【Grant-in-Aid for Scientific Research (S)】

Biological Sciences (Agricultural Sciences)

Title of Project : Molecular Basis of Infection Strategy in Plant Pathogenic Fungi: Host Recognition and Infection Structure Development

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Research Project Number : 15H05780 Researcher Number : 80183797
Research Area : Plant Pathology
Keyword : Plant Pathogenic Fungi

【Purpose and Background of the Research】

Colletotrichum species has specific trait as model plant pathogen for the study of infection mechanisms of plant pathogens. In our previous study, we have elucidated that plant pathogenic fungi recognize plant surface signals and form infection structure in response to environmental signals and that plant pathogenic fungi establish infection by communicating through interphase formed between fungal cells and plant cells and construct biotrophic interaction by suppressing plant immunity. This study deals with the molecular analysis of host recognition and infection structure formation of *Colletotrichum orbiculare*, an anthracnose disease fungus, thus establish the model for infection strategy of plant pathogenic fungi. Through this approach, we are aiming to explore the potential target metabolisms and genes in which involved for the development of novel antifungal reagents harmonious to environment, in view of developing innovative plant disease management.

【Research Methods】

We have identified genes and metabolisms that are essential for proper infection related morphogenesis and pathogenesis of *C. orbiculare*, which include melanin biosynthesis, signal transduction pathway, peroxisome function, cell wall integrity, and effector protein secretion. In this study, based on our previous cutting edge findings about fungal pathogenesis, we will further deepen the biology of plant-microbe interactions. Through this study, we are aiming to get fundamental understandings for the control of plant disease. Especially in this study, we divided the infection process into pre-penetration stage and post-penetration stage. In the pre-penetration stage, we will try to understand the mechanisms, how plant pathogenic fungi recognize host plant for the initiation of infection, and in the post-penetration stage, we will focus on how fungal pathogens manage plant immunity from the view point of the functional mechanisms of secreted effector proteins.

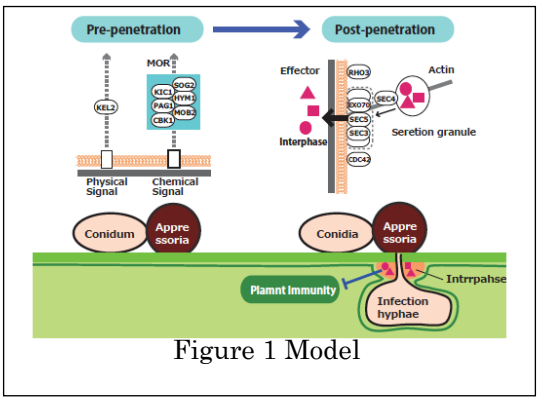

Figure 1 Model

【Expected Research Achievements and Scientific Significance】

In this study, we will obtain essential data for the understanding of infection mechanisms of plant pathogenic fungi. The study will constitutes fundamentals for the development of novel and challenging way of plant disease control. Our study will also contribute basic biology in the field of plant-microbe interactions and developmental biology of filamentous fungi.

【Publications Relevant to the Project】

・Kubo, Y. and Takano, Y. (2013) Dynamics of infection-related morphogenesis and pathogenesis in *Colletotrichum orbiculare*. Journal of General Plant Pathology 79: 233-242.
・Kubo, Y. (2011) Appressorium Function in *Colletotrichum orbiculare* and Prospect for Genome Based Analysis. In Morphogenesis and Pathogenicity in Fungi Series: Topics in Current Genetics, Vol. 22 Pérez-Martín, José and Di Pietro, Antonio (Eds.) 1st Edition., pp115-131.

【Term of Project】 FY2015-2019
【Budget Allocation】 98,500 Thousand Yen

【Homepage Address and Other Contact Information】

http://ykubo.blog.eonet.jp/