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FY10 ARS Agreement #: 59-0790-8-060

Research Category: GDER

Duration of Award: 1 Year

Project Title: Targeting Host Defense Mechanism for Enhancing FHB Resistance in Wheat.

PROJECT 1 ABSTRACT

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The long-term goal of this collaborative project is to enhance Fusarium head blight (FHB) resistance in wheat. With previous support from the USWBSI we have utilized *Arabidopsis thaliana* to identify plant genes that are involved in plant defense and susceptibility to *F. graminearum*. In addition, we have identified microbial elicitors that enhance resistance against FHB. We propose to utilize these genes/factors to genetically engineer FHB resistance in wheat. Three strategies will be utilized: (i) The ectopic expression of defense regulatory genes, (ii) targeting non-host resistance mechanism, and (iii) reducing the level of host susceptibility factors.

The specific objectives are:

1. Characterize FHB resistance and mycotoxin accumulation in *AtPAD4* and *AtWRKY18* expressing wheat and in plants co-expressing *AtNPR1* and *AtPAD4*
2. Target non-host resistance mechanism for enhancing FHB resistance
3. Characterize FHB resistance and mycotoxin accumulation in lipoxygenases silenced transgenic wheat lines

These objectives are continuation of the currently funded USWBSI project. As part of objective 1 and 3, promising transgenic lines that have been identified will be evaluated for FHB resistance and toxin accumulation and resistance correlated with transgene expression. In addition, during FY11 existing transgenic lines will be crossed to develop plants coexpressing *AtNPR1* and *AtPAD4*. Under objective 2, transgenic lines expressing genes associated with non-host resistance that will be developed as per the FY10 objectives will be evaluated in FY11 for FHB resistance. .

Our ongoing and proposed projects are relevant to the GDER initiative of USWBSI, by promoting the development of effective FHB resistance through transgenic strategies. Our approach and the genes/mechanisms being targeted complement the activity of other USWBSI sponsored projects.