Universität Basel

Research Project

Innate immunity and silencing in plant defense against pararetroviruses

Third-party funded project

Project title Innate immunity and silencing in plant defense against pararetroviruses
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The frontline of plant defense against non-viral pathogens such as bacteria, fungi and oomycetes is provided by transmembrane pattern recognition receptors that detect conserved pathogen-associated molecular patterns (PAMPs), leading to pattern-triggered immunity (PTI). To counteract this innate defense, pathogens deploy effector proteins with a primary function to suppress PTI. In specific cases, plants have evolved intracellular resistance (R) proteins detecting isolate-specific pathogen effectors, leading to effector-triggered immunity (ETI), an amplified version of PTI, often associated with hypersensitive response (HR) and programmed cell death (PCD). In the case of plant viruses, no conserved PAMP was identified so far and the primary plant defense is thought to be based mainly on RNA silencing, an evolutionary conserved, sequence-specific mechanism that regulates gene expression and chromatin states and represses invasive nucleic acids such as transposons. Endogenous silencing pathways generate 21-24 nt small silencing (s)RNAs - miRNAs and short interfering (si)RNAs - that repress genes post-transcriptionally and transcriptionally. We and others have shown that four distinct Dicer-like (DCL) proteins, which normally produce endogenous miRNAs and siRNAs, all contribute to the biogenesis of viral siRNAs in infected plants. Growing evidence indicates that RNA silencing also contributes to plant defense against non-viral pathogens. Conversely, PTI-based innate responses may contribute to antiviral defense. Indeed, intracellular R proteins of the same NB-LRR family are able to recognize both non-viral effectors and avirulence (Avr) proteins of RNA viruses, and as a result trigger HR and PCD in virus-resistant hosts. In some cases, viral Avr proteins also function as silencing suppressors. Our working hypothesis postulates that RNA silencing and innate immunity function in concert to fight plant viruses. Viruses counteract this dual defense by effectors that must suppress both PTI/ETI innate responses and silencing to establish successful infection. We further propose that plant pararetroviruses encode two types of effectors, a viral protein-based and a viral RNA-based. This project aims to validate these hypotheses in a comparative study of two distinct pararetroviruses - *Cauliflower mosaic virus* (CaMV) in *Arabidopsis and Rice tungro bacilliform virus* (RTBV) in rice.

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ID	Kreditinhaber	Kooperationspartner	Institution	Laufzeit - von	Laufzeit - bis
1407863	Pooggin, Mikhail	Ryabova Lyubov, Dr.	Institute of Plant Molecular Biology, Strasbourg	01.11.2009	30.11.2015