The plant immune regulator RIN4 against bacterial pathogens

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Plants can be infected by all classes of pathogens including bacteria, fungi, oomycetes, viruses, feeding insects, and nematodes. Although plants lack circulatory immune cells like lymphocytes in animals, they possess a sophisticated innate immune system capable of recognizing all pathogen classes. This recognition is mediated by immune receptors residing inside and outside the cell, which perceive conserved microbial features and secreted pathogen virulence proteins, known as effectors. Recognition of pathogen components leads to the activation of immune responses including production of reactive oxygen species, fortification of the plant cell wall, and induction of defense-associated genes. Much of our understanding of the plant immune system comes from studying the molecular interactions between the bacterial pathogen *Pseudomonas syringae* and the model plant *Arabidopsis thaliana*. A key regulator of plant immunity is the RIN4 protein, conserved across land plants. Several *P. syringae* effectors induce post-translational modifications on RIN4, such as phosphorylation and proteolysis, to favor pathogen colonization. However, some Arabidopsis accessions encode immune receptors that recognize effector-induced RIN4 modifications, inducing stronger immune responses to kill and prevent spread of the pathogen. In an Arabidopsis accession lacking immune receptors that perceived effector-induced RIN4 modifications, mimicking RIN4 phosphorylation renders plants more susceptible to *P. syringae* infections and have compromised immune responses. RIN4 does not possess enzymatic activity but exhibits a flexible structure, characteristic of hub proteins mediating protein-protein interactions. We hypothesize that RIN4 acts as an adapter protein to facilitate protein complex formation and immune signaling. To understand how RIN4 phosphorylation promotes disease susceptibility we performed protein immunoprecipitation and mass spectrometry analyses to identify RIN4 protein complexes. RIN4 associates with proteins involved in cellular trafficking, responsible for the uptake and secretion of compounds, including antimicrobial compounds. We are investigating the role of RIN4 in this important biological process, in particular its contribution to immune signaling.