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

Biological Sciences (Agricultural sciences)

Title of Project : Mechanism of disease caused by deficiency of degradation of tRNA intron in mitochondria

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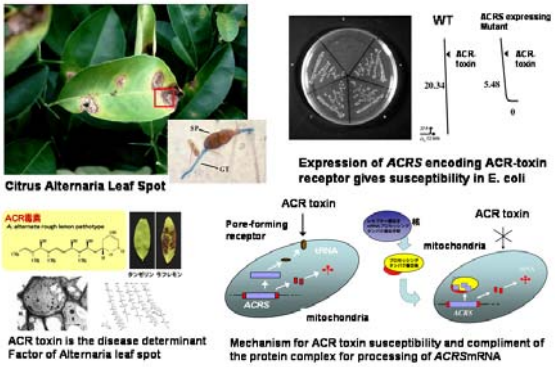
Research Area : Plant Pathology

Keyword : Gene, Plant, Mitochondria, Host-selective toxin

【Purpose and Background of the Research】

The host specificity of the rough lemon and tangerine pathotypes of *Alternaria alternata* depends upon the production of host-selective toxins (HSTs). The toxin from the rough lemon pathotype was named ACR-toxin I (MW 496).

ACR-toxin causes uncoupling similar to classic protonophores with a loss of membrane potential causing a leakage of co-factor, NAD^+ from the TCA cycle. We identified the gene (*ACRS*) confers ACR-toxin sensitivity, and also identified that the mechanism of specificity in plants is alternative transcript processing of the gene conferring ACR-toxin sensitivity



In this study, promoter analysis of gene encoding *ACRS*mRNA binding 30kD protein, identification of components of *ACRS*mRNA processing protein complex, and genomics of the gene cluster of ACR- and ACT-toxin biosynthesis will be performed for elucidation of specificity in plant and microbe interactions.

【Research Methods】

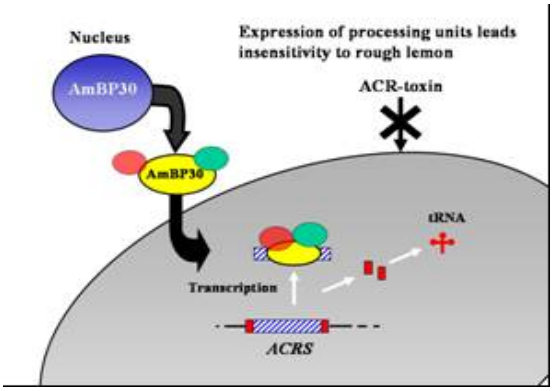
Transcript of gene encoding *ACRS*mRNA binding 30kD protein can be detected in mRNA from ACR-toxin-insensitive cultivars but not from the toxin sensitive cultivar, and thus promoter analysis of this gene in different cultivars will be performed.

The 30kD protein is considered to be a recognition component of the processing protein complex, and thus identification of the entire complex will be performed.

Conditionally dispensable chromosome carrying biosynthesis gene clusters for ACR- and ACT-toxin will be also sequenced.

【Expected Research Achievements and Scientific Significance】

Research purpose of this study is that elucidation of specificity by identification of *ACRS*mRNA processing protein complex as well as gene clusters responsible for the biosynthesis of ACR- and ACT-toxins. Addition of *ACRS*mRNA processing protein complex in the toxin sensitive cultivar might lead resistance against both the toxin and the pathogen producing the toxin in future.



【Publications Relevant to the Project】

・Ohtani K, Yamamoto H, Akimitsu K. (2002) Sensitivity to Alternaria alternata toxin in citrus because of altered mitochondrial RNA processing. Proc Natl Acad Sci USA. 99:2439-2444.

・Miyamoto, Y., et al. (2008) Functional Analysis of a Multicopy Host-Selective ACT-Toxin Biosynthesis Gene in the Tangerine Pathotype of *Alternaria alternata*Using RNA Silencing. Mol Plant Microbe Interac 21:1591-1599.

【Term of Project】 FY2009 - 2013

【Budget Allocation】 82,200 Thousand Yen

【 Homepage Address and Other Contact Information】

http://www.ag.kagawa-u.ac.jp/plantpathology/index.html