Bacteria engage sulfur for plant salt tolerance
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Enterobacter sp. SA187, which they found can make crops resistant to various stresses including heat, drought and salt tolerance.

Hirt's team has now analyzed the genetic and metabolic changes that happen inside SA187 and the model research plant Arabidopsis when they interact under salt-free and salt-stressed conditions.

"We wanted to understand the molecular mechanisms behind the salt tolerance that results from plant interactions with SA187," says plant scientist Rewaa Jalal, who obtained her Ph.D. at KAUST and is now an assistant professor at the University of Jeddah.

Generally, when plants are exposed to too much salt, their cells release reactive oxygen species, causing cell damage and reducing plant growth and crop yields. The researchers found that salt stress triggers sulfur metabolism in SA187 bacteria living inside Arabidopsis roots. This in turn leads to the release of sulfur metabolites that feed sulfur metabolism in the Arabidopsis plant, generating a key antioxidant called glutathione that detoxifies the plant from salt-induced reactive oxygen species, enabling it to grow and thrive despite the stress.

"Another key finding of our investigations was that we can replace the protective function of SA187 against salt stress damage of the plant by directly adding sulfur metabolites, opening up the possibility to use probiotics in agriculture," says Hirt.

Along with molecular biologist Maged Saad and several current and previous students, Hirt is establishing a startup that aims to provide breakthrough technologies that can treat seeds or crop plants with SA187, saving Saudi farmers money and making saline agriculture a reality.

"We could meet most of the global demand for food production if knowledge like this is applied with the
proper tools to arid and semi-arid lands," says postdoc Hanin Alzubaidy.


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