



Universität
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Research Project

Function of BAK1 in plant immunity

Third-party funded project

Project title Function of BAK1 in plant immunity

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Project Website <http://botanik.unibas.ch/en/botanical-research-groups/plant-physiology/current-research-projects/plant-immunity-regulation-of-plant-receptor-kinases/>

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Status Completed

In recent years, it became evident that the perception of **microbe associated molecular patterns (MAMPs)** plays a pivotal role in **plant immunity**. In Arabidopsis, the leucine rich repeat receptor kinase (LRR-RK) FLS2 forms one of the best characterized **pattern recognition receptors (PRRs)**, recognizing the bacterial **flagellin**, and is essential for defense against bacteria. Our recent research shed light on the importance of another type of LRR-RK represented by the Arabidopsis BRI1-associated kinase1 (**BAK1**): we have discovered that BAK1 is not only involved in the phytohormone brassinosteroid signaling but also in flagellin signaling and associates with the FLS2 receptor. In the course of my former project of the Swiss National Science Foundation (2008-2011), our studies firmly established the importance of BAK1 as central regulator of PRRs.

In the proposal for the next three years (2011-2014), we pursue and expand promising aspects of this former work. In particular we found that BAK1 over-expression in Arabidopsis plants induces constitutive defense responses, even under sterile conditions and leads to a "stunting" phenotype. This phenotype is different from those reported before, which reflected hyper-activation of the brassinosteroid signaling pathway. We want to elucidate if the accumulation of BAK1 activates PTI signaling, independently of the presence of MAMPs or if it induces another process. Emerging evidence indicates that BAK1, as an important regulator of MAMP signaling, may be under tight control by plant and guarded by resistance (R) proteins, another class of plant immune receptors. Here I propose to follow different genetic and biochemical approaches to further characterize the phenotype of the BAK1 over-expressing lines that were generated in my lab.

In a second part of this proposal, we want to use other tools and technical advances developed in our lab during the last three years to finally identify new PRRs regulated by BAK1. Using in vivo phospholabeling and coimmunoprecipitation approaches with antibodies recognizing BAK1 from Solanaceae, we want to identify the receptor for bacterial cold shock protein (CSP). In

The main interest of this project is in fundamental plant science. However, we hope to contribute with our work to the current efforts to understand basal disease resistance in life sciences in general. A better understanding of the PRR regulator BAK1 may also lead to new possibilities to enhance yield and natural basal disease resistance of crop. In addition, identification of the PRR for bacterial CSP may open doors in crop protection and allow new approaches in the agrochemical and agro-biotechnological industry.

Keywords plant immunity, receptor kinases, PRR, PAMP/MAMP

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Follow-up project of [6233 Regulation of LRR-Receptor kinases in plant innate immunity](#)

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