0203-MU-056 Enhanced resistance to scab by genetic engineering with PR-protein genes.

PI: Muthukrishnan, Subbaratnam; E-mail: smk@ksu.edu
Kansas State University, Department of Biochemistry, Manhattan, KS 66506

Grant #: 59-0790-0-066; $50,000; 1 Year
Research Area: BIO

PROJECT ABSTRACT
(1 Page Limit)

Genes for pathogenesis-related (PR-) proteins are useful tools in enhancing the resistance of plants to pathogen and pest infestations. They have been successfully employed in improving resistance of plants to several fungal pathogens such as *Rhizoctonia solani* and *Fusarium graminearum*. We intend to utilize combinations of these genes for enhancing resistance to wheat scab. The PR-protein group includes biochemically diverse proteins including fungal cell wall hydrolyzing enzymes (e.g. chitinase and ß-1,3-glucanase), inhibitors, peroxidases, oxalate oxidase and membrane permeabilizing proteins (e.g. thaumatin-like protein) and lipid transfer proteins. Genes/cDNAs for several of these proteins have been isolated in our laboratories from fungus-infected rice and wheat plants. We have utilized previously a *tlp* gene to obtain transgenic wheat plants with somewhat improved resistance to scab. Our proposed research is based on the hypothesis that combinations of PR-protein genes will prove to be more effective in controlling scab than single genes. We have generated additional transgenic wheat plants with various combinations of PR-protein genes by biolistic transformation. These combinations include chitinase/glucanase and chitinase/*tlp*. In the past year we have prepared transformation vectors for expression of additional combinations of PR-proteins that will be used in this project to get additional transgenic plants. Regenerated plants will be tested for the presence of the transgenes and their expression by molecular analyses. Homozygous transgenic plants and their progeny with high level expression of multiple PR-proteins will be tested for resistance to the scab pathogen using standard evaluation protocols. Once the specific combinations of PR-proteins that result in maximum protection against scab infection are identified, these transgenic plants will be evaluated in a scab nursery in Kansas for scab resistance. Promising lines will be made available to breeding programs at KSU and elsewhere to generate elite wheat varieties resistant to this devastating pathogen.