A Phytophthora capsici RXLR effector manipulates plant immunity by targeting RAB proteins and disturbing vesicle-mediated protein trafficking pathway

Tianli Li[1], Gan Ai[1], Xiaowei Fu[1], Jin Liu[1], Hai Zhu[1], Ying Zhai[2], Weiye Pan[1], Danyu Shen[1], Maofeng Jing[1], Ai Xia[1], and Daolong Dou[1]

[1]Nanjing Agricultural University
[2]Washington State University

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Abstract

The oomycete pathogen Phytophthora capsici encodes hundreds of RXLR effectors to enter plant cells and suppress host defense responses. Only few of them are conserved across different strains and species. Such 'core effectors' may target hub immunity pathways that are essential during Phytophthora pathogens interacting with their hosts. However, the underlying mechanisms of core RXLRs-mediated host immunity manipulation are largely unknown. Here, we report the functional characterization of a P. capsici RXLR effector, RXLR242. RXLR242 expression is highly induced during the infection process. Its ectopic expression in Nicotiana benthamiana promotes Phytophthora infection. RXLR242 physically interacts with a group of RAB proteins, which belong to the small GTPase family and function in specifying transport pathways in the intracellular membrane trafficking system. RXLR242 impedes the secretion of PATHOGENESIS-RELATED 1 (PR1) protein to the apoplast by interfering the formation of RABE1-7-labeled vesicles. Further analysis indicated that such phenomenon is resulted from competitive binding of RXLR242 to RABE1-7. RXLR242 also interferes trafficking of the membrane-located receptor FLAGELLIN-SENSING 2 (FLS2) through competitively interacting with RABA4-3. Taken together, our work demonstrates that RXLR242 manipulates plant immunity by targeting RAB proteins and disturbing vesicle-mediated protein transporting pathway in plant hosts.

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