PI: Scofield, Steve **PI's E-mail: scofield@purdue.edu**

Project ID: FY08-SC-115 **FY07 ARS Agreement #: NA**

Research Category: **GDER** **Duration of Award: 1 Year**

Project Title: Functional Dissection of the Pathways contributing to FHB Resistance by Virus-Induced Gene Silencing.

PROJECT 1 ABSTRACT

(1 Page Limit)

In previous work supported by the USWBSI we developed a virus-induced gene silencing (VIGS) system that can be used to rapidly assess whether or not a chosen gene makes a detectable contribution to resistance to Fusarium head blight (FHB) in wheat. Gene silencing is triggered by infecting wheat plants with Barley stripe mosaic virus vectors engineered to carry a 200 – 400 base fragment of transcribed sequence from a candidate wheat gene. In this assay, a gene is determined to contribute to FHB resistance if its silencing results in resistant genotypes becoming susceptible in FHB assays. Several features make this system highly advantageous in wheat: 1. RNA-mediated silencing gene is homology-dependent, so any homeologues that share greater than 85% nucleotide identity will be silenced. This aspect makes it likely that the homeoloci present in wheat will be silenced as well so loss-of-function phenotypes can be observed despite wheat's hexaploidy. 2. Wheat has proven to be very difficult to transform while viral infection is easy and rapid, therefore loss-of-function phenotypes can be generated in as little as one month using this FHB-VIGS system. We have selected a set of 25 candidate genes to screen in the FHB-VIGS assay. The majority of these genes were chosen on the basis of their demonstrated differential expression during FHB interactions. A smaller second group of genes was chosen based on genetic evidence suggesting a possible role in FHB resistance. This work has already given clearly positive results for two genes and we strongly believe that others will be identified as we complete this screening.

Objectives:

1. Complete the screening of these 25 candidate genes.
2. If a validated candidate gene is a component of well-studied biological pathway, we will make use of this knowledge to more fully characterize the role of this pathway in FHB resistance.
3. Isolate full-length cDNAs for any validated candidate genes that will be used to generate transgenic barley plants with FHB resistance.

Relevance of this project to the goals of the US Wheat and Barley Scab Initiative:

This research will directly serve the following goals of the Gene Discovery and Engineered Resistance research program:

1. We will identify genes with functional roles in FHB resistance.
2. The FHB-VIGS assay is an innovative tool that increases the efficiency in identifying genes involved in FHB resistance.
3. **The genes that are identified can be used to engineer improved FHB resistant wheat and barley.**