

**U.S. Wheat and Barley Scab Initiative  
Annual Progress Report  
September 18, 2000**

**Cover Page**

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<b>Year:</b>	<b>FY2000</b>
<b>Grant Number:</b>	<b>59-0790-0-066</b>
<b>Grant Title:</b>	<b>Fusarium Head Blight Research</b>
<b>Amount Granted:</b>	<b>\$39,024</b>

<b>Program Area</b>	<b>Project Objective</b>	<b>Requested Amount</b>
Biotechnology	Enhance scab resistance in wheat through genetic engineering.	\$64,812.00
	<b>Requested Total</b>	<b>\$64,812.00<sup>1</sup></b>

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Principal Investigator

Date

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<sup>1</sup> Note: The Requested Total and the Amount Granted are not equal.

### **Project 1: Enhance scab resistance in wheat through genetic engineering.**

1. What major problem or issue is being resolved and how are you resolving it?

Scab disease of wheat leads to substantial yield loss every year. We are attempting to reduce the yield loss by genetically increasing the resistance to scab. The specific approach involves the introduction of genes for pathogenesis-related (PR-) proteins in different combinations into wheat by biolistic transformation. We will identify the specific combinations of PR-proteins that are most effective against scab using bioassays of transgenic plants.

1. Please provide a comparison of the actual accomplishments with the objectives established.

Our specific objective 1 was to obtain transgenic wheat plants with high-level constitutive expression of the PR-protein genes, chitinases,  $\alpha$ -1,3-glucanases, and thaumatin-like proteins (TLP's) in various combinations. So far, we have obtained primary transgenic plants with high level expression of a rice chitinase and a rice thaumatin-like protein. Progeny from one of these plants has been studied extensively and found to express both the genes in the T<sub>1</sub> generation. We have also initiated transformation experiments to obtain transgenic wheat plants containing a wheat chitinase gene and a wheat glucanase gene. Several primary transgenic plants containing both the genes have been identified by polymerase chain reaction.

#### Work in Progress

Experiments are in progress to identify plants with the highest level of expression of the different combinations of PR-protein genes.

1. What were the reasons established objectives were not met? If applicable.

We have already made substantial progress and we expect to meet the objectives for the first year.

1. What were the most significant accomplishments this past year?

The most significant progress for the past year is to obtain a large number of transgenic plants with different combinations of PR-protein genes from rice and wheat. Some primary transgenic plants with high level expression have been identified.

Include below a list of the publications, presentations, peer-reviewed articles, and non-peer reviewed articles written about your work that resulted from all of the projects included in the grant. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.

Engineering disease resistance in wheat by cloning defense genes. Anand, A., Zhou, T., Walmsley, R. D., Janakirman, V., Prakash, P., Li, W., Chen, W.P., Sakthivel, N., Gill, B., Shah, J., Trick, H. N., and Muthukrishnan, S. (2000). In Vitro 36: P-1022 Abstract

Isolation and characterization of novel cDNA clones of acidic chitinases and  $\alpha$ -1,3-glucanases from wheat spikes infected by *Fusarium graminearum* Li, W.L., Faris, J.D., Muthukrishnan, S., Liu, D.J., Chen, P.D., Gill, B.S. Theor. Appl. Genet. (in press)