

# Study reports novel role of enzyme in plant immunity and defense gene expression

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A recently published article in the *Molecular Plant-Microbe Interactions* journal provides new evidence that pathogens are hijacking the plant immune system to cause disease while providing insights into a newly

discovered mechanism.

A large variety of pathogens infect plants and cause different diseases, which can lead to reduced [crop yields](#). During infection, pathogens secrete effector proteins into the plant cell. Some of these proteins target plant proteasomal degradation machinery, which is responsible for recycling proteins to regulate cell processes. Some E1, E2 and E3-ligase proteins have been identified as playing a role in plant susceptibility or resistance to pathogen invasion. SALT- AND DROUGHT-INDUCED RING FINGER1 (SDIR1) is an E3-ligase that degrades regulators of the plant hormone [abscisic acid](#) (ABA) in response to drought stress.

Ramu Vemanna from the Regional Center for Biotechnology and colleagues at the Noble Research Institute reported a new way SDIR1 impacts plant immunity during pathogen-induced stress. They found that silencing SDIR1 reduced the growth of host-specialized and nonhost *Pseudomonas syringae* strains in the model plant *Nicotiana benthamiana* and disease symptom development in the model plant *Arabidopsis thaliana*. Overexpressing SDIR1 in *A. thaliana* allowed even the nonhost *P. syringae* strain to multiply and cause disease symptoms.

In contrast to these results from challenging plants with biotrophic bacterial pathogens, SDIR1 overexpression lines are resistant to the necrotrophic bacterial pathogen *Erwinia carotovora*. The SDIR1 overexpression [plants](#) showed higher levels of ABA and jasmonic acid (JA), a plant hormone involved in defense against necrotrophic pathogens. In response to host-specialized *P. syringae* strain DC3000, SDIR1 overexpression led to less expression of genes that repress JA-mediated defense (signaling genes JAZ7 and JAZ8). The interaction of SDIR1 with the JA pathway indicate it is a susceptibility gene for biotrophic pathogens like *P. syringae* yet involved in defense against necrotrophic pathogens like *E. carotovora*.

"These findings open up new research avenues to discover the SDIR1-associated mechanisms that can harness the crop improvement by altering different plant traits," Ramu said. "The SDIR1 is also a potential target for genome editing in order to enhance crop protection. If the structure of SDIR1 is solved, more opportunities evolve to design CRISPR targets and drug-like molecules to protect crops from [pathogens](#) and abiotic stresses."

**More information:** Vemanna S. Ramu et al, A Novel Role of Salt- and Drought-Induced RING 1 Protein in Modulating Plant Defense Against Hemibiotrophic and Necrotrophic Pathogens, *Molecular Plant-Microbe Interactions* (2020). [DOI: 10.1094/MPMI-09-20-0257-R](https://doi.org/10.1094/MPMI-09-20-0257-R)

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