretion System to Inhibit Bacterial Virulence, *Cell Host & Microbe* (2020). DOI: 10.1016/j.chom.2020.03.004

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