UMBI life. science. works.

TECHNOLOGY BRIEF

Plants with Enhanced Pathogen Resistance

The Challenge: Plant diseases caused by various pathogens pose a constant threat to human food security. Identification of naturally evolved plant disease resistance (*R*) genes provides the best way to control plant disease problems. However, utilization of *R* genes to protect plants against pathogens have certain limitations. First, most *R* genes do not function in other plant species (due to "restricted taxonomic functionality"). Second, introgression of *R* genes to commercial cultivars from wild relatives by genetic crossing is a time-consuming process. Third, most *R* genes confer resistance to only one or a few strains of a particular pathogen and resistance is often overcome by pathogens in a short period of time. Recent studies in this field revealed that the signal transduction pathway(s) of *R* genes is highly conserved among different plant species. Therefore, a potential, novel strategy to enhance disease resistance in plants is to identify and manipulate key regulatory components of this conserved signaling pathway(s).

UMBI Solution: In 2001, UMBI scientists discovered a novel type of the plant *R* gene, *RPW8* from *Arabidopsis thaliana*. *RPW8* confers broad-spectrum resistance to powdery mildew pathogens. Recently, the investigators identified a protein phosphatase type 2C as an RPW8-interacting protein. This protein was subsequently shown to be involved in plant defense and thus named "defense-associated protein phosphatase type 2C 1" (DAPP1) . *DAPP1* is a negative regulator of plant defense signaling because down-regulation of this gene results in enhanced disease resistance to a broad range of pathogens. Close homologs of *DAPP1* exist in multiple crop species, thus providing potential opportunities to enhance disease resistance against various pathogens through controlled down-regulation of *DAPP1* homologs in target crop species.

Commercial Applications:

- Plant disease resistance - novel strategy to enhance plant disease resistance by genetic manipulation of *DAPP1* homologous genes

Advantages:

- No externally applied agents
- Enhances resistance to a variety of pathogens

Stage of Development: Tested in transgenic plants

Patent Status: Pending PCT patent application

Licensing Potential: UMBI is seeking non-exclusive and exclusive licensees to all or part of this technology. The UMBI inventors would welcome the opportunity to work with any licensee to further refine or extend the capabilities of this invention.

Inventor & UMBI Reference: Xiao, 04-016

Relevant Publications:

1. Wang W, Devoto A, Turner JG, Xiao S. Expression of the membrane-associated resistance protein RPW8 enhances basal defense against biotrophic pathogens. Mol Plant Microbe Interact. 2007 Aug; 20(8):966-76.
2. Orgil U, Araki H, Tangchaiburana S, Berkey R, Xiao S. Intraspecific genetic variations, fitness cost and benefit of *RPW8*, a disease resistance locus in Arabidopsis thaliana. Genetics. 2007 Aug;176(4):2317-33.
3. Xiao S, Calis O, Patrick E, Zhang G, Charoenwattana P, Muskett P, Parker JE, Turner JG. The atypical resistance gene, *RPW8*, recruits components of basal defence for powdery mildew resistance in Arabidopsis. Plant J. 2005 Apr;42(1):95-110.

Contact Information:

Jonathan Gottlieb, PhD, MBA
Director, Technology Transfer and Commercialization
Office of Research, Innovation & Commercialization

University of Maryland Biotechnology Institute
9600 Gudelsky Drive, Suite 2105L
Rockville MD 20850

Phone: (240) 314-6506
Mobile: (443) 468-9875
Email: gottlieb@umbi.umd.edu
http://www.umbi.org