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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 *Fusarium graminearum*. In addition, we have identified a microbial elicitor-induced process and systemic acquired resistance as effective mechanisms to target for enhancing resistance against *F. graminearum*. We propose to utilize these activators and defense/susceptibility genes to enhance 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 to:

1. Assess the impact of silencing wheat 9-LOX on FHB resistance and mycotoxin accumulation.
2. Analyze impact of promoting flg22-triggered immunity on FHB and mycotoxin in wheat.
3. Assess the impact of constitutive activation of SAR signaling on FHB and mycotoxin in wheat.

Under objective 1, FHB resistance and mycotoxin accumulation will be evaluated in transgenic wheat lines in which expression of wheat 9-lipoxygenase has been silenced. Experiments outlined under objective 2 will study the impact of flg22 expression on FHB resistance and mycotoxin accumulation in wheat. Under objective 3, transgenic wheat that exhibit enhanced FHB resistance in greenhouse studies due to constitutive expression of the SAR regulatory At*NPR1*, At*PAD4* and At*WRKY18* genes will be further tested in the field for FHB resistance and their effect on mycotoxin accumulation. The targeted expression/silencing of these genes/mechanisms are expected to provide novel transgenic strategies for enhancing FHB-resistance in wheat.

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.