Scientists discover a new form of pesticide that neutralizes pathogens attacking rice

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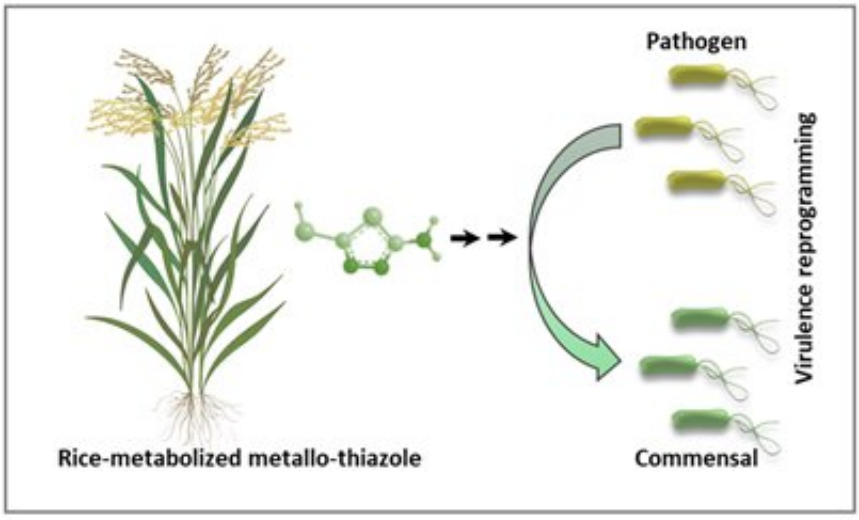

The virulence reprogramming method developed by the researchers using rice-metabolised metallo-thiazole. Credit: Haruna Matsumoto

Rice is one of the most important staple foods globally, providing one fifth of the calories consumed by humans. However, the major areas where rice are grown are blighted by pathogens—organisms that cause disease.

To date, this problem has been treated with the use of chemical pesticides that typically target the plant-pathogenic fungi. But, with none of these treatments wholly effective, and many considered unfriendly to

the environment, researchers have been seeking alternative solutions.

In a study published in the journal *Fundamental Research*, a group of researchers from China, Austria and Japan, outline a promising solution which uses a compound that has no harmful effects on the environment or humans consuming the rice.

Haruna Matsumoto, one of the study's authors, explains: "This work is based on an interesting phenomenon that we observed in certain rice fields. In rice plants grown in different and geographically distant locations, the bacteria-associated molecules required for a bacterium to cause disease showed substantial variations. We were curious to discover what the so-far unidentified factor affecting the pathogen's virulence was, and whether it was related to the host plant. By implementing metabolic profiling, we identified 5-Amino-1,3,4-thiadiazole-2-thiol, a plant metabolization product of thiazole-class agrochemicals, and confirmed that it lowers a pathogen's ability to harm without killing or otherwise affecting the pathogen."

According to the co-corresponding author of the study, Tomislav Cernava, "this anti-virulence effect triggered by the plant-converted agrochemical is a novel finding, and has substantial implications for supporting plant defense systems in counteracting bacterial pathogens. It is particularly important for combatting pathogens endowed with small molecule virulence factors, because plants are typically unable to respond to these when attacked." He adds that they "believe similar mechanisms have the potential to combat pathogens in other types of crops."

For the researcher who led the study, Mengcen Wang, the hope is that the team's results will encourage more scientists to continue investigating the complexity of the interactions between plants, microbes and the environment. "This would set the basis to develop more sustainable

approaches to secure global rice production."

More information: Haruna Matsumoto et al, Reprogramming of phytopathogen transcriptome by a non-bactericidal pesticide residue alleviates its virulence in rice, *Fundamental Research* (2022). DOI: 10.1016/j.fmre.2021.12.012

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